Nov. 17, 1942. W. F. ASTLEY 2,302,093

TAKEUP MECHANISM FOR LOOMS

Original Filed Feb. 10, 1940 2 Sheets-Sheet 1

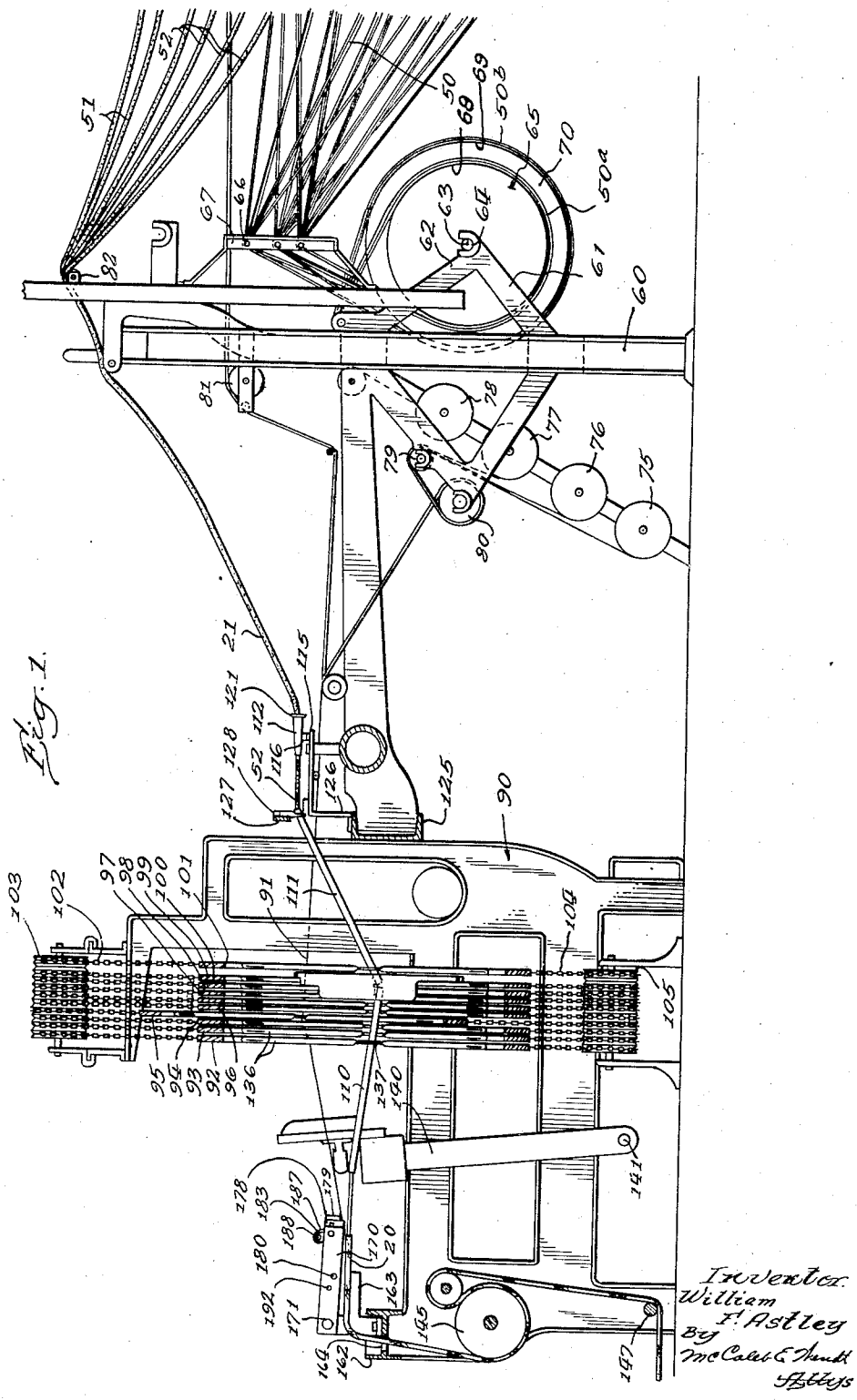


Fig. 1.

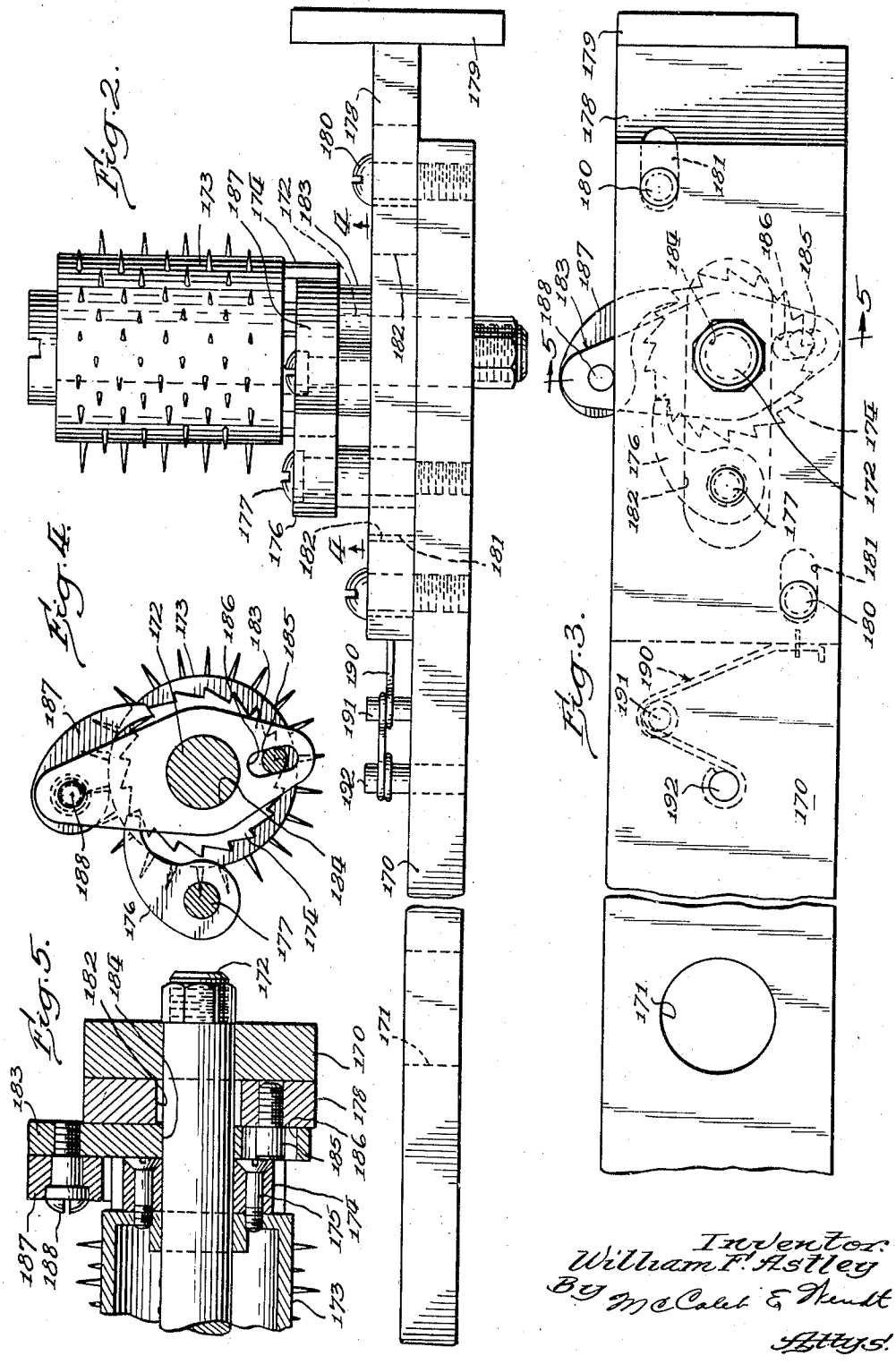
Inventor
William F. Astley
By McCaul & Smith
Attys

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TAKEUP MECHANISM FOR LOOMS

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Inventor
William F. Astley
By McCaleb & Hendt
Attys.

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2,302,093

TAKEUP MECHANISM FOR LOOMS

William F. Astley, Cicero, Ill., assignor to Union Asbestos & Rubber Company, Chicago, Ill., a corporation of Illinois

Original application February 10, 1940, Serial No. 318,228. Divided and this application September 23, 1940, Serial No. 357,902

4 Claims. (Cl. 139—305)

The present invention relates to takeup mechanism for looms, and is particularly concerned with takeup mechanism for a loom adapted to make insulating tape of the type having a woven sheath and a filler of asbestos fibers.

One of the objects of the invention is the provision of an improved takeup mechanism whereby one of the sides of the woven sheath of such an insulating tape may be made of greater length so that when the sheath is wrapped around a pipe the outer side of the sheath has a greater length required for extending about the periphery of the pipe without compressing the filling of the tape. The inner layer and the outer layer of such a sheath when wrapped around a pipe are at different radii, and the outer layer should therefore be of greater length. This is accomplished by a machine constructed according to the invention by providing warp threads for the outer layer of the sheath of greater length and by using a takeup mechanism constructed according to the invention for constantly withdrawing this outer layer of the sheath from the loom at a faster rate than the remainder of the sheath.

Another object of the invention is the provision of an improved takeup mechanism which is sturdy, simple, capable of being applied to various types of looms, and adapted to be manufactured at a low cost.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference are used throughout the several views.

Referring to the two sheets of drawings accompanying this specification,

Fig. 1 is a side elevational view of a loom constructed according to the invention and equipped with a takeup mechanism adapted to provide the sheath of the insulating tape with a longer outer wall;

Fig. 2 is a top plan view of the takeup mechanism shown apart from the machine;

Fig. 3 is a side elevational view of the takeup mechanism;

Fig. 4 is a sectional view taken on the plane of the line **4—4** of Fig. 2 and looking in the direction of the arrows; and

Fig. 5 is a fragmentary sectional view taken on the plane of the line **5—5** of Fig. 3 and looking in the direction of the arrows.

The present application is a division of my prior application Serial No. 318,228, filed February 10, 1940, Methods and apparatus for weaving insulating materials, and the present invention relates specifically to one of the forms of the takeup mechanism forming a part of said apparatus.

The insulating tape made according to the present methods and apparatus is covered by my prior application Serial No. 300,104, filed October 19, 1939, for improvements in Heat insulating tape and methods of manufacture.

This tape comprises a woven sheath of tubular form and a plurality of large loose soft rovings of asbestos fibers, the fibers being preferably embraced by one or more spirally extending threads and having one or more asbestos threads included as a core.

One of the distinguishing characteristics of the insulating tape made by the present machine when equipped with the feed mechanism is that the outer wall of the sheath is longer, as evidenced by a puckered condition which is illustrated in my prior application on the tape Serial No. 300,104.

This puckered condition actually represents a greater length in the woven fabric at the outer wall of the sheath, and is included for the reason that the outer wall of the sheath is disposed at a greater radius from the center of a pipe than the inner wall when the tape is wrapped on the pipe. This being the condition, the outer wall will not be under such great tension in the tape made by the present machine as it will be in the devices of the prior art, where both walls, inner and outer, of the sheath are of the same length.

The tape made by this machine will, therefore, tend to maintain its filler in a loose, fluffy condition, instead of tending to compress the filler when a tape is wrapped about a pipe.

Referring to Fig. 1, this is an elevational view of a loom or weaving machine which utilizes a takeup mechanism constructed according to the invention. The same numerals are used in the drawings as in the parent case, in order to maintain a clear connection with the parent case, although a great many numerals employed in the parent application will be omitted, due to the fact that they relate to elements not forming a part of the present takeup mechanism.

The weaving machine preferably comprises a framework which may consist of suitable vertically extending frame members **60** joined by horizontal frame members, and having rearwardly extending diagonal frame members **61** and **62** with an open bearing **63** for supporting a trunnion **64** of a feed drum **65**.

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The feed drum 65 extends across the back of the machine and is adapted to be rotated at a suitable speed for feeding the warp strands to the machine in proper relative length. For example, the warp strands 50 coming from suitable spools may extend over supporting dowels 66 carried by the frame members 67, and extend thence down about the drum 65. The drum 65 has two cylindrical portions 68 of the same diameter, and a central cylindrical portion 69 of a larger diameter. These cylindrical portions are preferably separated by intervening flanges 70, and the warp strands wound about these portions respectively may be identified by numerals 50*a*, 50*b*. The warp strands 50*b* wound about the central larger cylindrical drum portion 69 are those warp strands which are to be used for the upper and outside portion of the sheath of the tape. The warp strands 50*a* are those wound about the drum portions 68 of reduced diameter, and are for weaving the rest of the sheath, comprising the edges, and inside wall of the sheath when it is wrapped on the pipe.

All of these drum portions are fixedly secured and rotate together, and therefore the warp strands 50*b* for the outer wall of the tape sheath are fed at a greater rate, and are necessarily longer, than the rest of the warp strands in the sheath. The purpose of this is to increase the length of the sheath at its outer diameter when it is applied to the pipe so that the outer wall of the sheath, when it is applied to the pipe will not be so tightly tensioned as it otherwise would be, and it will not tend to compress the large, loose soft members which are used as a filler.

The insulating value of the assembly is enhanced by maintaining the filler in its most loose and soft condition, due to the insulating value of the air in the interstices between the fibers. It is this extra length of the outer wall of the sheath which results in what may be called a crimped or puckered appearance in the outer wall of the sheath. The amount of crimp depends somewhat upon the thickness of the filler, as the crimp is intended to supply the extra peripheral length for the outer wall of the sheath, which is rendered necessary by the location of this wall at a greater radius from the center of the pipe.

Insulating tapes have been constructed with from twenty-two percent to twenty-four percent of crimp, and other thinner tapes with approximately sixteen percent of crimp. The amount of crimp can readily be calculated by calculating the theoretical circumference of the insulated pipe assembly at the outer wall of the sheath and at the inner wall, as will be evident to one skilled in the art.

In addition to the supports for the warp strands the frame members 60 may support a plurality of suitable idler rolls 75—80 and the machine is also provided with suitable supports for the insulating filler members 51 which pass over the rollers 82 into a condensing tube 112. The machine also comprises a suitable frame 90 which provides support for heddles for controlling the warp strands and forming the shed 91, through which the shuttle moves in the weaving of the tubular sheath. The loom is in many respects similar to the construction of ordinary weaving looms, and therefore only the additional structures or points of difference will be described in detail. The heddles, some of which are indicated by the numerals 92—101, may be supported from the top by means of suitable metal chains 102, passing over pulleys 103; and similarly, at the bottom, by chains 104, passing over pulleys 105.

Like the other looms of the prior art, the heddles are actuated by means of a suitable cam or cams (not shown) for the purpose of moving the warp strands back and forth in between each of the movements of the shuttle which passes through the shed 91.

As this part of the loom is like the devices of the prior art in respect to the warp threads, and as the shuttle structure is likewise similar to the devices of the prior art, they will not be described in detail.

Certain of the heddles, however, such as for example, numbers 92 and 101, are adapted to control the movements of a plurality of tubular metal members 110, 111 which are adapted to support, move and protect the insulating filler members 21 as they progress past the heddles, and are placed in predetermined position within the sheath as it is woven.

The condensing member 112 comprises a tube with a bell shaped end 121 for receiving the insulating filler members 21 and guiding them and shaping them. From the shaping members 112 the filler strands pass into the tubular members 111 which are pivotally supported by frame members 127 and pintle brackets 128. Tubular members 111 are pivotally joined to tubular members 110, and the ends of the tubular members 110 are located to discharge the filler members 21 at the point where the sheath is being woven. The reed of the loom is carried by a movably mounted member 140, which is pivoted at 141, and all of the tubular members 110 extend through the reed, which is relatively deep and coarse. If it were not for the guiding and protecting tubes 110, 111, the filler, which comprises large, loose soft members of asbestos fibers, would be torn to pieces by the heddles and reeds.

20 indicates the woven and filled sheath as it emerges from the loom at the left of Fig. 1, and it is at this point that the loom is provided with a takeup mechanism preferably constructed as shown in detail in Figs. 2 to 5. 162 indicates a support for an angular guide 163, over which the insulating tape passes as it is directed through the aperture 164 to pass about a driven feed roll 145 and thence to other parts of the machine for applying a waterproof coating, or to a roll by means of which the tape is coiled.

Various types of takeup mechanism may be utilized, such as the one shown in the parent application, which operates at a regular rate of speed continuously, or the one which is the subject of the present application, which operates step by step. This takeup mechanism is pivotally mounted on the frame at 171 by means of an arm 170, comprising an elongated bar of metal.

In this embodiment the supporting plate 170 is again provided with a shaft 172 fixedly secured thereto and rotatably supporting a toothed metal drum 173.

The toothed metal drum has secured thereto a ratchet wheel 174 by means of the screw bolts 175, and the ratchet wheel is adapted to actuate the drum. The plate 170 carries a retaining pawl 176, which is rotatably mounted on a screw bolt 177 that is threaded into the plate 170.

The pawl 176 is urged into engagement with the ratchet by reason of its weight, the pawl being disposed in the position of Fig. 4, where its

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free end tends to pivot downward into engagement with the ratchet at all times.

In order to actuate the ratchet wheel 174, the plate 170 slidably supports a second or sliding plate 178, having a transversely extending plate 179 secured thereto to be used as a shoulder that is engaged by a part of the reed 140.

The plate 178 is slidably mounted by means of a pair of screw bolts 180, which pass through the slots 181, and are threaded into the plate 170. The plate 178 has an elongated and enlarged slot 182 surounding the shaft 172 and the stud bolt 177 carried by the plate 170.

An actuating lever 183 is pivotally mounted between its ends on the shaft 172, by means of an aperture 184. At its lower end it is pivotally mounted on a pin or screw bolt 185, which is carried by the plate 178 (see Fig. 5), and the bolt 185 is located in a slot 186 in the lever 183. At its upper end the lever 183 carries a driving pawl 187 by means of a screw bolt 188 fixedly secured to the plate and pivotally supporting the pawl 187.

It will be observed that the pawl 187 is also urged into engagement with the ratchet by gravity.

The operation of this type of puckering mechanism for the sheath is as follows: Each time that the lay or reed 140 moves toward the left in Fig. 1, it engages the member 179 and causes the plate 178 to slide toward the left in Fig. 2 and Fig. 3. This causes the lever 183 to move pivotally in a clockwise direction from the position illustrated in Figs. 3 and 4, under the action of the pin 186 on the lever 187, and moves the pawl 187 to the right. The pawl 187 acting on the ratchet 174 moves the toothed take-up roller 173, to which the ratchet is connected, in a clockwise direction. This causes the side of the tape having the longer warp threads, which is engaged by the teeth of the roller 173, to be advanced at a faster rate than the other side of the tape with its shorter warp threads. The layer of tape with the shorter warp threads governs the speed of withdrawal of the tape in accordance with the weaving rate, and the rate of movement of the take-up mechanism is, therefore, sufficiently faster than the weaving rate of the tape to compensate for the increased length of the longer warp threads, and to keep the longer warp thread side puckered up to the length of the short side, and thereby additionally to maintain proper withdrawing tension on the longer warp threads.

During the above described first half of the cycle of the take-up mechanism the spring 190 is compressed by the movement of the slide 178. Upon release of the member 179 on a return movement of the lay 140, the spring 190 moves the slide 178 to the right, and reverses the action of the pin 186, lever 183 and pawl 187, to move the pawl leftward from the position of Fig. 3 and take a new bite on a tooth of the ratchet 174. The pawl 176 holds the ratchet against counterclockwise movement during this second half of the cycle.

The toothed drum 173 withdraws from the loom the outer wall of the sheath having the long warp threads at a greater speed than the opposite or short warp side of the tape, and causes a puckering of the outer wall which is actually a greater length of fabric in that wall.

Thus, the insulating tape may be made according to the present method and by the present machine is adapted to have its outer wall proportioned in length to the increased periphery which is necessary to such a wall when the tape is wound about a pipe.

The present takeup mechanism may be moved out of operative position by merely pivoting the arm 170 upwardly on the pivot 171 and supporting the toothed drum 173 out of engagement with the tape. It is sturdy and simple, and being actuated by the reed or lay 140, it may be applied to any loom with a minimum amount of change of structure of the loom.

Insulating tape manufactured by a loom having takeup mechanism of the present type is adapted to be applied to a pipe by spiral wrapping with a minimum amount of stretching of the outer wall and a minimum amount of compression of the large, loose and soft filling, which should be maintained in this condition for a maxmium heat insulating value.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A take-up mechanism for a loom adapted to weave insulating tape of the type having a tubular insulating sheath, and a fibrous filler, comprising an arm pivoted to said support and extending longitudinally of the tape as it is discharged from said loom, a shaft carried by said arm, a toothed roller carried by said shaft and rotatably mounted thereon, the teeth of said roller being of sufficient length to penetrate one side of the sheath, said arm and roller resting on the woven tape by gravity, an actuating member comprising a bar slidably mounted on guides on said arm, and having an end portion adapted to be engaged by the lay, a ratchet wheel secured to said toothed roller, a holding pawl carried by said arm and engaging said ratchet wheel, and a second pawl adapted to be actuated by said actuating member to advance said ratchet wheel step by step upon engagement of the lay with said actuating member to effect a positive withdrawal of the outer wall of the tape and to produce a wavy or puckered condition in said outer wall.

2. A take-up mechanism for a loom adapted to weave insulating tape of the type having a tubular insulating sheath, and a fibrous filler, comprising an arm pivoted to said support and extending longitudinally of the tape as it is discharged from said loom, a shaft carried by said arm, a toothed roller carried by said shaft and rotatably mounted thereon, the teeth of said roller being of sufficient length to penetrate one side of the sheath, said arm and roller resting on the woven tape by gravity, an actuating member comprising a bar slidably mounted on guides on said arm, and having an end portion adapted to be engaged by the lay, a ratchet wheel secured to said toothed roller, a holding pawl carried by said arm and engaging said ratchet wheel, and a second pawl adapted to be actuated by said actuating member to advance said ratchet wheel step by step upon engagement of the lay with said actuating member to effect a postitive withdrawal of the outer wall of the tape and to produce a wavy or puckered condition in said outer wall, said second pawl being carried by a lever adapted to oscillate on said shaft, said lever being actuated by said actuating member.

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3. A take-up mechanism for a loom adapted to weave insulating tape of the type having a tubular insulating sheath, and a fibrous filler, comprising an arm pivoted to said support and extending longitudinally of the tape as it is discharged from said loom, a shaft carried by said arm, a toothed roller carried by said shaft and rotatably mounted thereon, the teeth of said roller being of sufficient length to penetrate one side of the sheath, said arm and roller resting on the woven tape by gravity, an actuating member comprising a bar slidably mounted on guides on said arm, and having an end portion adapted to be engaged by the lay, a ratchet wheel secured to said toothed roller, a holding pawl carried by said arm and engaging said ratchet wheel, and a second pawl adapted to be actuated by said actuating member to advance said ratchet wheel step by step upon engagement of the lay with said actuating member to effect a positive withdrawal of the outer wall of the tape and to produce a wavy or puckered condition in said outer wall, said second pawl being carried by a lever adapted to oscillate on said shaft, said lever being actuated by said actuating member through the engagement of a pin carried by said actuating member in a slot of said lever.

4. A take-up mechanism for a loom adapted to weave insulating tape of the type having a tubular insulating sheath, and a fibrous filler, comprising an arm pivoted to said support and extending longitudinally of the tape as it is discharged from said loom, a shaft carried by said arm, a toothed roller carried by said shaft and rotatably mounted thereon, the teeth of said roller being of sufficient length to penetrate one side of the sheath, said arm and roller resting on the woven tape by gravity, an actuating member comprising a bar slidably mounted on guides on said arm, and having an end portion adapted to be engaged by the lay, a ratchet wheel secured to said toothed roller, a holding pawl carried by said arm and engaging said ratchet wheel, and a second pawl adapted to be actuated by said actuating member to advance said ratchet wheel step by step upon engagement of the lay with said actuating member to effect a positive withdrawal of the outer wall of the tape and to produce a wavy or puckered condition in said outer wall, said second pawl being carried by a lever adapted to oscillate on said shaft, said lever being actuated by said actuating member through the engagement of a pin carried by said actuating member in a slot of said lever, and spring actuated means for urging said actuating member in a direction to cause said second pawl to move to a new actuating position on said ratchet wheel.

WILLIAM F. ASTLEY.

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