Sept. 24, 1946. L. M. COTCHETT 2,408,135

YARN WINDING MACHINE

Original Filed Jan. 19, 1943 4 Sheets-Sheet 1

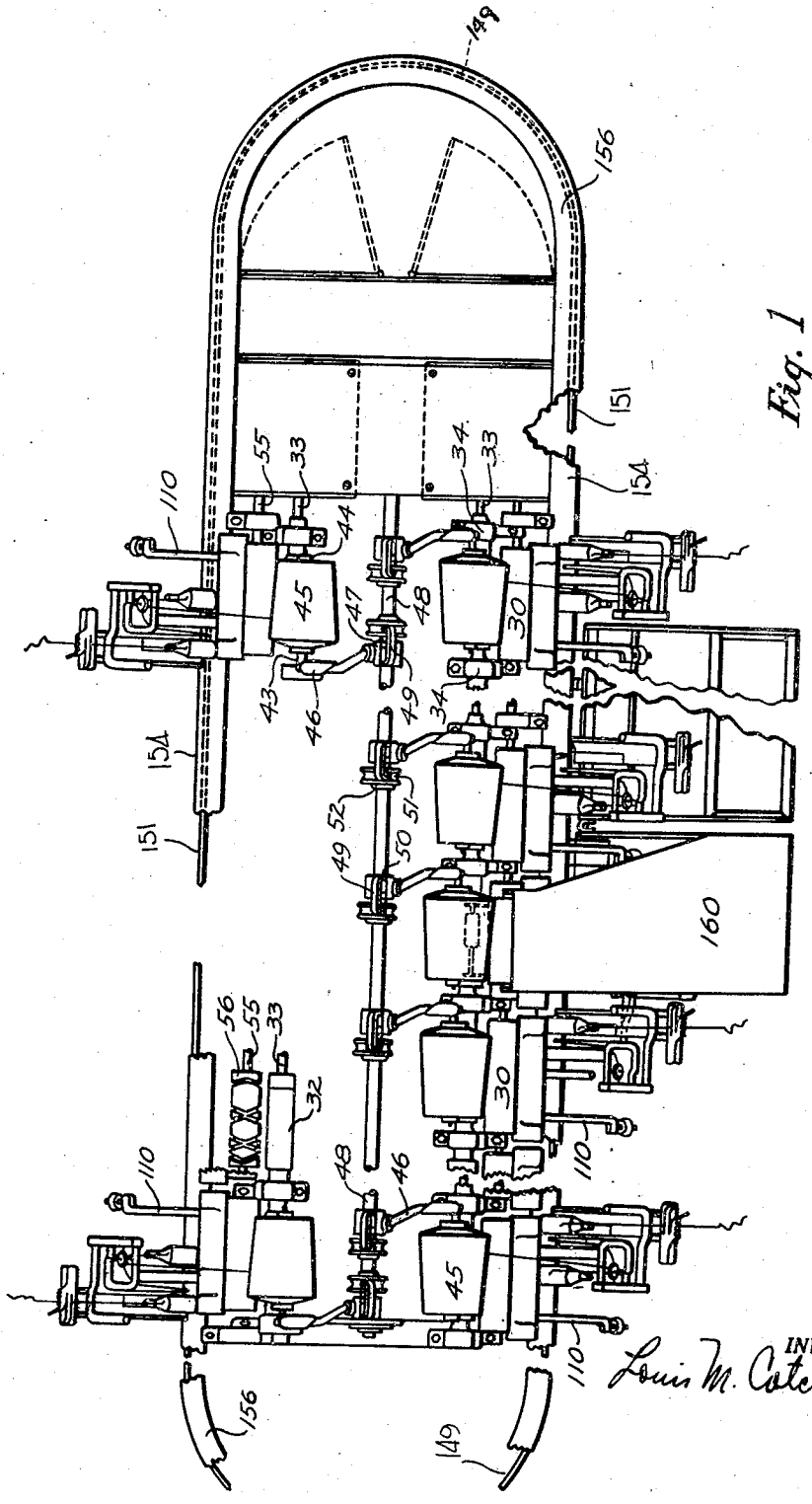


Fig. 1

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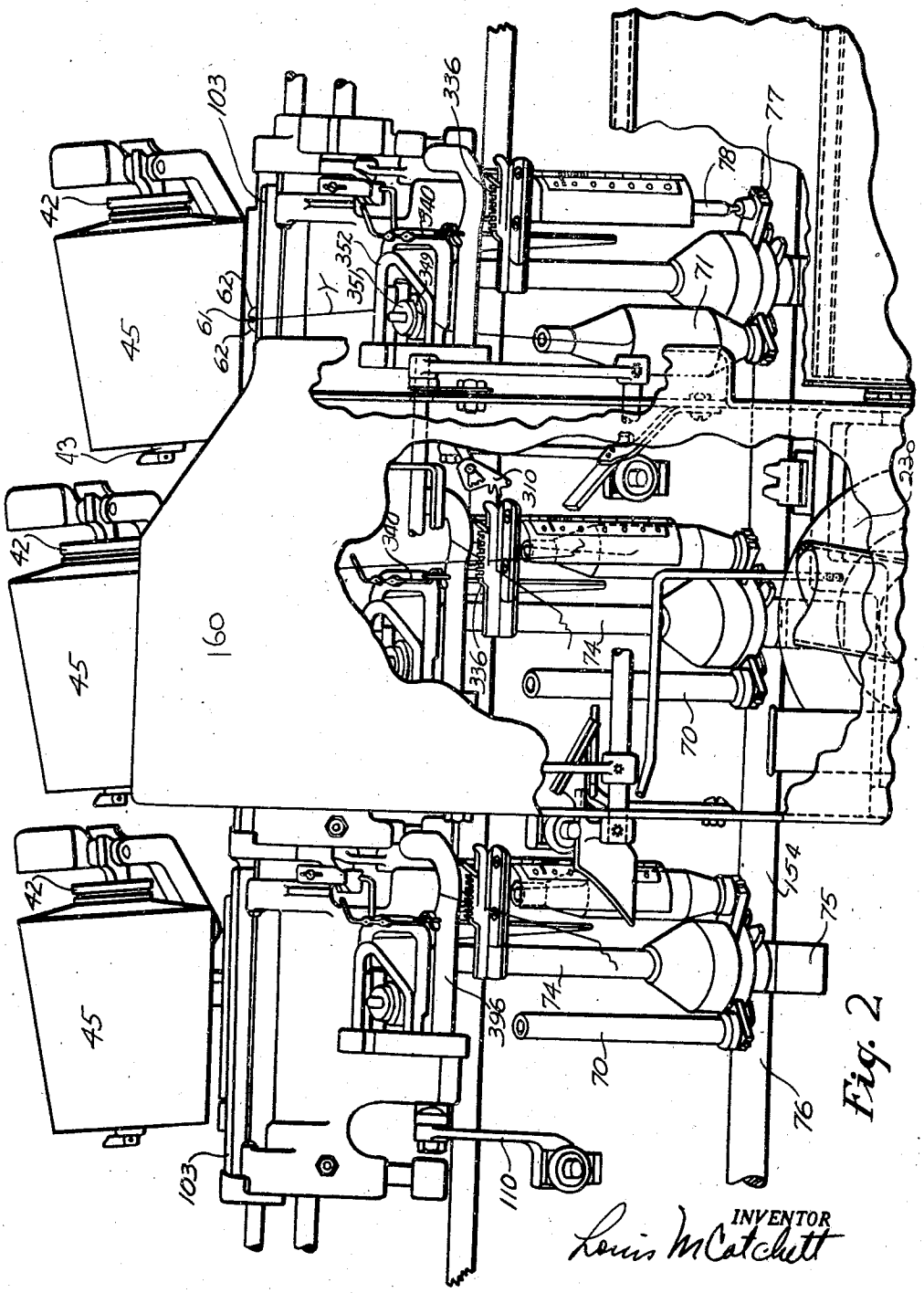


Fig. 2

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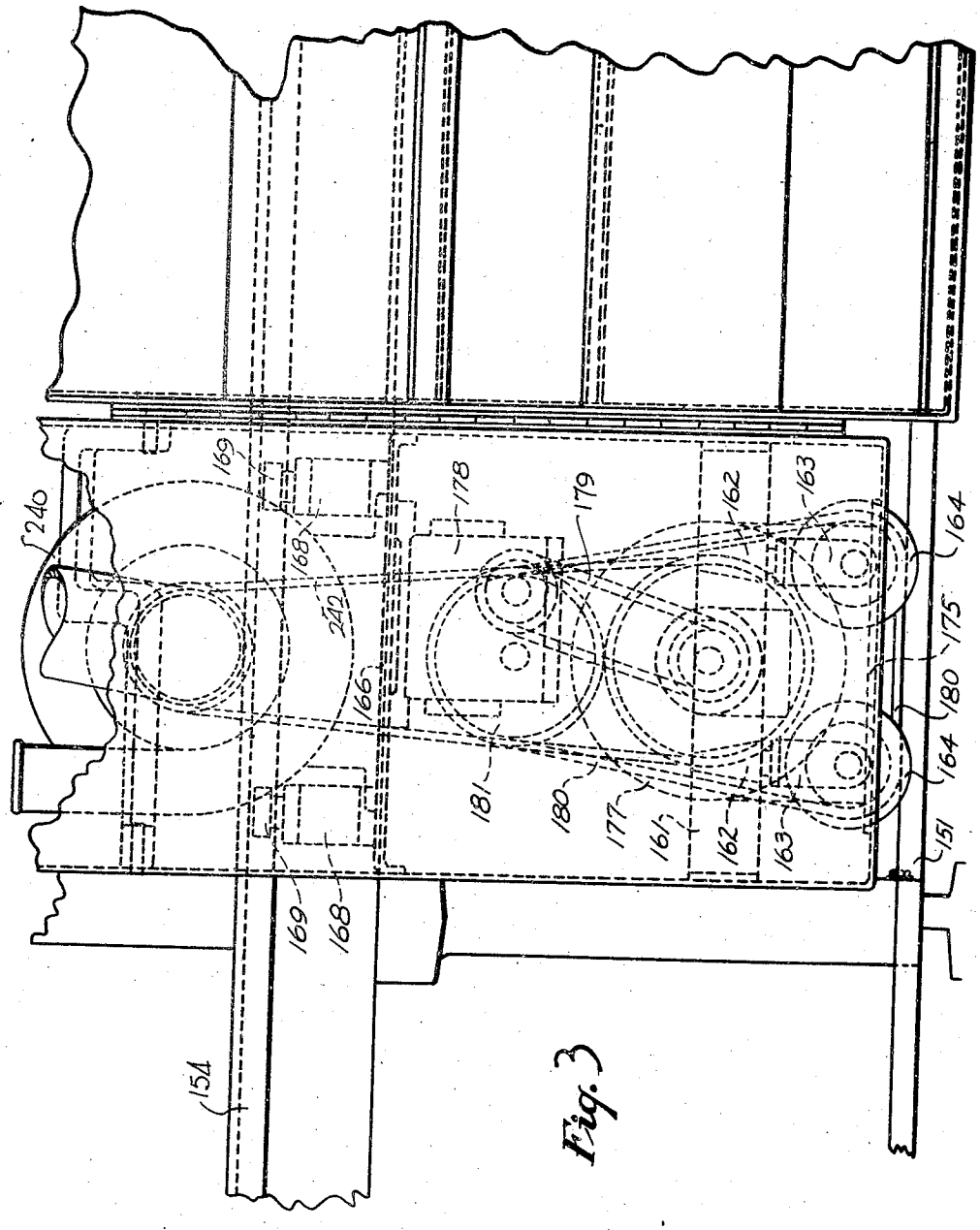


Fig. 3

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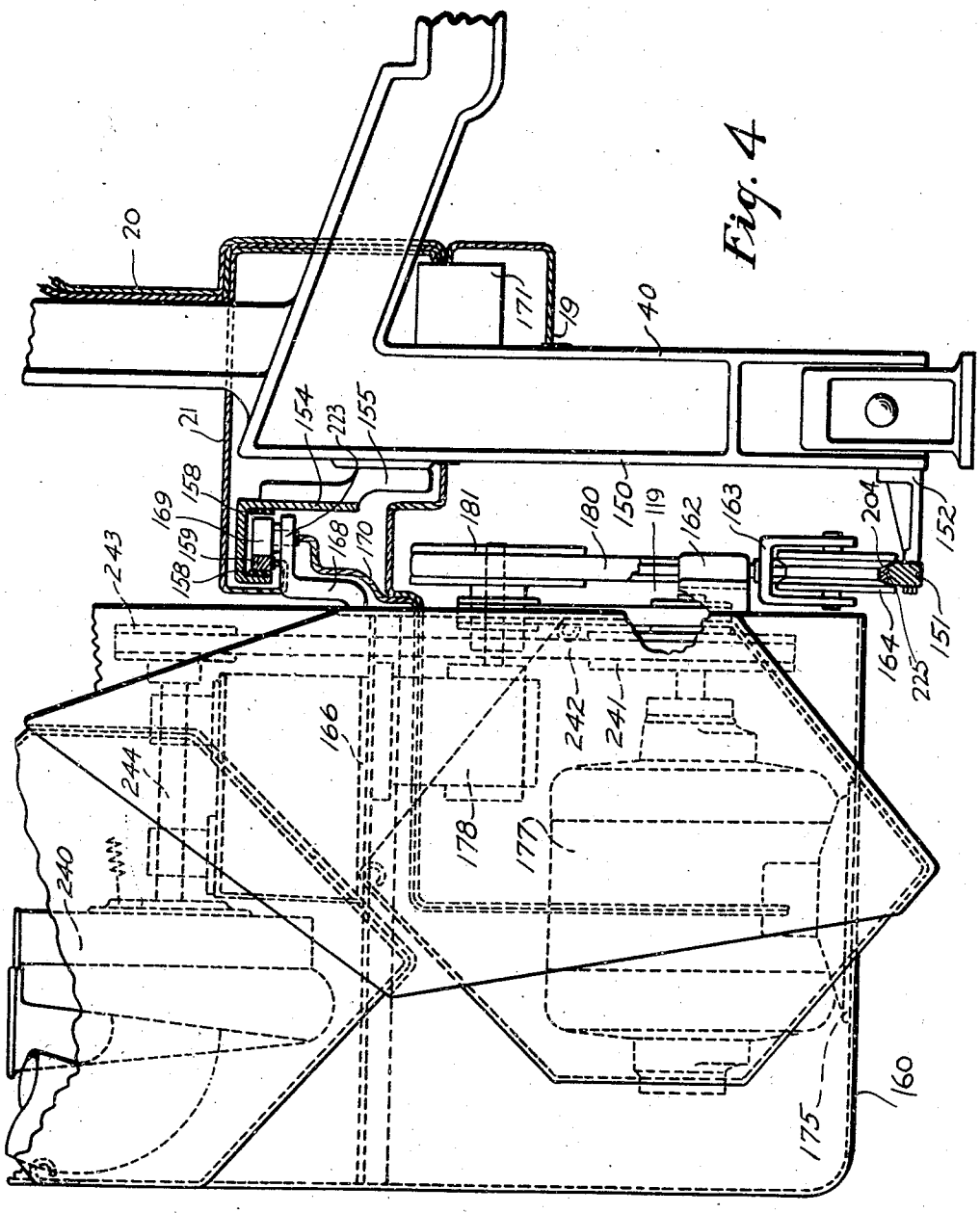
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YARN WINDING MACHINE

Original Filed Jan. 19, 1943 4 Sheets-Sheet 4

Fig. 4



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UNITED STATES PATENT OFFICE

2,408,135

YARN WINDING MACHINE

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Original application January 19, 1943, Serial No. 472,862. Divided and this application November 16, 1943, Serial No. 510,471

6 Claims. (Cl. 242—35.6)

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The present invention relates to new and useful improvements in winding machines and more particularly to novel and useful improvements for multi-unit yarn winders to render same semi-automatic.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

Of the drawings:

Fig. 1 is a plan view of a multi-unit winding machine including a typical and illustrative embodiment of the present invention and showing the preferred form thereof;

Fig. 2 is a fragmentary side elevation of some of the winding units of the machine and showing the tender according to this invention, the upper portion only being shown;

Fig. 3 is the lower portion of the side elevation shown in Fig. 2; and

Fig. 4 shows the lower portion of the multi-unit machine in a vertical section of a part thereof as illustrating the tender and driving means therefor in accordance with this invention.

The general object of the present invention is to provide means in a multi-unit yarn winding machine to render the various operations semi-automatic.

More particularly, it is an object of the present invention to provide a moving tender for servicing a plurality of units of a multi-unit winding machine.

A further object of the invention is to provide traction means for a moving tender servicing a multi-unit winding machine which are safe, of simple construction and efficient.

In the preferred embodiment of the invention, herein disclosed, the invention is illustratively applied to a multi-unit winding machine having a plurality of surface driven winding units arranged in a continuous series, each winding unit comprising a constantly rotating driving roll, a pivoted arm carrying a package core receiving spindle or shaft which can be lowered to bring the core into driving relation to the roll so that yarn or other filamentous material is wound on the package by the rotation of the roll and core. Usual yarn guide means are traversed back and

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forth across the surface of the package to wind the yarn properly on the core.

The winding units are preferably identical and may be divided into two groups of about fifty each, the two groups facing in opposite directions, while the driving rolls for each group are alined, mounted on and driven by a common shaft, each of the two group shafts being suitably driven at the desired winding speed.

Adjacent each of the winding units is provided a support for a yarn supply mass, such as a bobbin or bobbins, from which yarn is supplied through suitable tension mechanism to the package being wound.

As is usual in multi-unit winding machines, each unit is adapted to go through a cycle of operations for the purpose of obtaining a controlled winding of the yarn or like material on the package.

The instrumentalities for each unit may be separately operable for that unit or in some instances may be common to the units and adapted to be periodically actuated.

Thus, in the illustrated embodiment, the winding machine may have, for the various units, suitable means such as tension controlling means, means to associate ends of yarn together, knotting means to unite the yarn ends, blowing and suction means and the like, some of these being illustrated but not specifically described in that they form no part of the instant invention.

Cooperating with the several winding units in succession, and moving relatively to them is a tender, and, in accordance with the present invention, means are provided for moving the tender past the several winding units which are preferably fixed with reference to the machine frame. The tender is supported by and moves on a trackway, which trackway preferably extends along the multi-unit winding machine near its base and forms an endless track having two straight portions parallel to each other, one at either side of the machine, these straight portions being connected at the ends by curved track portions which provide an endless path, of generally oblong shape.

As embodied, on the tender and near its lower portions is provided a motor which is drivingly connected with traction devices carried by the tender and engaging the trackway. Conventionally, the traction devices may be a belt supported by pulleys, the belt resting on one member of the trackway, and connected through variable ratio gearing to the motor so that the speed of travel of the tender past the winding units

may be varied at will and adjusted to size of the supply package and speed of winding of the yarn or other filamentous material being wound (which is the duration of exhaustion), or the speed of the operative in handling the bobbin, or the most efficient combination of these factors.

In accordance with this invention, the traction motor receives its power from a bus bar extending along and optionally forming part of the trackway, the return circuit being grounded, and power is supplied at an inherently safe voltage so that no hazard is created in case the operative's body should short-circuit the power supply. Preferably the voltage is in the neighborhood of twenty-five volts, and this may be derived from a step-down transformer or otherwise.

Thus, in the instant invention, the tender is moved safely and easily by the various units of the machine and is thus in a position to service the various units in any desired manner, the traction means using a minimum of energy for the work done and having complete variability of speed to accomplish the greatest possible utility in connection with the units of the machine.

It will be understood that the foregoing general description and the following detailed description as well are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now in detail to the accompanying drawings which show the present preferred embodiment of the invention, there is provided a multi-unit winding machine having a plurality of winding units 30 arranged in two parallel alined series facing in opposite directions with the back sides of the winding units of one series adjacent to the back sides of the winding units of the other series.

These winding units are of substantially conventional construction and each comprises a driving roll 32 carried and driven by shaft 33 which is rotatably journalled in bearings 34, all of the rolls 32 for a given series being mounted on a single shaft 33, each shaft 33 of each of the two series is driven by a suitable motor.

For rotatably supporting the core 44 on which the package 45 is to be wound, there is provided a suitable core 42 which is freely rotatable on a spindle 43 pivotally supported in the end of an arm 46 which is rotatably mounted by means of collar 47 on a shaft 48, extending from one end of the machine to the other, the arms 46 being held against easy movement by a heavy spring 49 fast to the collar 47 and having a rolled end 50 which rides in the groove 51 of collar 52 fast to the shaft 48. The arms 46 for each series of winding units are mounted on the common shaft 48, but extend therefrom in opposite directions, and hold the cone spindle 43 at such an angle that substantially full contact may be established between the package core 44 and the driving roll 32, thereby rotating the package core by frictional contact with its surface to wind yarn on the package.

Means are provided for traversing the yarn throughout the desired distance on the package core and for this purpose a cylindrical traverse cam is mounted adjacent to the driving roll 32 and in parallelism therewith, the traverse cams for all of the winding units of each series being mounted on and driven by a common shaft 55 which is driven from a suitable motor provided with means to automatically recurrently vary the speed of cam shaft 55. The traverse cam and thread guide are of conventional construction and comprise a thread guide having a central thread guiding slot 61 and curved sides 62 supported to be reciprocated in a controlled varied timed relation to the rotation of shaft 33 by means of the usual cam groove in the cylindrical cam 56 on shaft 55. Thus as the package is rotated by the driving roll 32, yarn Y (Fig. 2) is traversed back and forth along the length of the package core by the thread guide to lay it on the package in uniform layers.

The yarn supplied for winding is illustratively carried on bobbins 70 which are tubular and have a mass of yarn 71 thereon, being shown as the type of bobbin which would be produced by conventional spinning machines. These bobbins are supported on movable bobbin supports, which comprise a shaft 74 projecting in a generally upwardly direction from a bracket 75 fixed to and supported along the lower part of the machine frame 40 by a bar 76. A bobbin receiving pin 78 which loosely projects into the tubular portion of the bobbin, extends from an arm 77 on shaft 74, several arms 77 being provided, if desired, to permit mounting of a reserve supply bobbin. The yarn Y as it is drawn from supply bobbin 71 to yarn package 45 passes through a suitable tensioning means 349, 351, 352, thence over a guide bar 103 and is led into groove 61 of guide 62.

Instrumentalities acting upon the units in succession may be carried by the tender 160, if desired, during its passage around the machine. For example, a knotter 310 of usual construction may be supported on the tender and operated upon assembled yarn ends from the package 45 and supply bobbin 71 to tie these ends. A hook 336 with clamps thereon may hold the ends of the yarn awaiting assembly, the yarn from the supply bobbin 71 being held over a finger 396 attached to the frame and located adjacent each supply group 75, 77.

Inasmuch as the knotter 310 must be supported on the tender in a position to be as shock proof and stable as possible, it will be noted that the spacing between the rails 151 and 154 which support the travelling tender is much greater than the distance between the upper rail 154 and the knotter 310. This is clearly illustrated in Figure 2 of the drawings and results in a stable construction for the knotter and one which is not greatly influenced by irregularities of the two rails, whereby causing constant knotting operations of uniform efficiency even at the relatively high speed of knotting of successive ends as the tender travels by the packages.

A starting handle 110 for each unit is arranged to control the winding onto the package 45.

As more clearly shown in Fig. 4, and in accordance with one feature of the present invention, on the lower portion of the machine frame 40, and preferably on the outermost uprights 150, is mounted a lower rail 151 supported by brackets 152 and an upper rail or channel 154 supported by brackets 155, the rails 151 and 154 being substantially parallel to each other and spaced a considerable vertical distance apart. The rails 151 and 154 extend along one side of the winding machine, and curve gradually to meet another straight section of each rail extending along the other side of the winding machine, and a second curved section of both rails is provided at the other end to form a closed double trackway.

Both the rails 151 and 154 are preferably horizontal, and the curved end portions 156 are preferably semi-circular and spaced sufficiently from the ends of the winding machine to provide ample

room for turning of the travelling tender, as shown in the plan view, Fig. 1, with respect to rail 154 and end pieces 156, and rail 151 with end pieces 149.

The lower rail 151 is preferably relatively narrow on its upper face while the upper rail 154 is a bent section having its channel opening downwardly and provided on its inner surface with insulating material 158 extending along the inner side surfaces of the rail 154, the insulation 158 on one side supporting a conductor 159 or bus bar through which it and the rail 151 current is supplied to power the tender from the main supply conductors 20, through conductor 21.

The tender 160 comprises a support member 161 from which downwardly extend two caster stud yokes 163 in each of which is rotatably journalled on a horizontal axis a pulley 164, these pulleys being alined to ride on the rail 151. Above the support member 161 is a plate 166 from which upwardly extend two spaced apart follower arms 168, at the inner and upper ends of each of which is rotatably mounted roller 169, both rollers 169 being received within the channel of rail 154, and bearing against the bus bar 159.

Power is supplied to the motor from the rail 151 through the pulleys 164 which are grounded with respect to the tender frame, and the circuit is completed through the rollers 169 which are connected to the motor by conductor 170, the follower arms 168 being insulated from the tender frame.

In order to permit the rails 151 and 159 to be relatively exposed, and at the same time provide safety for the operative and equipment, the current supplied to the motor through these rails is preferably at a relatively low and inherently safe voltage, for example, twenty-four volts, and the current is supplied from the mains to these conductors through a suitable step-down transformer 171, one side of the output of which is connected to frame 40, as at 19, and the other side to roller 169 through conductor 21, the main supply being connected to the input side of the transformer by means of conductors 20.

Supported on a bed plate 175, forming the lower part of the tender, is a traction motor 177 which drives the traction pulleys 164 through variable speed reduction gearing 178 and belts 179, 180. Belt 180 runs under both pulleys 164, and over the driving pulley 181, and its lower horizontal reach is in contact with the upper surface of rail 151 so as to assist in the movement of the tender along the rails by direct frictional contact.

Each of the caster stud yokes 163 is preferably adjustably mounted in a bracket block 162 on the support member 161, so that their relative vertical position may be varied to accurately adjust and level the tender on the rail.

As power is supplied to the motor, the tender is moved continuously around the two series of winding machines, and its speed is such that it preferably completes each trip around the machine in approximately the same time as is required for the normal wind of one of the supply bobbins. While these times are preferably substantially equal, some advantage, in many cases, is realized through having the tender make its complete trip in a slightly longer time than is required for the winding off of the average bobbin, thereby assuring when the tender approaches a particular winding unit, the respective active bobbin has been completely exhausted.

To this end, the reduction gear 178 is of any

usual form of adjustable ratio drive so that the speed of the tender around the units may be increased or decreased within close tolerances. A suitable blower or a suction device may also be carried by the tender and may utilize the same motor as that used for traction, this blower or the suction device, helping to free the ends of yarn of the packages for assembly with yarn ends from the supply. For this purpose there is provided a centrifugal blower 240 which is mounted on and carried by the tender and is driven at high speed from the motor 177 through a pulley 241, a belt 242, pulley 243 and shaft 244, the speed of the blower being sufficient to develop a rather high velocity of air.

It will be clear from the description hereinbefore given that the arrangement of rails and roller connections thereto is such that the tender may be a substantially vertical frame adapted to carry any desired instrumentalities, equipment, or replenishments, without any great frictional drag or like factor which might render the use of a self-propelled tender uneconomical in practice. To this end, it will be seen from Fig. 4 particularly, the rollers 169, which will be preferably mounted on an anti-friction bearing 223 move in the channel formed by the shaped upper rail 154 and bear against a portion of the insulation 158 through block 159. Thus, the tendency of the vertically supported tender 160 to pivot outwardly on rails 151 is mitigated while the contact of rollers 169 against block 159 is a substantially non-friction smooth contact which will permit easy movements of the rollers 169 along the trackway formed by rails 151 and 154, under urge of the traction drive.

In like manner, the wheels 164 will be suitably mounted in the yokes 163 in anti-friction bearings 206 to permit a free movement of wheels 164 on rail 151. As previously mentioned, the belt 180 is preferably used not only as a means for driving wheels 164 to cause them to propel the tender on its trackway, but also acts as a direct propulsion means by contacting the surface of rail 151 between wheels 164 thus helping in the movements of the tender. Accordingly, the belt 180 preferably will be specially shaped and prepared on its outer surface to give the greatest efficiency of drive.

The wheels 164 are, for example, substantially V shaped pulleys having the flanges thereof embrace and contact the sides of rail 151, as at 204.

The section of belt 180, shown at 225 in the V portion of a wheel 164, shows that this belt 180 will be of V shape also, being equivalent in contour to the shape of the pulleys 164 and has one flat face so arranged as to directly contact rail 151 as shown.

This contacting surface of the belt 180 will preferably be patterned or roughened to give better frictional contact with the upper face of rail 151.

Thus, a self-propelled tender is provided having the minimum of factors of inefficiency and the maximum of ease of movement whereby the traction motor may be relatively of small power contributing to both economy of operation and of weight of the machine as a whole.

The operation of the illustrated embodiment may be summarized as follows:

Assuming that the several winding units 30 are operating normally with motors 36 driving the roll shafts 33 and the cam shafts 55. The travelling tender 160 is moving around the group of winding units 30 by operation of its driving mo-

tor 177 which actuates the traction pulleys 164 engaging the rail 151 while the power is supplied to the motor and the tender is held in proper vertical position by means of the rollers 169 and the power rail 159. The blower 240, if used, is at the same time driven continuously by the motor 177.

Most of the winding units, except a few in front of the tender, are still winding in the normal manner but certain of the winding units have stopped winding due to exhaustion of the yarn supply mass or breakage of the yarn.

In its circuit around the group of winding units, the tender moving at a substantially constant speed approaches a winding unit which is still winding in the normal manner, and passes by idly.

However, when the tender approaches a winding unit 30 which has stopped for any reason it is in a position to act by its movements to re-establish winding, either automatically by suitable instrumentalities or semi-automatically by an operative.

The resumption of winding having been accomplished causes the yarn to be pulled free from the knotter and over the finger 340 which is thereby swung to insert the yarn into proper position in the tension and slubbing mechanism with the knot beyond the slubbing device.

After resumption of winding the tender continues movement to the next winding unit, and the operations are repeated on that unit if the unit has been stopped by exhaustion or breakage of the yarn, but in case the unit is winding the tender unit passes idly by the winding unit.

When the packages have been built to the proper size, the operative individually removes them as they become full, thereby preventing overwinding of the packages. Also as the operative follows the tender, she may replenish the empty bobbin supporting pins, or remove the partially exhausted bobbins and replace them on the empty bobbin pins, as well as remove the doffed bobbins from the bobbin pins utilizing means carried by the tender for such replenishment which are moved along with it.

This application is a division of copending application Serial No. 472,862, filed January 19, 1943.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

1. In a multi-unit winding machine, the combination of a trackway passing a plurality of winding units and below the units, a tender movable on the trackway, a track engaging traction device on the tender and a motor carried in the lower portion of the tender for driving the traction device to move the tender, said traction device including a pair of pulleys riding upon a part of said trackway and a belt connecting said pulleys and a driving pulley driven by said motor, said belt having one face in frictional contact with part of said trackway.

2. In a multi-unit winding machine, the combination of a trackway passing a plurality of winding units and below the units, a tender movable on the trackway, a track engaging traction device on the tender, a motor carried in the lower portion of the tender for driving the traction device to move the tender, and variable ratio gearing between the motor and traction device, said traction device including a pair of pulleys riding upon a part of said trackway and a belt connecting said pulleys and a driving pulley driven by said motor, said belt having one face in frictional contact with part of said trackway.

3. In a multi-unit winding machine, the combination of a travelling tender movable past the packages being wound, a trackway on which the tender moves, a motor driven blower carried by the tender and connected to be applied to a position close to a package and a traction device driven from the blower motor for driving the tender on the trackway, said traction device including a pair of pulleys riding upon a part of said trackway and a belt connecting said pulleys and a driving pulley driven by said motor, said belt having one face in frictional contact with part of said trackway.

4. In a multi-unit winding machine, the combination of a continuous trackway passing around and below a plurality of winding units and a self-propelled tender adapted to be moved by a prime mover past said units continuously in one direction, on said trackway by traction means contacting said track, said traction means including a belt driven from said prime mover and acting in frictional contact with a part of the trackway to propel the tender along the trackway.

5. In a multi-unit winding machine, the combination of a travelling tender movable past the package being wound, a knotter carried by said tender, a trackway including a pair of spaced tracks on which the tender moves, a motor mounted on and driving the tender on the trackway and power supplying means connected to the motor including a conductor extending along the trackway and a contact carried by the tender, said knotter being spaced from the nearest of said tracks a distance less than the space between said tracks.

6. In a multi-unit winding machine, the combination of a trackway passing a plurality of winding means and below the units, a tender movable on the track and including a knotter, a track engaging traction device on the tender and a motor carried in the lower portion of the tender for driving the traction device to move the tender, said trackway comprising a pair of rails spaced apart one above the other and said track engaging traction device contacting the lower of said rails to drive the tender thereon, and said upper rail serving to movably support the tender in running position, said knotter being spaced from said upper rail a distance less than the spacing between the upper and lower rails.

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