April 29, 1969 S. SIEGEL 3,441,231

TEXTILE WINDING MACHINE

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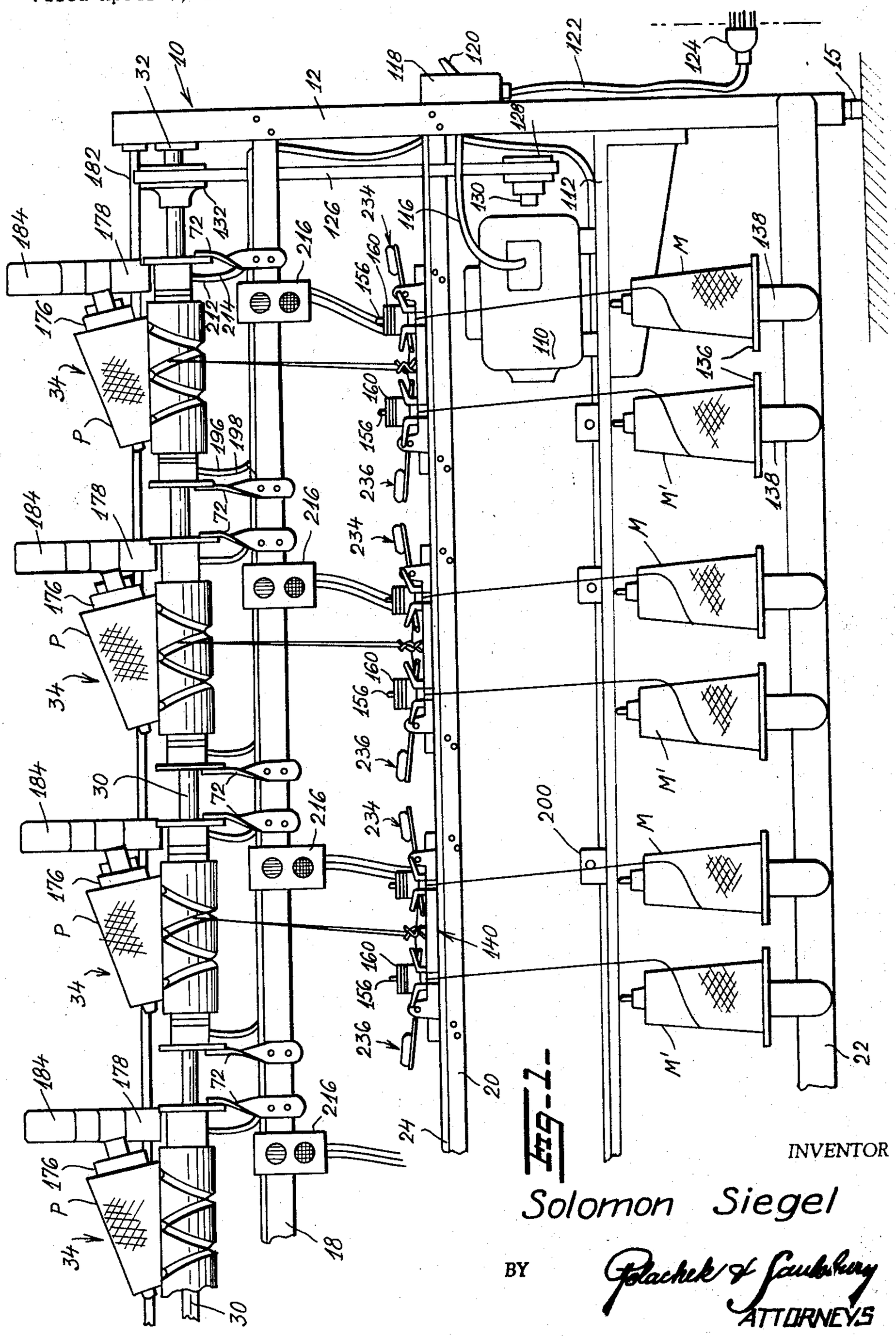


Fig. 1

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TEXTILE WINDING MACHINE

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Fig - 3.

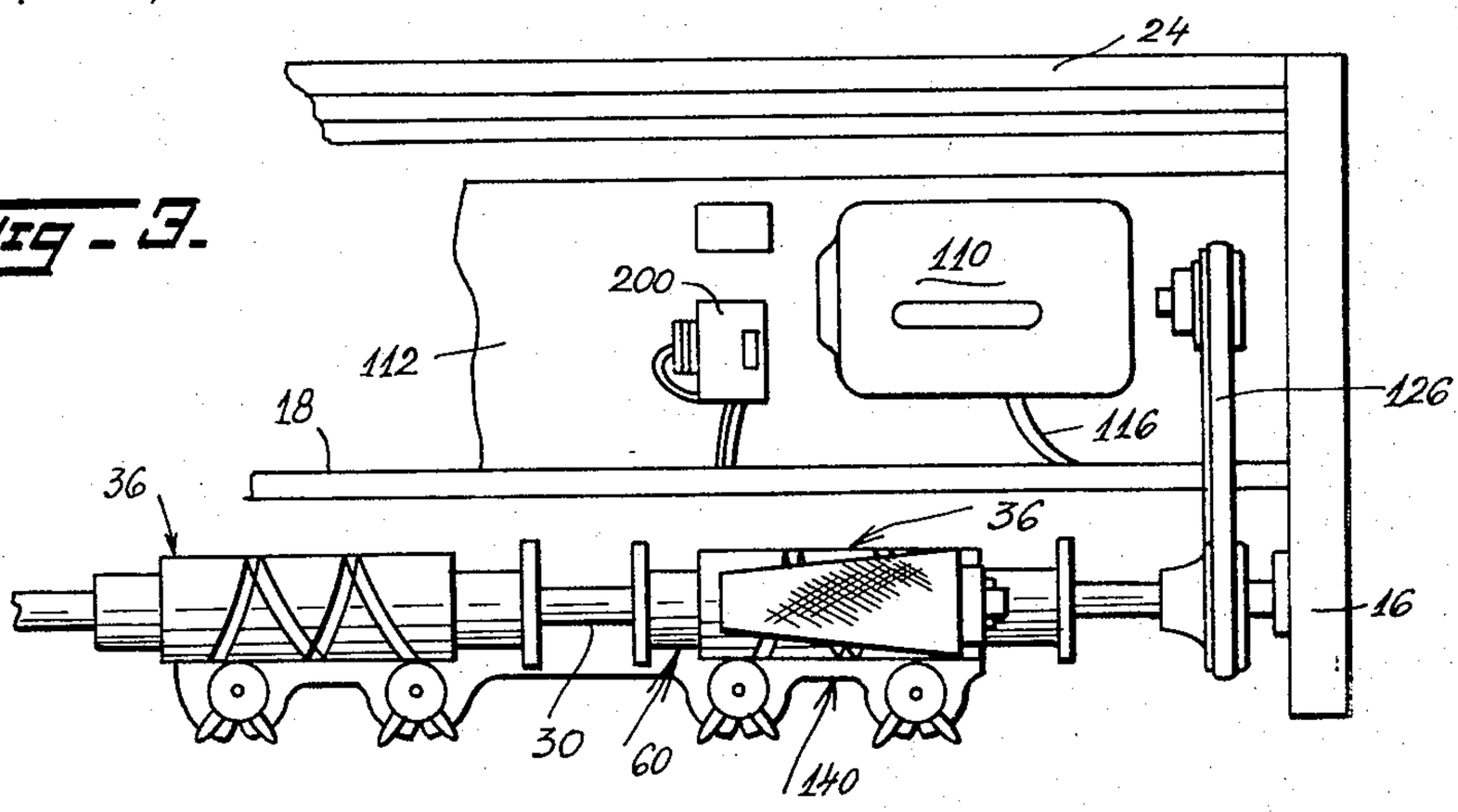
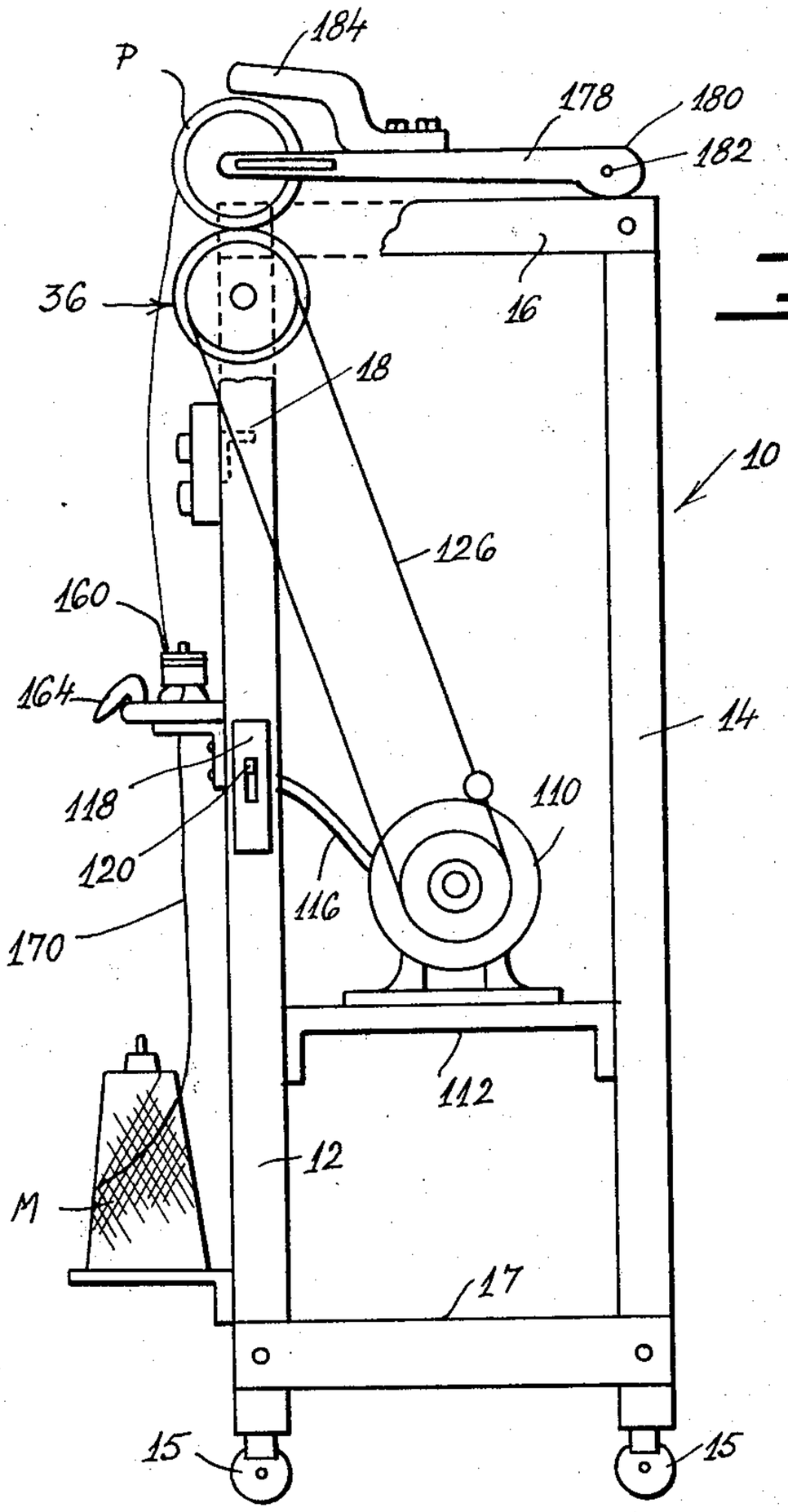


Fig - 2.



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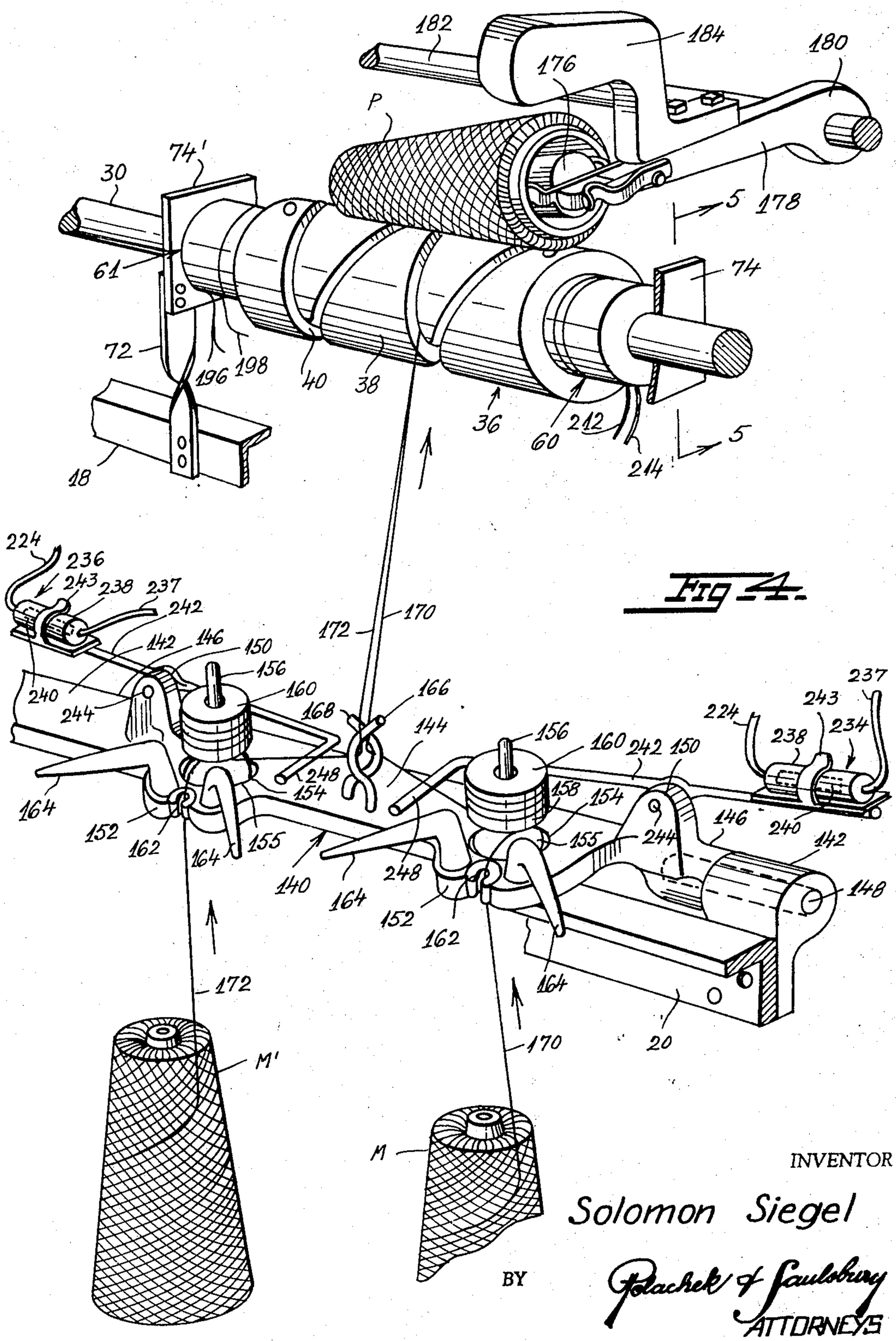


Fig 4

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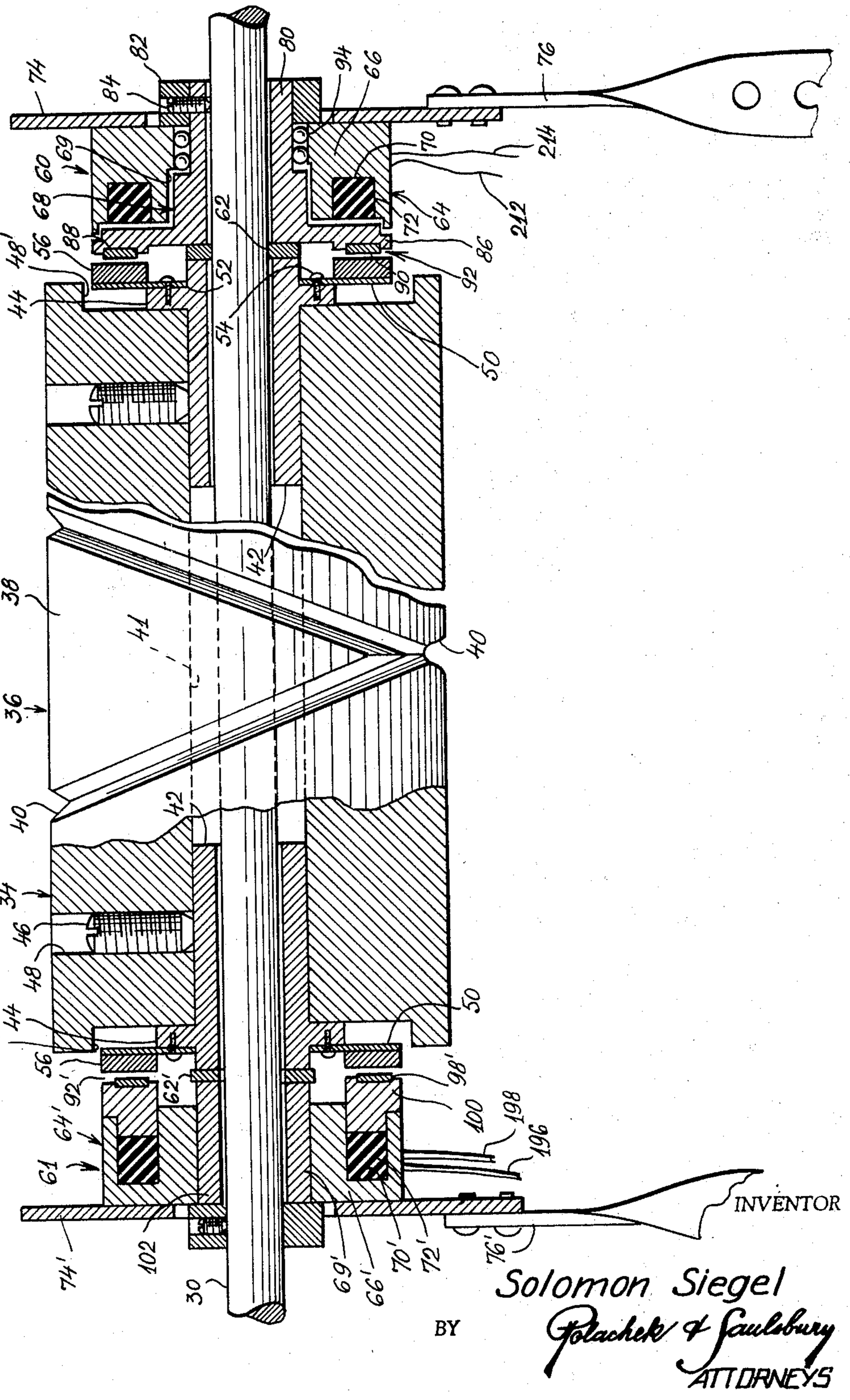
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Fig. 5.



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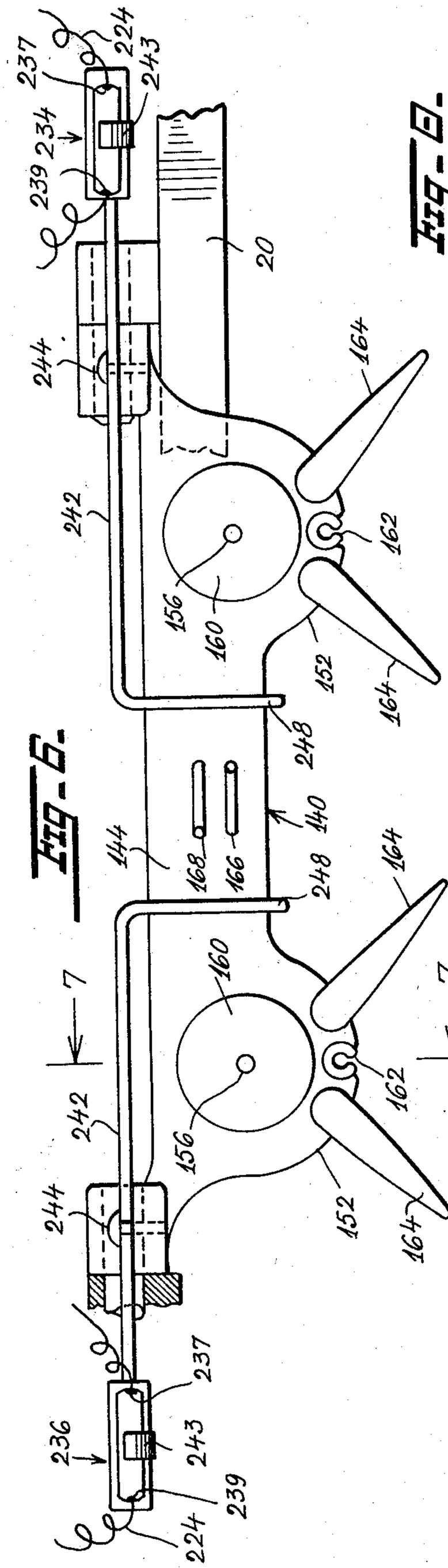


FIG. 6.

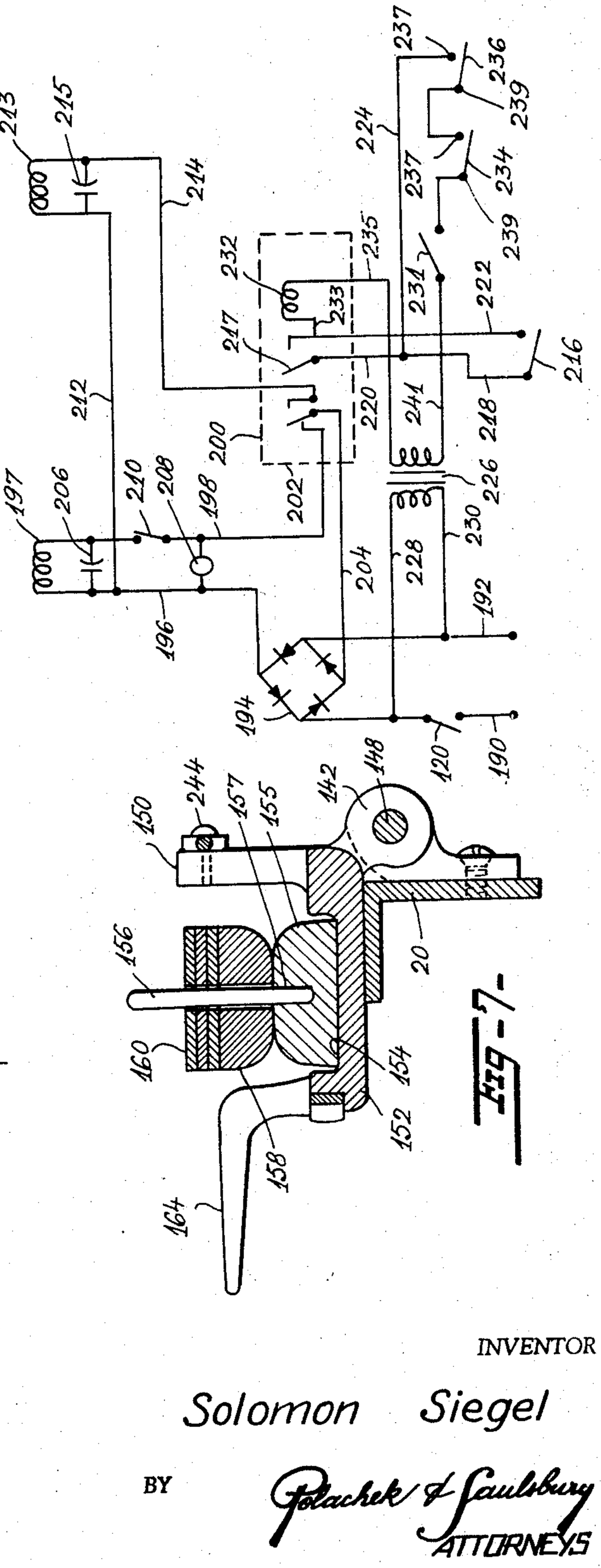


FIG. 5.

FIG. 7.

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United States Patent Office

3,441,231

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3,441,231

TEXTILE WINDING MACHINE

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U.S. Cl. 242—38

7 Claims

ABSTRACT OF THE DISCLOSURE

A textile winding machine having a plurality of driven grooved traverses or winders on a common motor driven shaft. A pivotally mounted weighted yarn package engages the surface of each traverse. Mechanism is provided for stopping the individual traverses at will or automatically upon the breaking of a single thread of yarn, the mechanism including an electrically actuated clutch device and brake mechanism, allowing each traverse on its common shaft to be run or stopped individually without stopping the shaft for the other traverses. The mechanism also permits the traverse to stop after a predetermined size has been reached without damaging the threads that are still attached to the package, that are made by the winder. The mechanism also permits an indicating light to go on signalling that the individual traverse has stopped and thus calling the operator's attention thereto.

At present, machines that make cones or parallel packages of yarn or any class of thread that uses grooved traverses or winders are fixed permanently to a shaft driven by a motor.

The reason for running many traverses on one shaft driven by a single motor is that for a good wind the motor current is shut off after a predetermined time and then switched on again. Normally a small drop in speed of 10 to 25% is allowed to take place before the current goes on again. This causes a slippage between traverse and the cone being made. Because of the controls needed to effect this current cut off and cut in, it is easier to control one motor for a great number of traverses. Usually a plurality of traverses are mounted on single shaft. In making a package from more than one end of yarn, if one of the ends were to run out or break and the package being built is lifted away from the traverse, the remaining end would get tangled up with the fast spinning traverse and cause great deal of damage. In the past, doubling (combining two or more ends on a package) has been found impractical on a winder with a grooved traverse.

It is a principal object of the present invention to provide a mechanism for selectively and automatically stopping individually any grooved traverse on a common drive shaft having a broken thread, allowing such winder to be used for doubling with no danger of damaging itself or the package being made.

Brief description of the views of the drawings

FIG. 1 is a fragmentary front elevational view of a winding maching embodying the invention, packages being shown in the process of being threaded.

FIG. 2 is a side elevational view thereof.

FIG. 3 is a top plan view thereof.

FIG. 4 is a perspective view partly diagrammatic showing a winder and package assembly, the package being fed from a pair of supply masses, the threads being shown passing through mercury switch mechanisms, the switch mechanisms being shown in inoperative positions.

FIG. 5 is an enlarged sectional view taken on the plane of the line 5—5 of FIG. 4.

FIG. 6 is an enlarged top plan view of the mounting

for a pair of mercury switches for actuating the clutch and brake mechanisms.

FIG. 7 is a vertical sectional view taken on the plane of the line 7—7 of FIG. 6.

FIG. 8 shows a wiring diagram for the electrically actuated clutch and brake mechanisms.

Detailed description of the drawings

Referring now in detail to the various views of the drawings, FIG. 1 shows a fragment of a multiple textile winding machine **10** embodying the invention. The machine comprises an open framework, rectangular in plan, including corner front posts **12** of angle bar and rear corner posts **14** of the same material, only one of each corner post being shown. The corner posts are mounted on casters **15**. Angle bars **16** and **17** join the front and rear corner posts at the ends of the frame at the top, and bottom, respectively. A top angle bar **18** joins the corner posts at the corner posts at the front, and another angle bar **20** joins said front corner posts intermediate the top and bottom ends thereof. A third angle bar **22** joins the front corner posts at the bottom. An angle bar **24** joins the rear corner posts intermediate the top and bottom ends thereof, angle bar **24** being disposed opposite angle bar **20**.

In accordance with the present invention, a drive shaft **30** is journalled at its ends in bearings **32** supported on the front corner posts **12** adjacent the top ends thereof. A plurality of winder or traverse assemblies **34** are loosely mounted on the shaft **30** in spaced relationship therealong. Each winder assembly **34** includes, as best seen in FIG. 5, a winder or traverse **36** having a solid cylindrical body **38** of suitable rigid plastic material formed with a spiral groove **40** on its outer surface. The body has a central bore **41** extending therethrough. A metal bushing **42** is interposed in the bore **41** between the body of the winder and the shaft **30** at each end of the body **38**. Each bushing is formed with an annular flange **44** outwardly of the adjacent end of the body of the winder and inwardly of its outer free end which flange engages the face of the end of the body. Set screws in radial recesses **48** in the body **38** secure the body to the bushings. The face of each end of each winder is formed with an annular groove **48'**. A metal disc **50** having a central opening **52** to receive the bushing **42** is fixed to the face of each end inwardly of the groove **48'** by means of screws **54**. An annular metal ring **56** is suitably fixed to the face of the disc **50** along the periphery thereof opposite the groove **48'** in the face of the body **38**.

Clutching mechanism indicated generally at **60** is mounted on the shaft **30** adjacent one end of the winder or traverse **36**, the right hand end as viewed in FIG. 5, and braking mechanism indicated generally at **61** is mounted on shaft **30** at the other end of the winder or traverse **36**. The clutching mechanism **60** is closely spaced from the outer end of bushing **40** by means of a washer **62**. The clutching mechanism is formed with a ring-like body **64** of metal. The body **64** comprises a stationary section **66** constituting a stationary clutch field, and a rotating section **68** constituting a rotating clutch field or armature. The stationary section **66** is formed with a central bore **69** and with an annular groove **70** in one face thereof, the inner face as viewed in FIG. 5. The solenoid **72** is fitted and held in groove **70** protruding slightly outwardly of the face of the body of section **66**. Section **66** is held against rotation by means of a perforated plate **74** mounted on shaft **30** and fixed to a bracket **76** upstanding from angle bar **18** and fixed thereon. The plate **74** constitutes a drag link and may be welded or otherwise suitably fastened to adjacent end face of the body of the fixed section **66**.

The rotating field section **68** comprises a tubular body

80 nested or telescoped in the bore of 69 of stationary section 66.

The outer end of the body of section 68 extends through the central perforation in plate 74 and is fastened to the shaft 30 by means of a collar 82 on the shaft 30 extending through said perforation. A set screw 84 passing through aligned holes in the collar and end of the tubular body of section 68 secures the section 68 to the shaft so that is rotates with the shaft. The inner end of tubular body 80 of section 68 is formed with a disc-shaped enlargement 86. The disc 86 is formed with an annular groove 88 adjacent the periphery thereof and secured in said groove is a ring 90 of friction material facing and closely spaced from the ring 56 on the end face of the transverse 36 thereby providing an air gap 92. Ball bearings 94 are interposed between the fixed and rotating sections in the bore 69 of the fixed section 66 adjacent the outer end of the bore.

The braking mechanism 61 on the other end of traverse 36 on shaft 30 is somewhat similar to the clutching mechanism 60, being formed with a ring like body 64' having a stationary section 66' with a central bore 69' and with an annular groove 70' in the face thereof, accommodating a solenoid 72' and accommodating a metal ring 100 fitted in the outer end of the groove and extending outwardly of the inner face of the body of the section 66'. A friction ring 98' is suitably fastened to the face of the ring 100, closely spaced from the ring 56 on disc 50 secured to the face of the adjacent end of the body 38 of traverse 36 leaving an air gap 92'.

The fixed section 66' is mounted on a bushing 102 on shaft 30 and is held against movement by a perforated plate 74' on shaft 30 fixed on a bracket 76' secured to the angle bar 18. Bushing 102 is spaced from bushing 42 by a washer 62'.

An electric motor 110 supported on a shelf 112 mounted across the corner posts at one end of the framework and connected to a suitable source of electric motive force by means of a cable 116 leading to a switch box 118 containing a main switch 120, a ribbon break timer, a cord 122 and a plug 124, drives the shaft 30. A belt 126 trained around a pulley 128 on the outer end of the motor shaft 130 and around a pulley 132 fixed on shaft 30 brings the drive from the motor to the shaft 30.

On the bottom bar or rail 22, there is a plurality of holders for supporting upright unwinding masses M and M' of thread, each holder including a plate 136 and a depending pin 138 fitted in a hole in the bar or rail. Above each pair of holders, there is a metal subframe 140 pivotally mounted in end tubular bearings 142 fixed to the bar 20. The subframe consists of a plate 144 with tubular end sockets 146 pivotally mounted on pins 148 extending inwardly from the end bearings 142. A perforated lug 150 extends upwardly from the rear long edge of the plate as viewed in FIG. 4, adjacent each socket 146. The plate is formed with semi-circular enlargements 152 along the front long edge thereof, at each end of the plate.

Each enlargement is formed with a central recess 154. Seated in each recess, on the base thereof, there is a semi-spherical metal block 155, with a central socket recess 157 in the top surface thereof, and a pin 156 is fitted in the socket 157 and is supported in upright position thereby. Another semi-spherical block 158 is loosely mounted on the pin over the block 155 and mounted on the pin over the block 158 there is a plurality of removable perforated tension discs 160 constructed to open easily. The front periphery of each semi-circular enlargement 152 is formed with a narrow notch 162 and with radial fingers 164 extending upwardly and outwardly at an angle. The notches 162 are positioned directly above the masses M and M' of thread.

A pair of curved round wires 166 and 168 of light stock mounted on the plate between the recess 154 extends upwardly in partially overlapping relation. The strands 170 and 172 from masses M and M', respectively, pass upwardly to and through the notches 162, the strands

being guided thereinto by the radial fingers 164, 164 if moving out of line, and from the notches, and the strands pass over the blocks 158 in the recesses 154 and under the tension discs 160 thereon and then laterally to the center of the plate 144 where strand 170 of mass M passes loosely around the wire 163 and moves upwardly, and simultaneously, the strand 172 of mass M' passes loosely around the wire 166 and then upwardly, in closely spaced relationship to strand 170 to the end of the groove 40 in winder or traverse 36 thereabove, the right hand end, as viewed in FIGS. 1 and 4, and from the traverse onto the yarn package P. The winding package P of each unit is shown as removably held on a conical shaped spindle 176 mounted on the long arm 178 which is pivoted at 180 to a round rod 182 supported at the rear of the framework between the rear corner posts 14. The arm 178 is shown equipped with a weight 184 at its forward end. The arm also serves as a handle for manipulating the arm and supported package P. The spindle 176 is tapered or conical to cause the package P to be supported so that its conical surface rests on the surface of traverse 36.

An important feature of the present invention is mechanism for automatically detecting a break in the thread being wound, and for automatically stopping the winding mechanism of each traverse unit separately upon the breaking of a strand or in the case the winding operation has proceeded continuously to complete exhaustion of a supply mass. This automatic stopping mechanism is operated electrically using the alternating current supply furnished by the cord 122 and plug 124, by means of conductors 190 and 192. The main switch 120 is interposed in conductor 190. Referring to FIG. 8, a direct current rectifier 194 may be connected across the conductors 190 and 192. A conductor 196 is connected at one end to the rectifier 194. A condenser 206 is connected across the conductors 196 and 198. A light bulb 208 is also preferably connected across the conductors 196 and 198. A normally closed switch 210 is interposed in conductor 198. A conductor 212 is connected to conductor 196 and to the clutching mechanism indicated by coil 213. A conductor 214 leads from the clutching mechanism to switch 202. A condenser 215 is connected across the conductors 212 and 214. Another switch 217 forms part of the relay 200. A push button switch 216 is connected to the switch 217 by conductors 218, 220 and 222. Switch 216 is normally open and when the button is pushed the relay is energized. A conductor 224 is connected to conductor 218 of switch 216 and a conductor 241 is connected to a transformer 226 connected by conductors 228 and 230, to conductors 190 and 192, respectively. A switch 231 is interposed in conductor 224 for manual stopping traverse 36 when running. A coil 232, forming part of relay 200, is connected to conductor 222 by a conductor 233 and connected to transformer 226 by a conductor 235.

According to the invention, a pair of yarn controlled switches 234 and 236 with electrical contacts 237 and 239 is interposed in conductor 224 and are connected to the transformer 226 by conductor 241. Switches 234 and 236 are normally open but are closed when yarn is positioned thereover for running as shown in FIG. 4.

Each switch 234 and 236 comprises a transparent tube 238 closed at both ends with a supply of mercury 240 therein. The tubes are mounted at the ends of elongated wires 242 pivotally mounted on pivot pins 244 protruding from the perforated lugs 150 on the ends of the plate 144 at the rear thereof. The tubes are held in place by spring clips 243. The other ends of the wires are bent at right angles as indicated at 248, and are adapted to extend across the body of plate 144 adjacent the curved wires 166 and 168. The weight of the tubes is such that the tubes are adapted to fall by gravity below the plane of the top surface of plate 144 when pressure thereon is released, whereby the mercury in the tubes flows by gravity in one direction to one end of the tubes 238. When the threads or strands 170 and 172 are running, the tubes

238 are normally held on a level keel with the top surface of plate 144, with their bent ends under the threads 170 and 172.

In operation, because of the relay, the fields of the clutching mechanism 60 and the fields of the braking mechanism 61 cannot be energized at the same time. When either field is energized, it will then draw its respective armature towards itself thereby locking up the mechanism. When the shaft 30 is rotating and the clutch mechanism 60 is energized, the traverses 36 will turn at the same speed as the shaft 30. When the brake field is energized the clutching mechanism will be deenergized and will cause the individual traverse to stop its rotation.

In normal operation of the machine, the supply masses M and M' will exhaust at frequent intervals. In case strand or thread 170 breaks, pressure on end 248 of wire 242 supporting switch 234 will be released, the tube 238 thereof will fall by gravity opening the circuit through the conductor 212 leading to the clutching mechanim 60 of the traverse 36 deenergizing the rotating field 86 thereof, and thus breaking the driving connection between the rings 56 and 90. By means of conductors 224 and 237, the rotating field 100 of the braking mechanism 61 is energized connecting the rings 98' and adjacent ring 56 thereby stopping the rotation of the traverse 36.

In case strand or thread 172 breaks, the mercury switch 236 will similarly fall by gravity and will simultaneously deenergize the clutching mechanism 60 and energize the braking mechanism 61. When the supply on either mass M or M' is exhausted, the pressure on the ends 248 of the wires 242 are released with similar results. The tilting of each mercury switch also closes the circuit through the bulb 208 thereby signalling that the traverse has stopped rotating.

While I have illustrated and described the preferred embodiments of my invention it is to be understood that I do not limit myself to the precise construction therein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

I claim:

1. In a textile winding machine, in combination, a framework, rectangular in plan, including upstanding corner posts, bars extending the length of the framework at the top and bottom thereof, at the front of the framework, a rod extending the length of the framework at the top thereof, at the rear of the framework and cross bars joining the corner posts at the top and bottom thereof at the ends of the framework, a plurality of pairs of masses of thread removably mounted on the bottom bar of the framework, a rotatable shaft supported on the front end of the top cross bars, a motor for rotating said shaft, means for connecting said motor to a source of electric motive force, a plurality of traverses mounted loosely on the shaft in spaced relationship, means for operatively and releasably connecting said traverses to the shaft, means for guiding the thread from a pair of masses to a single traverse, removable thread packages pivotally connected to the bar at the rear of the framework and adapted to be supported on the traverses for receiving threads in wound condition from the traverses, and automatic means for stopping the winding of the threads upon a break in the threads when running from the masses to the traverses or upon exhaustion of the supply of threads on the masses, the means for fixedly and releasably connecting the traverses to the shaft including clutching mechanism operatively connected to the shaft at one end of the traverses, and braking mechanism operatively connected to the other end of the traverses and means for operatively connecting said mechanisms to a source of electric motive power, the means for guiding the thread from the masses to the traverses including a frame bar between the front corner posts intermediate the top and bottom of the framework, subframes spaced along said intermediate bar in spaced relation, one of said subframes being disposed below and in line with a traverse on the shaft, each subframe including an elongated plate radial curved enlargements along one long edge of the plate, at each end of the plate, said enlargements having central notches disposed in the path of movement of the thread from the masses to the traverse and adapted to receive said thread.

2. A textile winding machine as defined in claim 1 wherein the pivotal connection between the packages and rear rod includes an elongated arm pivotally connected at one end to the rod, a conical shaped spindle carried at the other end of the arm disposed radially thereof for removably mounting the thread package.

3. A textile winding machine as defined in claim 2 and a weight on the end of the arm mounting the spindle above the spindle for yieldingly pressing the package against the traverse.

4. A textile winding machine as defined in claim 3 wherein the automatic means for stopping the winding of the thread includes at least one pivotally mounted mercury switch, said pivotal mounting including an elongated wire pivoted intermediate its ends to the plate, a tube supported at one end of the wire, said tube containing mercury, electrical contacts carried at the ends of the tube, a supply of mercury in said tube adapted to roll into engagement with either of said contacts, when the tube is tilted by gravity, the other end of the wire being bent and disposed across the plate, at least one curved wire disposed upwardly on the plate adjacent the bent end of the wire, said curved wire adapted to receive a thread passing from the notch and over and in pressing contact with the bent end of the wire to keep the tube in even keel with the surface of the plate, said tube being heavier than the bent end of the wire, said tube being electrically and operatively connected to the clutching mechanism associated with the traverse and with the braking mechanism associated with the traverse so that upon breaking of the thread and release of the pressure thereof on the bent end, the tube will fall by gravity thereby breaking the circuit through the clutching mechanism and closing the circuit through the braking mechanism.

5. A textile winding machine as defined in claim 3 wherein the automatic means for stopping the winding of the thread from a pair of masses includes a pivotally mounted mercury switch associated with the thread of each mass, the pivotal mounting of each switch including an elongated wire pivoted intermediate its ends to the plate, a tube supported at one end of the wire, said tube containing mercury, electrical contacts carried at the ends of the tube, a supply of mercury in said tube adapted to roll into engagement with either of said contacts, when the tube is tilted by gravity, the other end of the wire being bent and disposed across the plate, curved wires disposed upwardly on the plate adjacent the bent ends of the wires, said curved wires adapted to receive threads passings from the notch and over and in pressing contact with the bent ends of the wires to keep the tubes in even keel with the surface of the plate, said tubes being heavier than the bent ends of the wires, said tubes being electrically and operatively connected to the clutching mechanism associated with the traverse and with the braking mechanism associated with traverse so that upon breaking of the threads and release of the pressure thereof on the bent ends, the tubes will fall by gravity thereby breaking the circuit through the clutching mechanism and closing the circuit through the braking mechanism.

6. A textile winding machine as defined in claim 5 wherein an electrical relay is interposed between the source of electric motive power and the mercury switches, whereby the rotating fields of the clutching mechanism and of the braking mechanism cannot be energized at the same time.

7. A textile winding machine as defined in claim 6 and an electric light bulb operatively connected across the

relay and source of electric motive power, for indicating that an individual traverse has stopped rotating.

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STANLEY N. GILREATH, *Primary Examiner.*

U.S. Cl. X.R.

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