July 3, 1934.

E. J. ABBOTT

1,964,714

TEXTILE MACHINE

Filed June 4, 1931

5 Sheets-Sheet 1

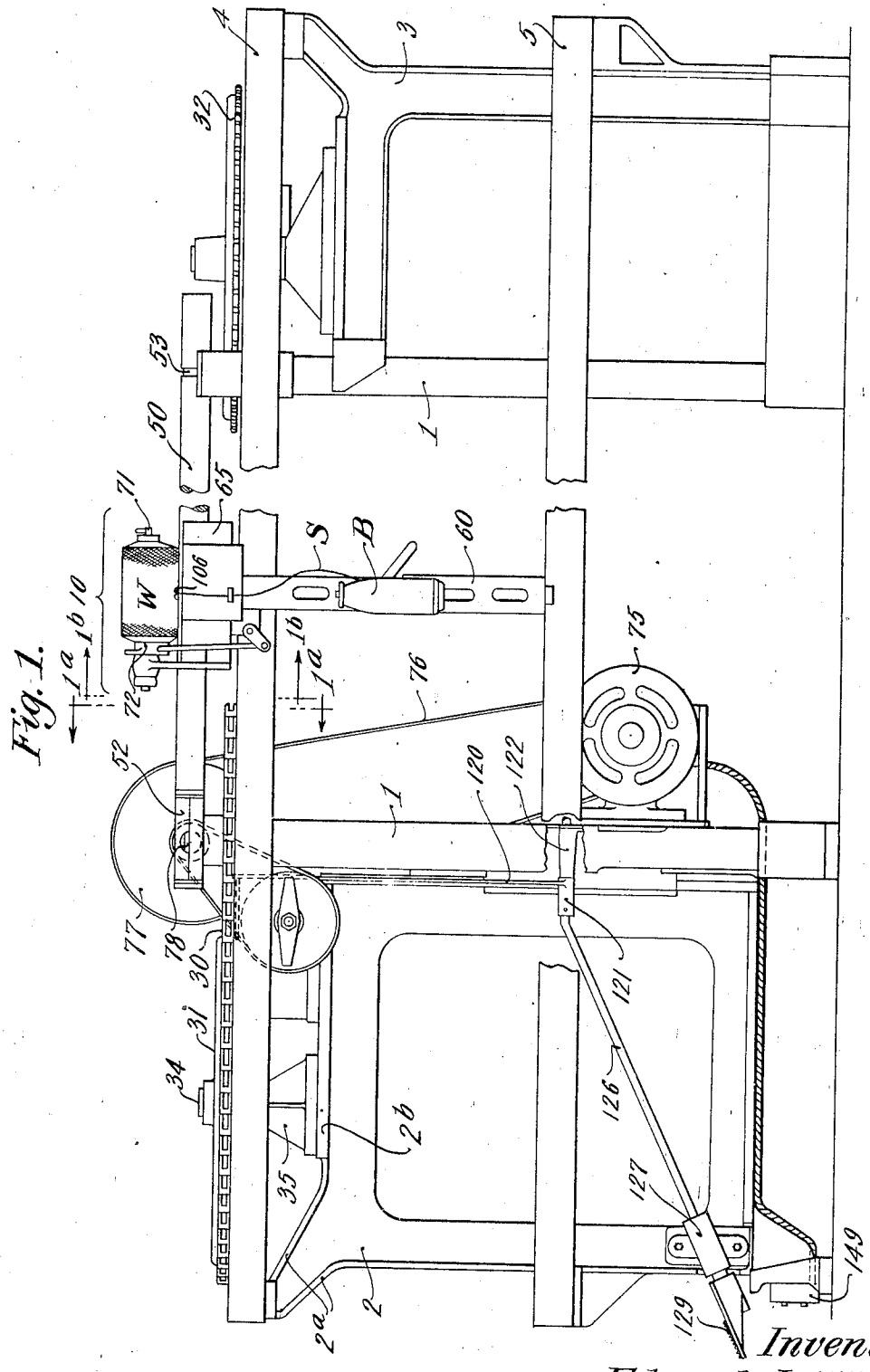


Fig. 1.

Inventor,
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his Att'ys.

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Fig. 1a.

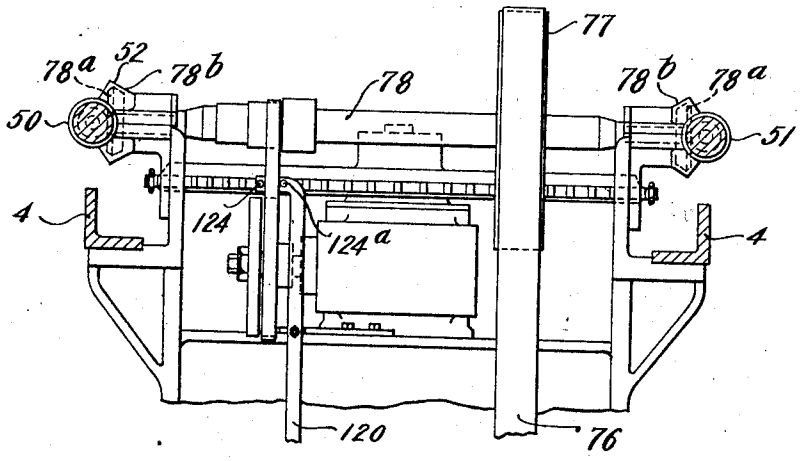


Fig. 1b.

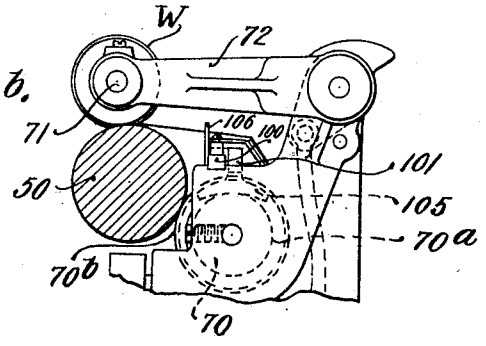
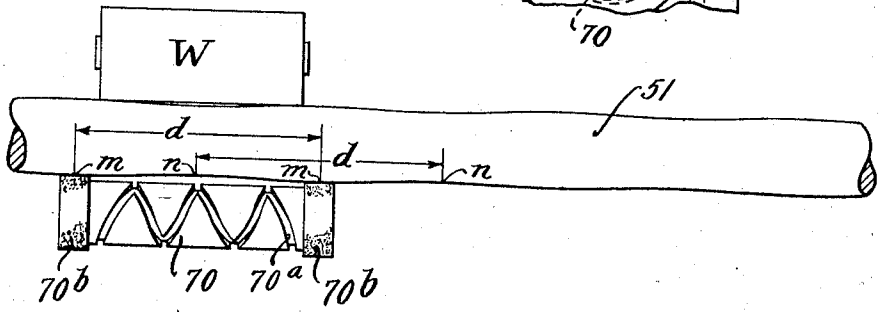


Fig. 6.



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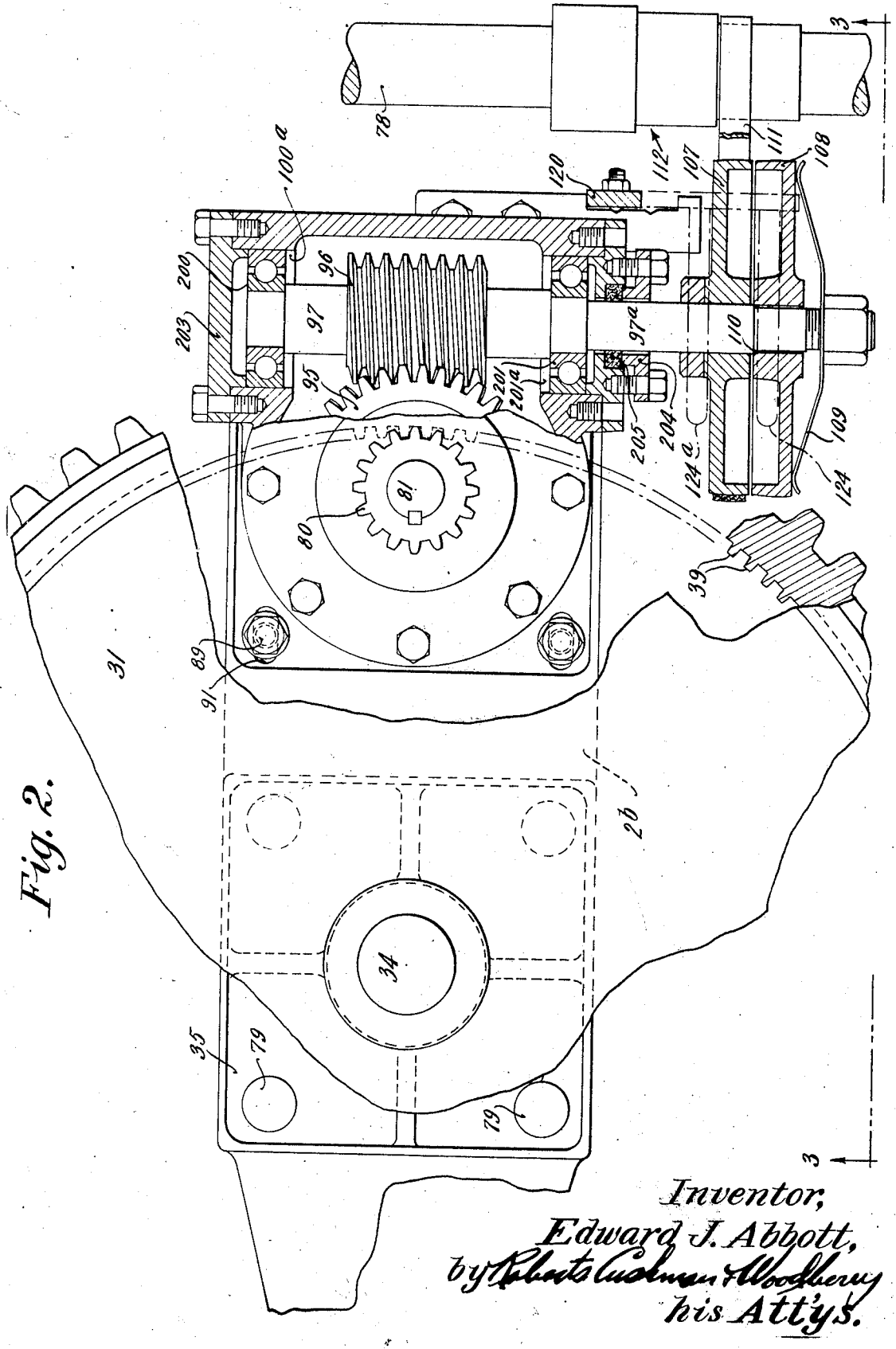


Fig. 2.

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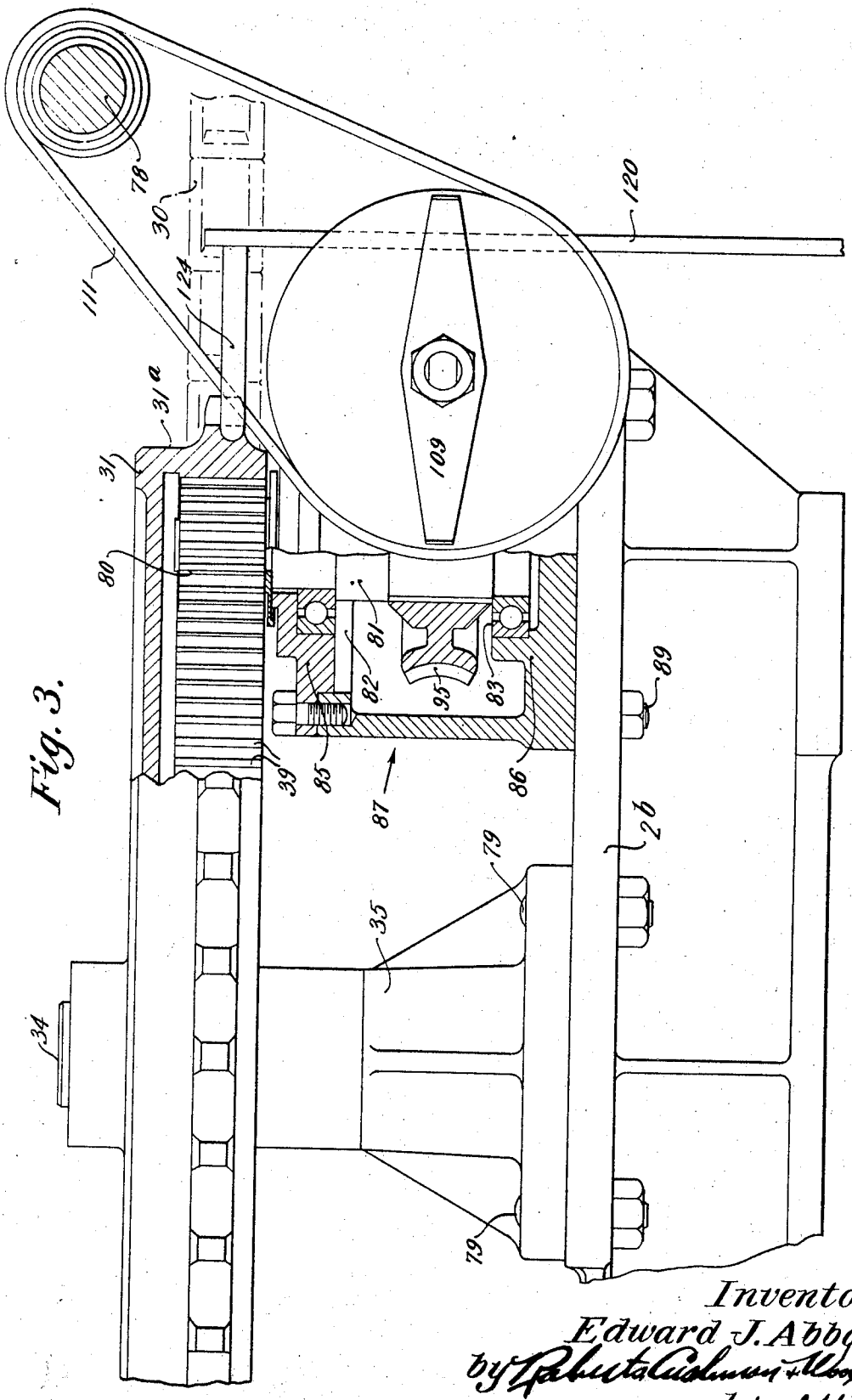


Fig. 3.

Inventor,
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Fig. 4.

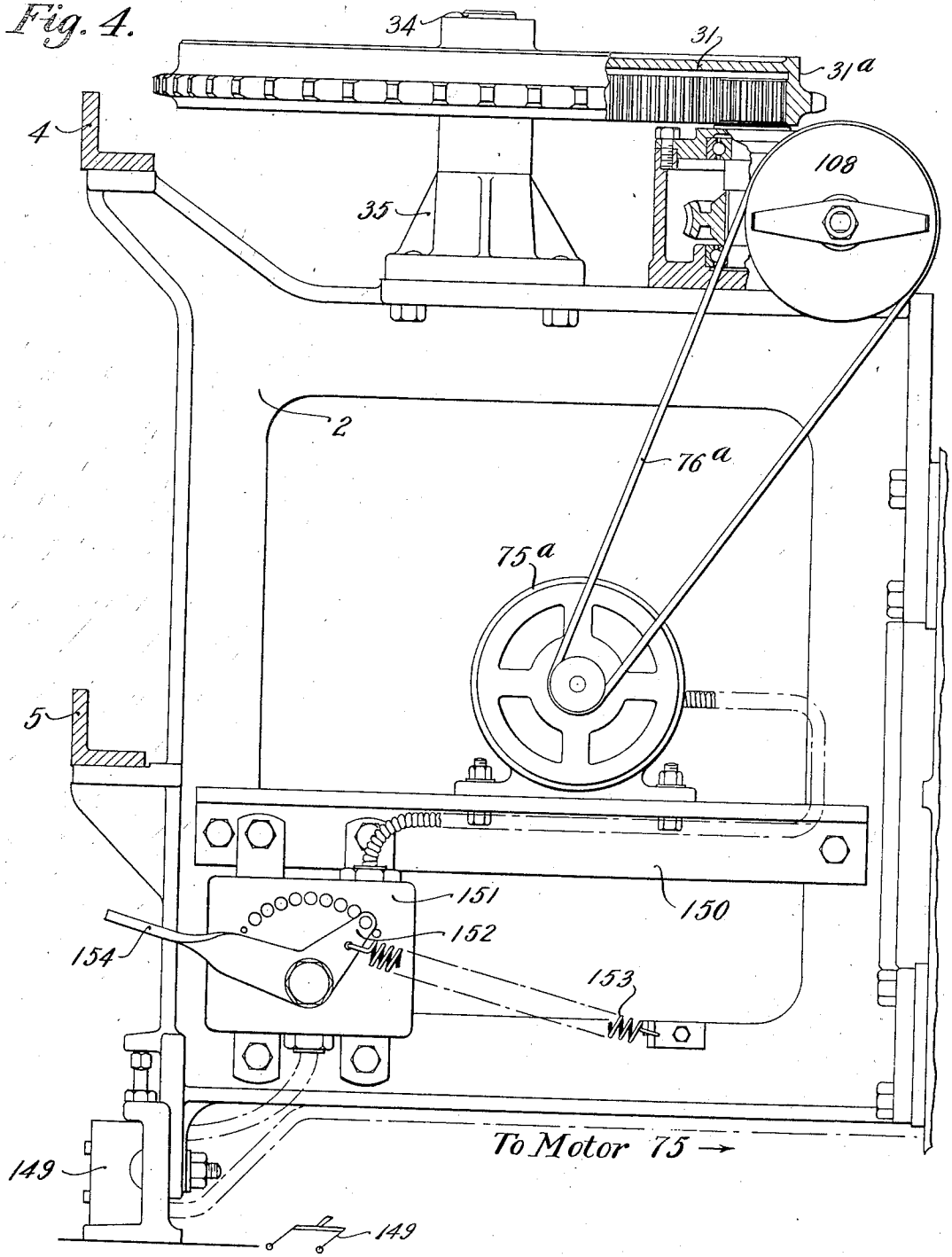
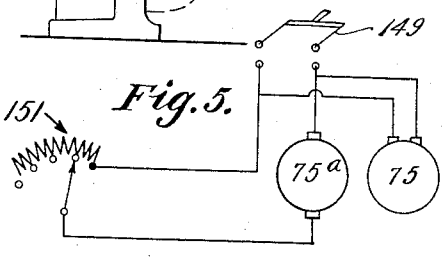


Fig. 5.



Inventor,
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1,964,714

UNITED STATES PATENT OFFICE

1,964,714

TEXTILE MACHINE

Edward J. Abbott, Wilton, N. H., assignor to Abbott Machine Company, Wilton, N. H., a corporation of New Hampshire

Application June 4, 1931, Serial No. 542,011

8 Claims. (Cl. 242—35.5)

This invention relates to textile machines of the kind having a plurality of strand-manipulating devices adapted to be moved in a procession in relation to the machine, typically in a circulatory path so as successively to pass an operator or automatic tending devices. Instances of such machines are disclosed in my Patent No. 1,609,639; in the patent to Edward J. and W. G. Abbott, No. 1,700,425;—and in my copending applications Serial Nos. 476,776 and 508,868, the individual strand-manipulating devices being capable for example of operating on a textile strand to wind, unwind, twist, spin, or elongate by drafting. My invention is particularly concerned with improving the mechanism by which such machines are driven and controlled, and has for some of its objects to provide improved mechanism for advancing the strand-manipulating devices; to provide improved means for concomitantly advancing these devices and causing their operation; to provide for varying the rate of advance with respect to the rate of operation of the several devices; and to provide means for causing the devices to pass the operator or attendant (or automatic tending devices) at varying speeds consistent with the efficient performance of necessary tending operations.

Other objects of invention, and features of novelty and advantage will be apparent from this specification and its accompanying drawings wherein specific instances of my invention are shown by way of example only.

In the drawings:

Fig. 1 is a side elevation of a machine according to the present invention, this view omitting all but one of the numerous carriers of strand-manipulating devices with which the machine is usually provided;

Fig. 1*a* is a vertical section on line 1*a*—1*a* of Fig. 1;

Fig. 1*b* is a vertical section on the line 1*b*—1*b* of Fig. 1, showing a fragment of one of the traveling strand-manipulating devices;

Fig. 2 is a fragmentary plan view of driving connections at the left end of the machine of Fig. 1;

Fig. 3 is a vertical section on the line 3—3 of Fig. 2, this view corresponding in point of view to Fig. 1;

Fig. 4 is a vertical section corresponding to Fig. 3, but on a smaller scale, and showing a modification of certain parts of the machine;

Fig. 5 is a wiring diagram of electrical connections of parts shown in Fig. 4; and

Fig. 6 is a diagrammatic view showing an arrangement of drive roll, winding package and traverse cam which may be employed to prevent the occurrence of "ribbon wind" in machines of this kind.

The machine illustrated herewith as exemplifying the present invention includes in common with the machines of the above patents and applications, a guideway formed of upper and lower rails 4 and 5 and defining an endless path of travel for a large number of traveling strand-manipulating carrier units 10 which move in a procession along opposite straight and curved portions thereof. In Fig. 1, only one of these strand-manipulating carrier units 10 is indicated, but it will be understood that the machine will usually have as many of these units as can conveniently be disposed on the above-described guideway. A strand-manipulating carrier unit 10 may, as disclosed in the above patents and applications include a unit frame consisting mainly of a vertical plate 60 bridging the distance between the upper and lower rails 4 and 5, and an upper head portion 65 fast on the plate 60, this unit frame carrying any suitable rollers for holding the unit on the rails 4 and 5 and for facilitating its travel thereon.

The strand-manipulating devices of the traveling-carrier units may be such as are competent to perform, for example, a winding, or unwinding, or drafting, or twisting, or spinning operation on strand material;—on the traveling unit 10 illustrated herewith, a strand S is shown as being unwound from a bobbin B and rewound in overlapped quick-traverse layers of reversed spiral windings laid in place on a rotatably driven headless package W, by a reciprocating traverse eye 106, as disclosed in the above patents and applications. While any desired form of connections may be employed for rotating the winding package W, the present machine employs for this purpose a pair of rotary rolls extending along the two opposite straight portions of the guideway, above the upper rail 4; one of these rotary rolls is shown at 50 (Fig. 1) mounted in suitable bearings 52 and 53. The winding package W, on any suitable core therefor, may be rotatably mounted on a spindle 71, so positioned by a pivoted arm 72 as to allow the package to rest upon and be driven successively by the rotating rolls 50 and 51 as the traveling unit moves around the guideway.

As disclosed in the above Patent No. 1,700,425 and in the above two applications, traversing of the winding strand may be effected by a traverse guide or eye 106 carried by a slider 101 reciproca-

ble on a rod or bar 100 which is supported at its ends by the head portion of the carrier unit (Fig. 1b). A traverse cam 70 is rotatably mounted in the head in position for tires 70^b (Fig. 6) at its ends to contact with and be driven by the drive rolls 50 or 51 and for its groove 70^a to operate a follower 105 (Fig. 16) connected to the slider 101, thus to operate the traverse eye 106.

Motion of the several strand-manipulating carrier units along the guideway is induced by a suitable endless band approximately paralleling the guideway; preferably such endless band is a chain 30, suitably connected to each traveling unit and running on sprocket wheels 31 and 32 which lie at opposite ends of the machine. The forms of connecting link illustrated in the above patents and applications may be employed to connect each traveling unit to the chain 30.

The framework of the guideway, which preferably serves also to support the driving connections of the machine may consist for example of a plurality of cross members 1 which extend from side to side of the machine at suitable intervals (only two of these being illustrated), and a pair of longitudinally extending end sections 2 and 3 which abut against and are affixed to the middle portions of the endmost cross members 1.

Preferably as many as possible of the driving connections both for the traveling motion of the carrier units and for the strand-manipulating (e. g., winding) operations, are concentrated at one end of the machine at which an operator may be stationed,—this being the left-hand end in Fig. 1. As illustrated in Figs. 1 and 2, the motive power of the machine is supplied by an electric motor 75 affixed to the cross member 1. Through a belt 76 and a pulley 77 this motor drives a cross shaft 78 turning in any suitable bearings on the top of the endmost cross member 1. The rotary drive rolls 50 and 51 are each connected at their bearings 52 to this cross shaft 78 by bevel gearing 78^a contained within a gear casing 78^b, the construction described in my application, Serial No. 476,776 being especially suitable for this purpose. Any suitable switch, such as is diagrammatically indicated at 149 (Fig. 1) may control the motor 75 and thus stop or start the rotary drive rolls 50 and 51 and the winding operations on all of the carrier units. The motor 75 is preferably operated at such a speed that the rotary drive rolls 50 and 51 rotate at for example 1500 R. P. M.

The sprocket wheel 31, which in the present instance acts to drive the chain 30, is preferably mounted to turn freely on a pin 34 which extends vertically from a bracket 35 (Figs. 1 and 2). The end frame member 2 (Fig. 1) is in the form of a web with marginal upper flanges 2^a. These upper flanges are enlarged laterally to form a horizontal platform 2^b which constitutes a stable support to which the bracket 35 is suitably fastened, as by bolts 79 (Fig. 3).

It is to be noted that the illustrated machine does not rely upon a vertical power shaft fast to the sprocket wheel for driving the wheel from its center, as in the case of the machine illustrated in my Patent No. 1,609,639; on the contrary the present machine is characterized by the application of driving force to the sprocket wheel 31 near its periphery, thus providing a stronger and more compact construction of driving parts. Referring to Figs. 2 and 3, the sprocket wheel 31 is provided on its rim 31^a with a set of internal gear teeth 39, these teeth preferably being located, as shown, closely adjacent to the horizontal plane occupied by the chain 30 and the sprocket teeth engaged thereby. A pinion 80 keyed on a short vertical shaft 81, is arranged to intermesh with and apply driving force to these internal gear teeth 39. Advantageously the shaft 81 is mounted in anti-friction bearings 82 and 83 which are respectively held in a detachable cover 85 and a bottom 86 of a gear box 87. This gear box 87, containing the pinion 80 and shaft 81, is preferably bolted to the horizontal platform 2^b as by bolts 89, which preferably pass through suitable slots 91 in this platform, so that a fine degree of adjustability may be secured between the pinion 80 and the gear teeth 39 on the sprocket wheel. The mounting of the bracket 35 and the gear box 87 on the common surface of the platform 2^b provides for accurate alignment of the interfitting gear and pinion, and provides a compact structure wherein the strains incident to driving are minimized and localized.

The gear box 87 is preferably arranged also to contain suitable speed reduction gearing, herein shown as including a worm wheel 95, keyed on shaft 81, and a worm 96 intermeshing with this worm wheel, (Fig. 2). The worm 96 is keyed on a horizontal shaft 97, which preferably turns in anti-friction bearings 200 and 201 held in opposite recesses 200^a and 201^a of the gear box 87. A reduced portion 97^a of the shaft 97 preferably extends from the gear box, and the gear box is closed by suitable caps 203 and 204,—cap 204 preferably serving to retain any suitable packing 205 about the reduced portion 97^a of the shaft.

The outer portion 97^a of the shaft 97 preferably serves to receive torque for driving the speed reduction gearing and sprocket wheel 31. As shown in Fig. 2, two belt pulleys 107 and 108 are mounted to rotate on this shaft, pulley 107 being freely rotatable with relation to the shaft and serving as an idler pulley. Pulley 108 is yieldingly pressed against a small shoulder 110 on the shaft, by means of a spring 109 which turns with the shaft; this pulley 108 is the driving pulley and transmits its driving torque by virtue of its frictional engagement with the spring 109. Together with spring 109, the pulley 108 constitutes a slip clutch, effective to permit slippage of the driving connections in the event of obstruction to the progression of any of the carrier units of the machine, thus to avoid breakage.

In the form of device of Figs. 1, 2, and 3, the live pulley 108 is rotated by a belt 111 driven by a cone pulley 112 keyed to and slidable on the cross-shaft 78. Thus, in this form of the device, the motor 75 produces the traveling motion of the carrier units as well as operates the drive rolls 50 and 51 which effect the winding motion on each of the traveling units.

The machine preferable includes means for arresting the travel of the carrier units without stopping the winding or other strand-manipulating operation, for example to permit the operator to give special attention to the strand of one particular carrier. One preferred form of such means comprises a belt shifter which includes a lever arm 120 having at its lower end a hub 121 mounted on a pivot 122 (Fig. 1) and having at its upper end a pair of pins 124 and 124^a which extend to either side of the upper run of the belt 111, (Figs. 1*a* and 2). A revolvable rod 126 mounted in a bearing 127 on the end frame member 2 is loosely connected to the hub 121 to turn the latter and the belt shifter lever arm. A treadle 129, fast on the outer end of rod 126

may then be tilted in either direction by the operator to shift the belt 111 from the idler pulley 107 to the driving pulley 108 or vice versa.

In case the operator of the machine encounters a passing carrier unit which requires more attention than most, (for example one in which a tangled or otherwise defective yarn requires attention) she can stop the progress of the carrier units, perform the operation and then cause the units to resume their normal rate of travel. For economical operation, this mode of procedure necessitates attuning the speed of the carrier units to the rate at which the operator can tie up all but the most difficult bobbins. However, by providing means for varying the speed of travel of the carrier units, it is possible to increase materially the average speed of travel, and hence the number of units which can be tended by a given operator or used on the same machine.

The modified form of device of Figs. 4 and 5 illustrates the provision of such means, the same reference characters being used to designate parts of this device as in describing the previous arrangement. Referring to Fig. 4, wherein only the driving connections for advancing the carrier units are shown, (other parts being omitted for clarity of illustration) the pulley 108 is driven through a belt 76^a from a motor 75^a which is separate from the previously described motor 75 employed to drive the cross-shaft 78. Motor 75^a may conveniently be mounted on a structural member 150 which is suitably bolted to two opposite parts of the web constituting the end frame member 2. This motor 75^a is in this instance preferably a variable speed motor competent to drive the pulley 108 and the other previously described connections including the sprocket wheel 31 and chain 30 at different rates of speed consistent with various rapid, slow or medium speeds of performance of the replenishing operations required by the traveling units. For varying the speed of the motor 75^a (and hence of the strand-manipulating units), the electrical connections to the motor 75^a are shown as including a rheostat 151 of conventional form, (Figs. 4 and 5). The contact arm 152 of the rheostat is preferably urged toward either the "off" or "full on" position by a suitable spring 153, and a suitable treadle 154 is preferably operatively associated with this contact arm, for manual actuation thereof by the operator.

The electrical connections to the motor 75^a and rheostat 151 preferably lead to, and are controlled by, the main switch 149 which controls the other motor 75. Thus by actuation of the main switch 149, the whole machine may be de-energized. By actuating rheostat 151 (which acts as a switch when the contact arm 152 is in its "off" position) the movement of the traveling units may be stopped, begun again, or changed almost instantly to any desired speed within the range of the motor 75^a, without stopping the strand-manipulating operation on the various units. As an instance of one of the ways in which these features are useful, the operator of the machine may cause the carrier units to pass her at a rapid rate consistent with the performance of her usual operations but at which it would be impossible for her to repair an occasionally badly tangled supply yarn. When a carrier having such a yarn reaches the operator she can decrease the speed of travel of the units sufficiently to provide time enough for her to give this yarn the necessary attention; after the repair has been effected, the operator can cause the units to resume their higher rate of travel. By this procedure the average rate of travel of the units, and hence the number of units which can be included in one machine may be materially increased.

The means whereby progress of the carrier units may be retarded without necessarily causing complete stoppage is distinctly useful in conjunction with any means acting as a consequence of the carriers' travel to prevent "ribbon wind." By "ribbon wind" I mean the coincidence in radial overlying relation of successive like spiral layers of the winding, such as would ordinarily occur at various diameters of the winding package when a surface-driven winding package is traversed by a traverse mechanism operating at a constant speed.

It is contemplated that devices for preventing such "ribbon wind" will in general operate by varying the relation between the speed of the traverse device of each carrier unit and the speed of winding on the corresponding package in such a way that successive like spiral wound layers will not exactly coincide radially of the package. My copending application, Serial No. 476,776 claims and discloses by way of example a preferred construction utilizing the traveling motion of the carrier units to accomplish this end. Referring to Fig. 6 of the accompanying drawings, wherein this preferred construction is illustrated, the traverse cam 70 which actuates the traverse eye or guide 106 carries at its opposite ends tires 70^b which contact with either of the drive rolls 50 or 51 (depending on the position of the carrier unit). The traverse mechanism of each carrier unit is thus driven as the carrier travels, while the winding package W is simultaneously driven by contact with the same drive roll 50 or 51. To provide the above-described variation in the ratio of winding and traversing speeds, the drive rolls 50 and 51 are each formed with nodes M and N of maximum and minimum diameter respectively spaced apart integral multiples d of the distance between the two tires 70^b of the cam roll. These nodes are illustrated on an exaggerated scale in Fig. 6. The effect of the traveling cam tires 70^b passing over the nodes of maximum and minimum diameter on the rolls 50 and 51 is to vary the ratio of the winding speed to the traverse speed sufficiently to prevent the phenomena of "ribbon wind". Obviously if, for example, in repairing a tangled yarn, the travel of the carrier units is halted, such variation of speeds will not take place, the probabilities being that one or more of the several winding masses will attain a diameter at which the phenomenon of ribbon wind can occur. However, by the utilization of a variable speed drive for the traveling carrier units such as described above, the speed of travel of the units may be temporarily reduced sufficiently to permit any replenishment operation without such complete stoppage of travel as would permit of the occurrence of "ribbon wind".

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. A textile machine having therein a plurality of traveling strand-manipulating units, a guideway defining a path of circulation for said units, a framework for said guideway, said framework including a vertically disposed end frame member, a sprocket wheel and an endless chain run-

ning thereon for advancing the strand-manipulating units along said guideway, a bracket mounted on said end frame member, said bracket including a pivotal support for the sprocket wheel, gear teeth on the sprocket wheel, speed reduction gearing and a pinion driven thereby and adapted to engage the gear teeth of the sprocket wheel, a gear box including bearings for retaining said speed reduction gearing, said gear box and the bracket which supports the sprocket wheel being mounted on a common surface on said end frame member whereby the sprocket wheel and its associated pinion may be suitably aligned.

2. A textile machine having therein a plurality of movable strand-manipulating devices adapted to wind textile strands, means for moving the said devices in a predetermined path, means for causing said devices to operate at various parts of said path, and means for varying the speed at which said devices move in said path.

3. A textile machine having therein means for moving a winding strand package in a predetermined path, means for winding a strand on the package during such motion, and means for varying the speed of movement of the package in the path independently of the speed of winding thereon.

4. A textile machine having therein a plurality of traveling carriers of winding and unwinding strand masses, means including a motor for moving said carriers in a predetermined path, winding means acting to wind the strands from the unwinding strand masses onto the winding strand masses while said carriers are in various positions in said path, and means for controlling the progress of said carriers in said path without interruption to the normal operation of said winding means, said controlling means including a device for stopping and starting the said motor.

5. A textile machine having therein a plurality of traveling carriers of winding and unwinding strand masses, means including a motor for moving said carriers in a predetermined path, winding means acting to wind the strands from the unwinding strand masses onto the winding strand masses while said carriers are in various positions in said path, and means for controlling the progress of said carriers in said path without interruption to the normal operation of said winding means, said controlling means including means for altering the speed of said motor.

6. A textile machine having therein means for moving a plurality of strand packages in procession in a predetermined path, means effective to wind strands on the packages while the packages occupy various positions in said path, and means for varying the rate at which the packages progress in said path.

7. A winding machine having therein means for causing a winding strand package to travel in a predetermined path in relation to the machine, means for winding strand on the package during such motion, a traversing device acting to distribute the strand in overlapped layers of reversed spiral windings on the package, means acting as a consequence of the traveling motion of the package in said path to prevent the occurrence of ribbon wind on the package, and means for varying the speed of travel of the package in said path.

8. A winding machine having therein means for causing a winding strand package to travel in a predetermined path in relation to the machine, means for winding strand on the package during such motion, a traversing device acting to distribute the strand in overlapped layers of reversed spiral windings on the package, means acting to vary the ratio between the speed of winding and the speed of traversing of the strand continually during progress of the package along its path while winding, and means for varying the rate of travel of the package without completely stopping such travel.

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