J. W. CONNELLY.

UNWRAPPING MECHANISM FOR YARN CHAINS.

APPLICATION FILED JAN. 27, 1911.

1,005,162. **Patented Oct. 10, 1911.**

2 SHEETS—SHEET 1.

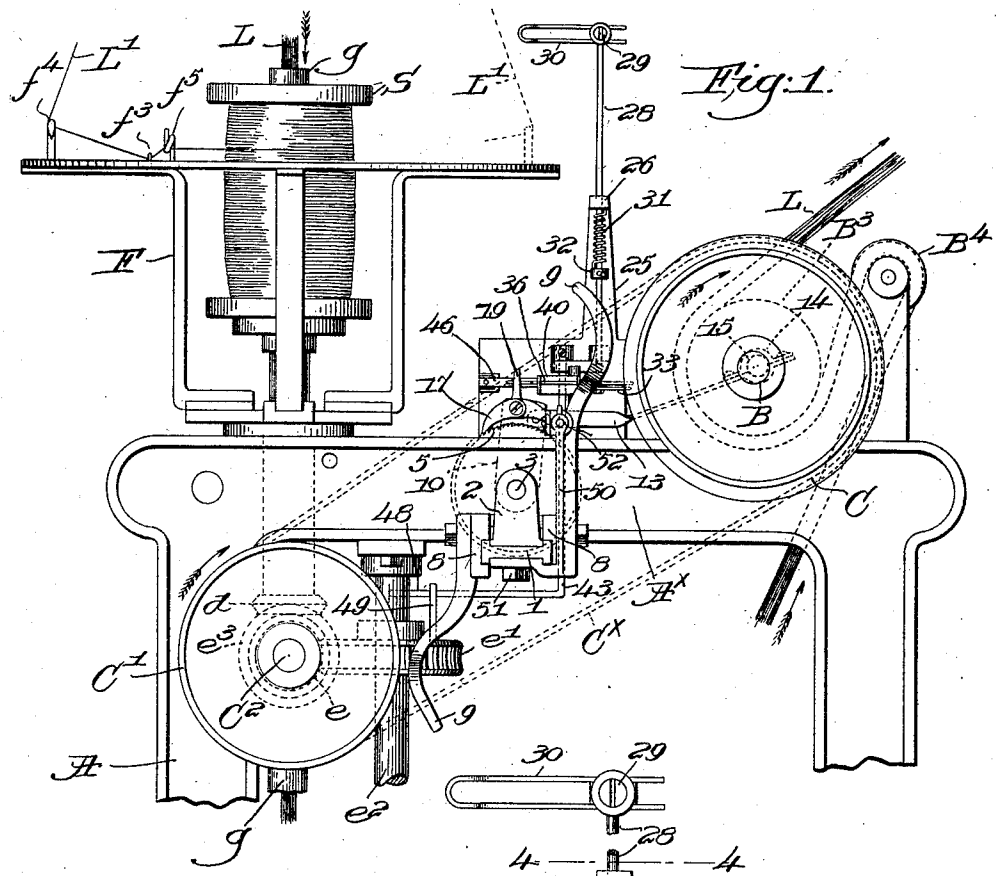

Fig. 1.

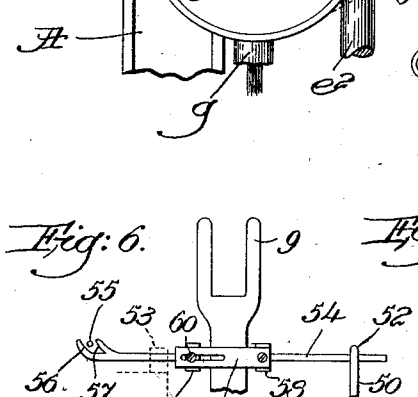

Fig. 6.

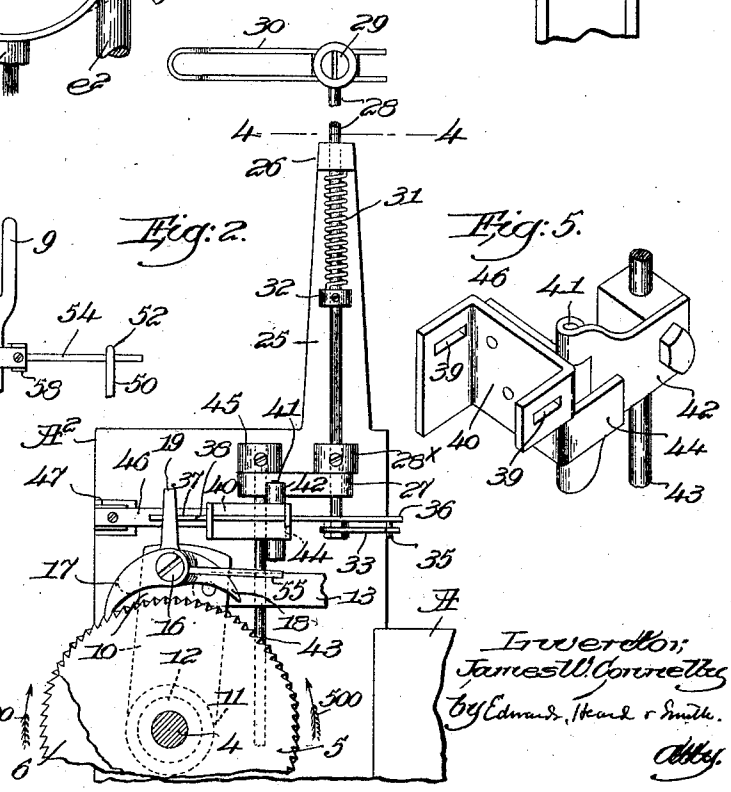

Fig. 2.

Fig. 5.

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2 SHEETS—SHEET 2.

Fig. 3.

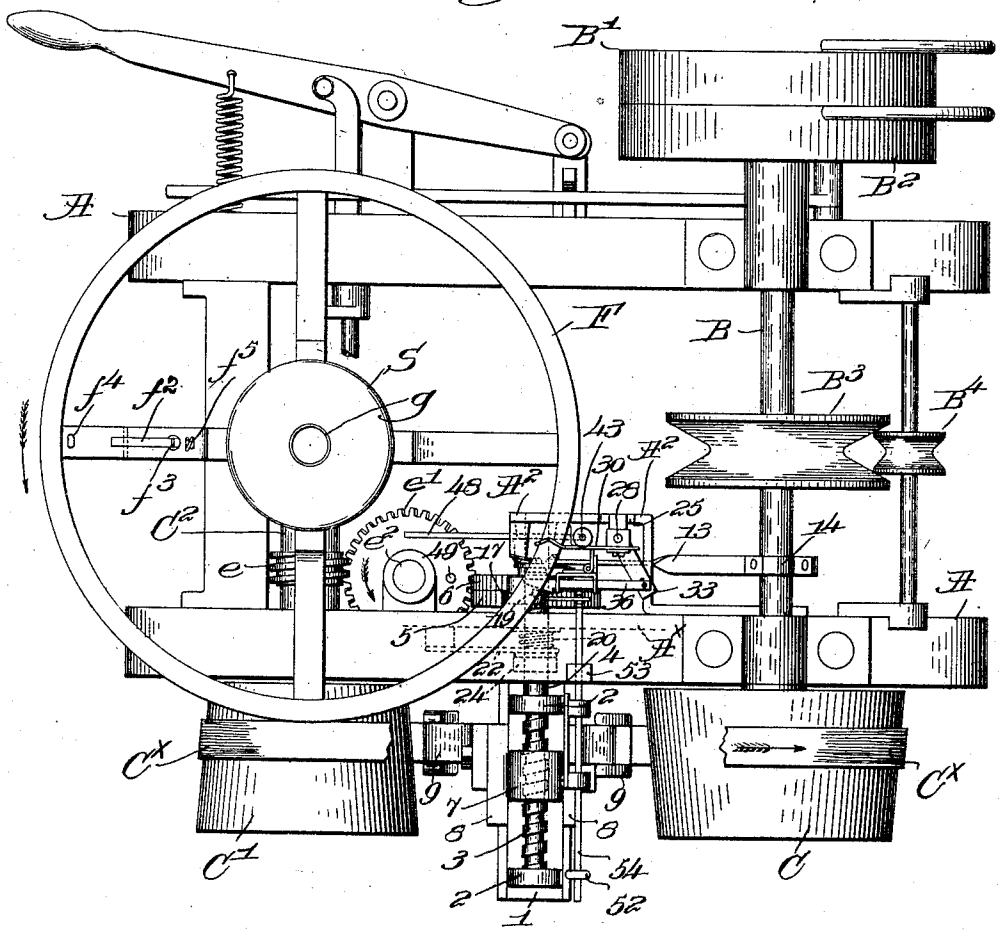
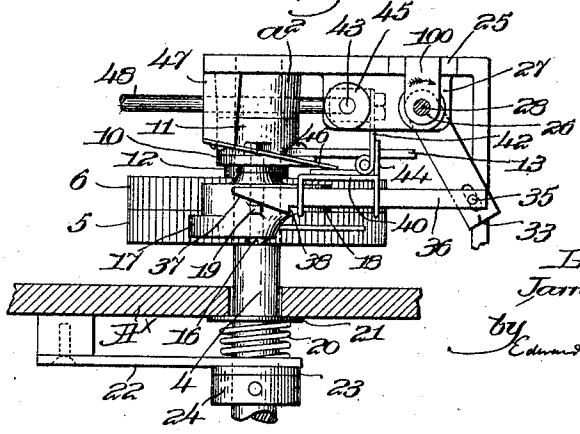


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES W. CONNELLY, OF METHUEN, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

UNWRAPPING MECHANISM FOR YARN-CHAINS.

1,005,162. Specification of Letters Patent. Patented Oct. 10, 1911.

Application filed January 27, 1911. Serial No. 604,954.

To all whom it may concern:

Be it known that I, JAMES W. CONNELLY, a citizen of the United States, and resident of Methuen, county of Essex, State of Massachusetts, have invented an Improvement in Unwrapping Mechanism for Yarn-Chains, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention relates to mechanism for unwrapping from a yarn chain the thread or cord which has been coiled around it during dyeing, bleaching or other processes, and said invention belongs to unwrapping mechanism of the type wherein the ratio between the linear speed of the chain and the rotary speed of the flier is varied automatically by changing the speed of rotation of the flier, the chain speed remaining constant, as in United States Patent No. 732,439 granted June 30, 1903 to Pearce.

It will be understood by those skilled in the art that the proper obtuse angle at which the cord leaves the chain during unwrapping is effected by maintaining the point at which the cord leaves the chain at a considerable distance above the flier, such point in practice constantly rising and falling to a greater or less extent. Herein, if the unwrapping gains unduly upon the chain speed, causing an objectionable rise of the point of departure of the cord, automatically acting means decreases gradually the speed ratio to the normal rate or to a point somewhat below the normal rate, and the point of departure of the cord falls toward the flier. Thereafter, or if such point of departure of the cord descends unduly, the speed ratio is gradually and automatically raised until the normal, or highest practical ratio between the chain and flier speeds, is restored, the speed controlling parts of the mechanism thus serving to balance each other and acting to maintain as nearly as possible the speed ratio at the desired normal This action in the present invention differs from what is disclosed in the Pearce patent, for in the latter when the point of departure of the cord rises unduly the speed ratio is decreased very suddenly, to a point decidedly below the normal rate, and thereupon the speed ratio is gradually raised to the normal rate.

As will appear hereinafter I have obviated any rapid or sudden changes in the speed ratio, and thereby I obviate to a very considerable extent any tendency of the cord to break when a sudden change is made. The cord as it is unwrapped governs the speed ratio automatically and directly, as is the case in the Pearce patent, and my present invention has for its object the production of various improvements in construction, arrangement, and operation, whereby the efficiency of the apparatus is increased, and the various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a side elevation of a sufficient portion of an unwrapping mechanism to be understood, with one form of my present invention embodied therein; Fig. 2 is an enlarged detail in side elevation of some of the parts shown in Fig. 1, the upper part being broken out to save space; Fig. 3 is a top plan view of the mechanism shown in Fig. 1; Fig. 4 is a detail in plan view and partly in section on the line 4—4, Fig. 2, of portions of the apparatus shown in Figs. 2 and 3, to more clearly illustrate the same and the mode of operation thereof; Fig. 5 is a greatly enlarged perspective detail of the movable carrier for the pawl-shifter, to be referred to; Fig. 6 is a detail view of a safety device, to be referred to, the device being shown as if viewed from the left, Fig. 1.

The main frame A, driving shaft B having fast and loose pulleys B′, B², Fig. 3, adapted to be connected by a belt (not shown) with a suitable source of power, the delivery rolls B³, B⁴ around which passes the chain L when unwrapped, the roll B³ being fast on shaft B; the cone-pulley C connected by a shiftable belt C× with and to drive a reverse cone-pulley C′ fast on the worm-shaft C² rotatably mounted in the frame A; the worm *e* on shaft C² engaging a worm-gear *e′* on an upright shaft *e²* suitably supported in the main frame, and a hollow traverse-spindle *g*, may be and are all substantially as in the Pearce patent, the mechanism between the shaft *e²* and said spindle for effecting the vertical traverse of the latter being omitted, as they are in practice the same as in the Pearce patent. As shaft B is driven at a constant speed

shifting of the belt C^x outward will decrease the speed of the shaft C^2, while shifting of said belt inward, Fig. 3, or toward the large end of the cone-pulley C, will increase the speed of the shaft C^2. The wrapped yarn-chain leads downward from a guide-sheave (not shown) above and at some distance from the upper end of the traverse-spindle g, the chain entering the latter after the cord L′ has been unwrapped therefrom, the unwrapped chain passing from the lower end of the spindle to the delivery rolls B^3, B^4, or other usual delivery means, and thence to a "splitter", or any other suitable mechanism, as is customary.

The cord L′ as it is unwrapped by the rotating flier F is wound upon a cord-receiver or spool S on the upper end of the traverse-spindle, as is customary in apparatus of this character. Said flier F has its depending hub rotatably mounted in the frame A loosely surrounding the spindle g, a bevel gear d, see dotted lines Fig. 1, on said hub being driven by a similar and larger gear c^3 on the shaft C^2, as in the patent referred to, the cord L′ passing through guide-eyes f^4, f^5 on the flier and also through the eye f^3 of the latch f^2, Fig. 3, forming a part of the stop-motion, said stop-motion being well known and forming no part of this invention. It may be substantially as in Patent No. 745,993 granted December 8, 1903 to Baxter.

The novel means whereby I effect automatically a change in the ratio between the linear chain speed and the rotative speed of the flier will now be described in detail. A stand 1 fixedly attached to the main frame A projects therefrom between the speed cones C and C′ and also between the upper and lower runs of the belt C^x, said stand having upturned parallel ears 2, 2 which form bearings for a quick-motion screw 3 constituting an actuator for the belt-shifter, said actuator forming an extension of a shaft 4 extended loosely through the side of the main frame, at A^x, Fig. 4. Said shaft at its inner end is supported in a bearing boss a^2, Fig. 4, on a bracket A^2 bolted to the frame-side, and between the latter and the bracket two like but oppositely toothed ratchets 5, 6 are fixedly attached to the shaft side by side. A nut 7 has a threaded hole through which the actuator 3 extends, the nut having depending and oppositely grooved feet 8 which embrace and slide upon the edges of the stand 1 transversely to the path of the belt C^x, rotation of the actuator 3 in one or the other direction sliding the nut in or out. Belt-forks 9 attached to the feet 8 coöperate with the upper and lower runs of the belt C^x, so that when the nut is shifted along the stand 1 the belt will be shifted to increase or decrease the speed of the shaft C^2.

An upturned oscillating pawl-carrier 10 has its hub 11 loosely mounted on the shaft 4 between the bearing a^2 and the hub 12 of the adjacent ratchet 6, the upper end of said carrier being suitably connected with a link 13 which is connected with the strap 14 of an eccentric 15, see dotted lines Fig. 1, fixed on the driving shaft B, so that when the apparatus is running the pawl-carrier will be constantly oscillated upon the shaft 4 as a fulcrum. A lateral stud 16 extended from the pawl-carrier pivotally supports a double or two-way pawl having oppositely acting teeth 17, 18 to coöperate respectively with the ratchets 5, 6, the tooth 17 being made heavier than tooth 18 so that when free to so do the tooth 17 will drop by gravity into coöperative engagement with its ratchet 5, to rotate the latter step by step in the direction of arrow 500, Fig. 2, through the oscillation of the pawl-carrier 10.

When the pawl tooth 18 is in operative engagement with its ratchet 6 the latter will be rotated step by step in the direction of arrow 600, and while one tooth is always absolutely inoperative when the other is operative there is a neutral position for the double pawl in which neither tooth is operative, as will be explained hereinafter. The body of the pawl has an upturned finger 19, for a purpose to be described.

It will be understood that rotation of shaft 4 and the threaded actuator 3 by or through the ratchet 5 and its pawl tooth 17 will move the belt-shifter inward, Fig. 3, to increase the speed of the flier F, and conversely opposite rotation of said actuator, by ratchet 6 and the tooth 18, will move the belt-shifter (the nut 7 and attached forks 9) outward to decrease the speed of the flier.

To prevent overrunning, or improper rotative movement of the shaft 4 I provide a suitable friction device, shown in Fig. 4 as a spring 20 coiled loosely about the shaft and interposed between a washer 21 and a resilient arm 22 fixed at one end on the frame side A^x, a friction pad or washer 23 being interposed between a collar 24, fixed on the shaft, and the adjacent face of the arm. As the friction pad 23 is held yieldingly against the collar 24 by the spring 20 there will be a sufficient drag or retardation exerted upon the shaft 4 to prevent any improper rotative movement or back-lash thereof.

The bracket A^2 has an upright extension 25 provided with vertically alined upper and lower bearings 26, 27 for a rock-shaft or rod 28 which extends some distance above the top of the flier F, Fig. 1, and has adjustably connected with it by a set-screw 29 a laterally extended arm 30 so positioned that normally said arm will not intersect the conical path traversed by the cord L′ between its point of departure from the chain

and the flier, see Fig. 1. This normal position of the arm is maintained by a rather light spiral spring 31 coiled about the rod 28 and attached at one end to the bearing 26, the lower end of said spring being attached to a collar 32 fixed on the rod, the spring being so wound as to resist rotative movement of said rod in the direction of arrow 100, Fig. 4. The lower end of the rod has a radially extended arm 33 fast upon it and longitudinally slotted at 34 to receive a pin 35 depending from the tail end of a flat latch 36 provided with a head having a beveled edge 37 and a shoulder 38, Fig. 4. Normally the edge 37 rests against the finger 19 of the double pawl, as shown in Fig. 4, the latch being mounted for longitudinal sliding movement in seats 39 formed in the opposite ends of a yoke-like latch-carrier 40, Fig. 5, having a vertical pivot or hinge connection at 41 with an arm 42 extended horizontally from and rigidly attached to a vertical rock-shaft 43. As shown in Fig. 5 the latch-carrier is provided with a rearwardly bent ear 44 which serves as a stop when brought into engagement with the arm 42. The rock-shaft 43 is mounted in one end of the bearing 27, Fig. 2, and is held in proper vertical position by a collar 45 fixed on the shaft and resting upon the top of the bearing 27, and the latter also supports a collar $28^{\times}$ fixed on the rod 28, to maintain it in proper position vertically.

A leaf spring 46 fixed on a boss 47 projecting from the bracket A^2 has its free end bearing against the back of the latch-carrier 40 to hold the edge 37 of the latch yieldingly against the pawl finger 19 and also to position the rock-shaft 43 so that its horizontally bent foot 48 will be held in the path of a trip, shown as a pin 49 on the worm-gear e'.

It will be remembered that the pawl-carrier 10 is regularly oscillated from the driving shaft B, so that unless the double pawl is in neutral position one or the other of the ratchets 5, 6 will be rotating the actuator 3 at a slow speed, and first the operation will be considered when the ratchet 5 is the active one, and the flier speed is very gradually increasing. Let it be supposed that the point of departure of the cord L′ has risen so high on the chain L that the whirling cord as it traverses its conical path will hit the arm 30 a quick blow and thereby turn it and the latch-controlling rod 28 in the direction of arrow 100, Fig. 4, against the stress of the spring 31. Thereby the arm 33 slides the latch 36 to the left, the spring 46 yielding, until the shoulder 38 catches the pawl-finger 19 and as the cord whirls on beyond the controller arm 30 the spring 31 expands and turns the rod 28 oppositely to arrow 100, and thereby the latch is drawn to the right, Figs. 3 and 4, rocking the pawl and lifting tooth 17 from the ratchet 5 while depressing the tooth 18 and yieldingly holding it in operative engagement with the ratchet 6 on the right-hand strokes of the pawl-carrier. Manifestly the rotation of actuator 3 will now be effected by said ratchet 6 as the pawl-carrier 10 is oscillated, and as a consequence the nut 7 will be moved outward slowly so that the belt $C^{\times}$ will be shifted to decrease the speed of the flier.

The described engagement of the latch and the pawl-finger also serves at this time to maintain the controller arm 30 out of the path of the whirling cord, and eventually the latch is disengaged automatically from the pawl-finger, such disengagement being effected as follows: The rotation of the worm-gear e' sooner or later causes the trip 49 to engage the foot 48 and turn the rock-shaft 43 in the direction of arrow 100, Fig. 4. Such rotative movement of the shaft swings the latch-carrier 40 inward away from the side $A^{\times}$ of the main frame, retracting the latch-shoulder 38 from the pawl-finger 19, the spring 46 yielding, and when the pawl is thus released the weighted tooth 17 will descend into engagement with its ratchet 5, the tooth 18 being rendered inoperative. When the trip 49 releases the foot 48 the spring 46 will return the latch-carrier, latch, and rock-shaft 43 to normal position, so that the belt-shifter will again be restored to the control of the ratchet 5, the condition illustrated in the drawings.

It may be that the flier speed has not been reduced sufficiently when the ratchet 5 is thus thrown into action, and if that is the case the cord will again act through the controller arm 30 and intervening parts, as previously described, to promptly throw the ratchet 5 out of action while the ratchet 6 is again brought into action to effect the decreased-speed shift of the belt-shifter. On the other hand, while it may be that the ratchet 5 should continue active, the releasing movement of the latch-carrier will be effected once for every revolution of the worm-gear e', but it will not interfere with the coöperation of the ratchet 5 and its pawl-tooth 17, as will be manifest.

While it is not often that either ratchet would continue in operation long enough to force the belt-shifter nut 3 against one or the other of the ears 2 there is the possibility that such action might take place, and in order to prevent injury to any of the parts I have provided an automatic safety device, shown separately in Fig. 6. An L-shaped bar 50 has its foot bolted at 51 to the bottom of the stand 1, the upright stem of the bar having a bearing eye 52 in horizontal alinement with a bearing boss 53 on the main frame, Fig. 3, to support a horizontal slide-rod 54 parallel to the actuator 3 and at about the height of the double pawl, the latter

having extended from it adjacent its pivot 16 a pin 55 which enters loosely between two opposed cam faces 56, 57 on the inner end of the slide-rod. A collar 58 is adjustably set on the latter near the outer side of the upturned fork 9 of the belt-shifter, and near the inner side of the fork a second collar 59 is held in adjusted position by a set-screw 60 and slotted plate 61 attached to collar 58, Fig. 6.

When the ratchet 5 is active the flier speed is being increased and the belt-shifter is moving slowly to the left, Fig. 6, but before the nut 3 is in dangerous proximity to the inner ear 2 the fork 9 will engage collar 59 and will move the slide-rod 54 to the left to bring the cam-face 57 into engagement with the pin 55, depressing said pin and turning the pawl on its pivot 16 until the tooth 17 is disengaged from the ratchet 5, and at the same time tooth 18 will be held inoperative, the pawl then being in neutral position. As the pawl is now inoperative relatively to both ratchets the belt-shifter will remain stationary while the flier F is running at its maximum speed, and thus the tendency of the whirling cord to engage the controller-arm 30 is present. When such engagement does take place the latch 36 is moved into engagement with the finger 19 and thereby the pawl is swung from neutral position and the tooth 18 is brought into engagement with the low-speed ratchet 6, the cam face 57 permitting the corresponding movement of pin 55, and the outward movement of the belt-shifter is instituted to reduce the flier speed.

Should the ratchet 6 continue active long enough to bring the nut 3 dangerously near the outer ear 2 (and this is a very remote possibility) the outwardly moving upper fork 9 will engage the collar 58 and move the slide-rod 54 to the right, Fig. 6, so that the cam-face 56 will engage and lift the pin 55, rocking the pawl enough to disengage the tooth 18 from the ratchet 6, when the pawl is rendered neutral, and thereafter the weight of the tooth 17 will cause it to drop into engagement with ratchet 5 when the trip 49 acts to retract the edge 37 of the latch from the pawl-finger 19, so that inward movement of the belt-shifter will be instituted by the said high-speed ratchet.

While the ratchets 5 and 6 are designated respectively as high and low speed ratchets it is to be understood that the term as used does not refer to the rate of speed of the ratchets themselves, as they are rotated at the same speed, but the term relates to the flier speed, which is increased by the action of ratchet 5 and decreased by the action of ratchet 6.

The desired point of departure of the cord from the chain is determined by adjusting the arm 30 toward or away from the chain, inward adjustment lowering such point and outward adjustment of the arm elevating such point, as will be manifest.

It will now be understood that while a theoretical normal ratio is adapted as the proper one between the chain and flier speeds, for the best results, the practical operation of the apparatus results in frequent changes from such ratio, due to the inevitable variance between the desired and actual point of departure of the cord from the chain, and it is the province of variable-speed mechanism herein described to vary the flier speed when necessary in order to raise or lower the speed ratio to that adopted as a normal one, in order to maintain such point of departure of the cord as nearly as possible at the desired height above the flier.

In the ordinary operation of the apparatus herein described one or the other of the ratchets is in action practically all of the time, and the flier speed is varied by small increments, rather than by a sudden variation in one direction and a slow and more gradual variation in the opposite direction, as in the Pearce structure. I find in practice that a highly efficient and very uniform operation of the apparatus is secured by the mechanism herein set forth, with very little trouble from breakage of the cord.

Various changes or modifications in different details of construction and arrangement may be made by those skilled in the art without departing from the spirit and scope of my invention as set forth in the claims hereunto annexed.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In apparatus for unwrapping longitudinally moving yarn-chains, a cord-receiver, means to unwrap the cord from the moving chain and wind it upon the receiver, variable speed mechanism to actuate said unwrapping means, controlling means for said mechanism, including high and low speed ratchets, a continually oscillating double pawl, to actuate one or the other ratchet but in opposite directions, to increase or decrease the speed of the unwrapping means, and a device to effect coöperation of the low speed ratchet and said pawl when the unwrapping of the cord gains unduly upon the movement of the chain.

2. In apparatus for unwrapping yarn-chains, a cord-receiver through which the chain travels as unwrapped, means to unwrap the cord and wind it upon the receiver, mechanism, including oppositely acting members to increase or decrease the speed of said unwrapping means, respectively, a common actuating device for said members, and means controlled by the cord when the unwrapping gains unduly upon the movement of the chain to disconnect the actuating de-

vice from the member which increases the speed and effect its coöperation with the member which decreases the speed.

3. In apparatus for unwrapping yarn-chains, a cord-receiver through which the chain travels as unwrapped, means to unwrap the cord and wind it upon the receiver, and mechanism set in action by the cord to decrease the speed of said means, combined with an instrumentality operating at regularly recurring intervals while the apparatus is in motion to stop such action of said mechanism.

4. In apparatus for unwrapping yarn-chains, a cord-receiver through which the chain travels as unwrapped, means to unwrap the cord and wind it upon the receiver, mechanism, including a common actuating device, to increase or decrease automatically the speed of the unwrapping means, an instrumentality controlled by the cord to render said actuating device operative to bring about the decreased speed of the unwrapping means, and a separate instrumentality operating at regular intervals and adapted at any one of its regular operations to render the actuating device operative to effect an increase in the speed of said unwrapping means.

5. In apparatus for unwrapping yarn-chains, a cord-receiver, means to unwrap the cord from the longitudinally moving chain and wind it upon the receiver, mechanism, including speed-changing cones and a shiftable connecting belt, to drive the unwrapping means, means, including two oppositely rotatable members and a common actuating device, to shift automatically the belt to increase or decrease the speed of the unwrapping means, an instrumentality controlled by the cord to effect the coöperation of the actuating device and one of said members to shift the belt and decrease the speed of the unwrapping means, and a separate instrumentality to insure coöperation of the other member and the actuating device at regularly recurring intervals, to shift the belt and increase the speed of the unwrapping means.

6. In apparatus for unwrapping yarn-chains, a cord-receiver, means to unwrap the cord from the longitudinally moving chain and wind it upon the receiver, mechanism, including speed-changing cones and a shiftable connecting belt, to drive the unwrapping means, belt-shifting means, including a rotatable shaft and two oppositely acting ratchets fast thereon, and a continually oscillating double pawl to effect step-by-step rotation of either ratchet and thereby shift the belt to increase or decrease the speed of the unwrapping means, an instrumentality to effect coöperation of the pawl and speed reducing ratchet when the unwrapping gains unduly upon the speed of the chain, and means to effect coöperation of said pawl and the speed increasing ratchet at predetermined intervals.

7. In apparatus for unwrapping yarn-chains, a cord-receiver, means to unwrap the cord from longitudinally moving chain and wind it upon the receiver, mechanism including speed-changing cones and a connecting belt, to drive the unwrapping means, a belt-shifter having a nut, a threaded shaft coöperating therewith and having two attached and oppositely-toothed ratchets, a continually oscillating pawl having separate teeth to coöperate with said ratchets singly, one ratchet rotating the shaft to cause the belt-shifter to effect increased speed, and the other ratchet rotating said shaft oppositely to effect decreased speed, of the unwrapping means, an instrumentality to effect coöperation of a pawl tooth and the speed reducing ratchet when the unwrapping gains unduly upon the chain speed, and a separate instrumentality to disconnect said pawl tooth and ratchet and effect coöperation of the other pawl tooth with the speed increasing ratchet.

8. In apparatus for unwrapping yarn-chains, a cord-receiver, rotary means to unwrap the cord from the moving chain and wind it upon the receiver, and mechanism to vary automatically and gradually the ratio between the speed of the chain and of said unwrapping means, said mechanism including an oscillating carrier having a double pawl pivoted thereon, and two fixedly connected, oppositely toothed ratchets to be driven one at a time by coöperation with the pawl, combined with an instrumentality governed by the cord to effect cooperation between the pawl and one of the ratchets, to gradually decrease the speed of the unwrapping means, and a separate instrumentality to disengage said pawl and ratchet at regularly recurring intervals, said pawl when so disengaged being moved automatically into coöperation with the other ratchet to gradually increase the speed of the unwrapping means.

9. In apparatus for unwrapping yarn-chains, a cord-receiver, rotary means to unwrap the cord from the moving chain and wind it upon the receiver, and mechanism to vary automatically and gradually the ratio between the speed of the chain and of said unwrapping means, said mechanism including an oscillating carrier having a double pawl pivoted thereon, and two fixedly connected, oppositely toothed ratchets to be driven one at a time by coöperation with the pawl, combined with an instrumentality, including a latch, to engage the pawl and effect coöperation thereof with the speed reducing ratchet when the unwrapping gains unduly upon chain speed, and a separate instrumentality to release the pawl from said latch, the disengaged pawl being

thereupon moved by gravity into coöperation with the speed increasing ratchet.

10. In apparatus for unwrapping yarn-chains, a cord-receiver through which the chain travels as unwrapped, means to unwrap the cord and wind it upon the receiver, mechanism, including a common actuating device, to increase or decrease automatically the speed of the unwrapping means, an instrumentality to effect a decrease of speed, through said actuating device, when the unwrapping gains unduly upon the chain speed, a separate instrumentality to render said device operative to increase the speed of the unwrapping means, and safety means to prevent an undue increase or decrease in the speed of such unwrapping means.

11. In apparatus for unwrapping yarn-chains, a cord-receiver through which the chain travels as unwrapped, a positively-driven flier to unwrap the cord and wind it upon the receiver, means to gradually decrease the speed of the flier, means to gradually increase the speed of the flier, a common actuating device for said means, and an instrumentality controlled by the cord to effect temporary coöperation of said actuating device with the means for decreasing the flier speed when the unwrapping gains unduly, combined with an instrumentality to effect coöperation of said actuating device and the means for increasing the flier speed after each temporary decrease in its speed.

12. In apparatus for unwrapping yarn-chains, a cord-receiver through which the chain travels as unwrapped, a positively-driven flier to unwrap the cord and wind it upon the receiver, variable-speed mechanism, including oppositely acting ratchets and a tilting, double-acting operating pawl therefor, to change the ratio between the linear speed of the chain and the rotative speed of the flier, said pawl being moved by gravity into coöperation with the speed increasing ratchet, and means controlled by the cord to tilt the pawl into temporary engagement with and to actuate the speed decreasing ratchet when the unwrapping gains unduly upon the chain speed.

13. In apparatus for unwrapping yarn-chains, a cord-receiver through which the chain travels as unwrapped, a positively-driven flier to unwrap the cord and wind it upon the receiver, variable-speed mechanism, including oppositely acting ratchets and a tilting, double-acting operating pawl therefor, to change the ratio between the linear speed of the chain and the rotative speed of the flier, said pawl being moved by gravity into coöperation with the speed increasing ratchet, a latch rendered operative by the cord to coöperate with and tilt said pawl into coöperation with the speed decreasing ratchet when the unwrapping gains unduly upon the chain speed, a pivoted carrier in which the latch is slidably mounted, and means acting at regular intervals to swing said carrier and release the pawl from the latch if said parts are in abnormal engagement, the pawl when so released returning by gravity to coöperation with the speed increasing ratchet.

14. In apparatus for unwrapping yarn-chains, a cord-receiver through which the chain travels as unwrapped, means to unwrap the cord and wind it upon the receiver, and mechanism to decrease automatically the speed of said unwrapping means, said mechanism including an upright rock-shaft, and a controller arm, mounted on said rock-shaft and adjustable thereon toward or from the chain to thereby determine the desired point of departure of the cord from the chain, an undue rise in such point of departure causing the cord to strike and swing laterally the controller arm to turn the rock-shaft and thereby set said mechanism in action.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JAMES W. CONNELLY.

Witnesses:

HENRY A. ASHWORTH,

JOHN S. POWELL.