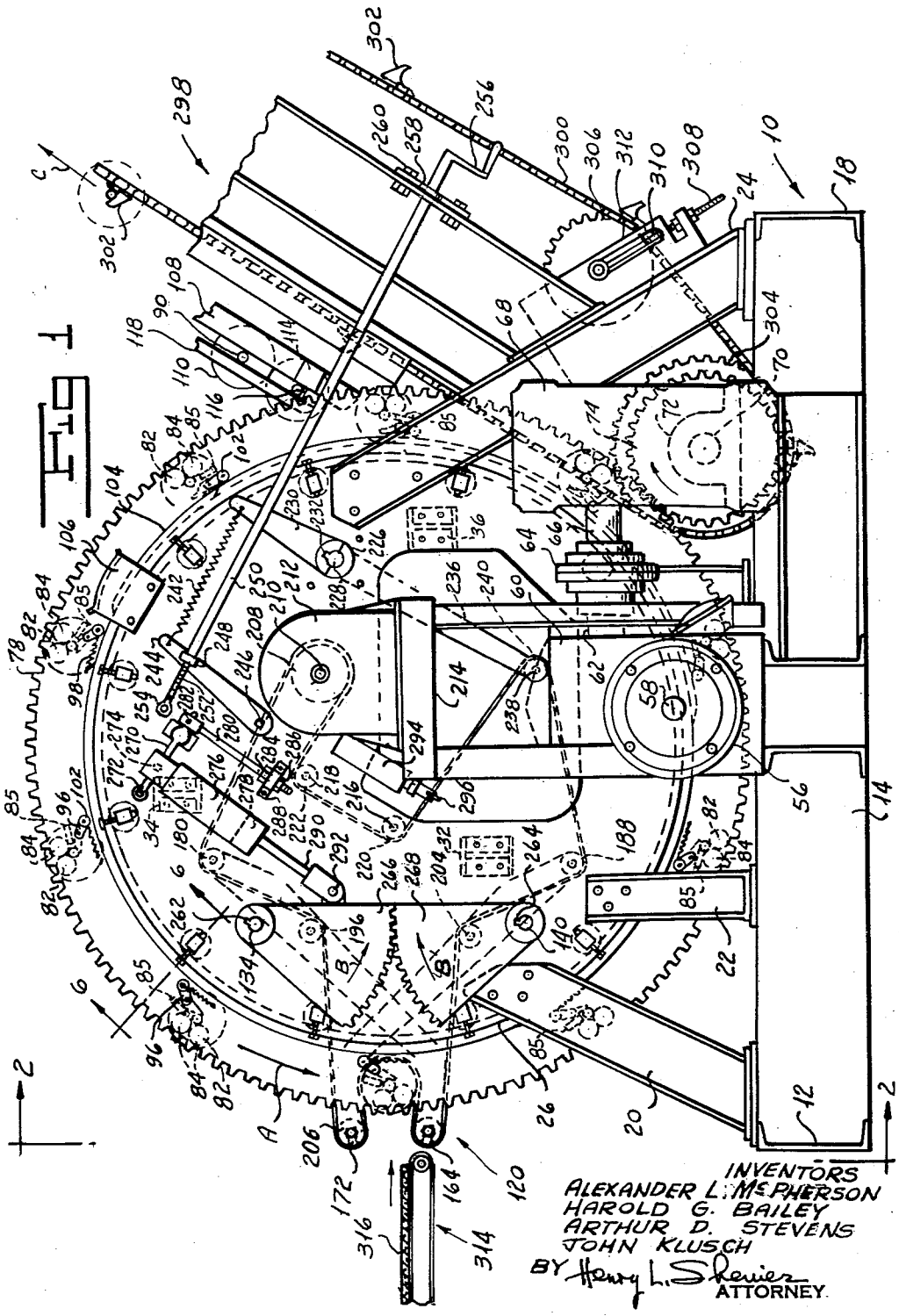
Nov. 28, 1961 A. L. McPHERSON ET AL 3,010,668

REEL FEED MAT WINDING MACHINE

Filed April 8, 1957 6 Sheets-Sheet 1



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REEL FEED MAT WINDING MACHINE

Filed April 8, 1957 6 Sheets-Sheet 2

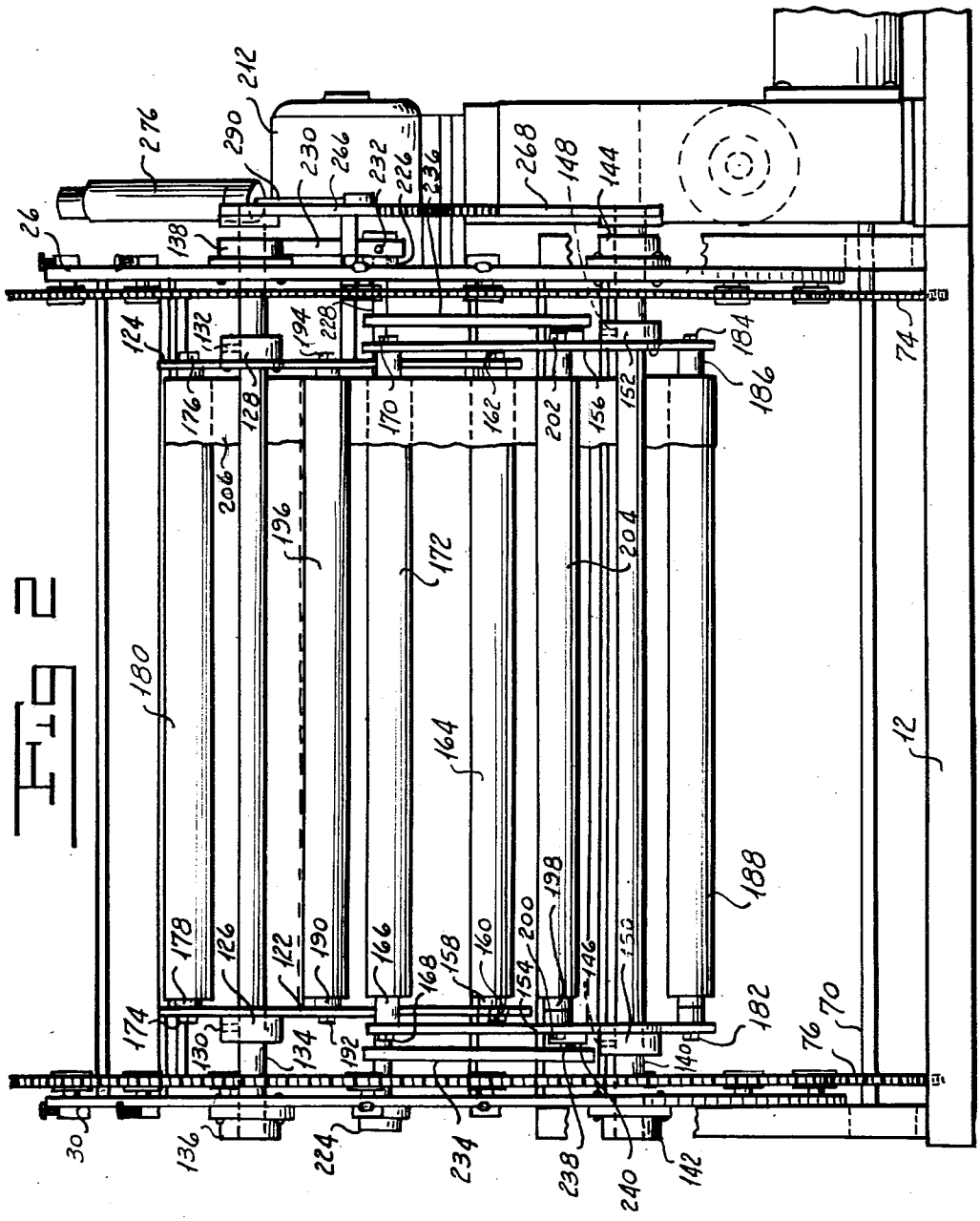


FIG. 2

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REEL FEED MAT WINDING MACHINE

Filed April 8, 1957 6 Sheets-Sheet 3

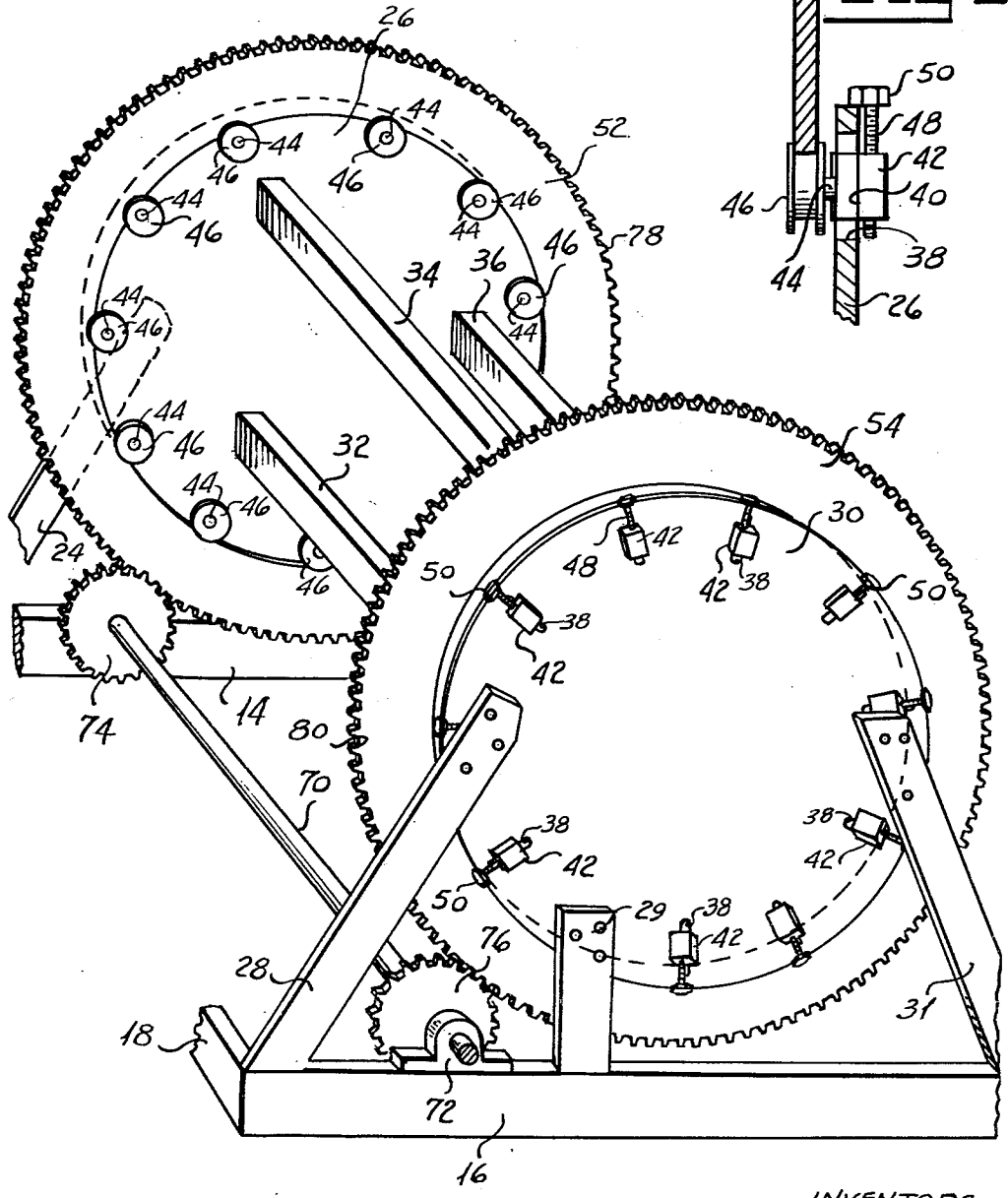


FIG 3

FIG 6

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REEL FEED MAT WINDING MACHINE

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Fig 4

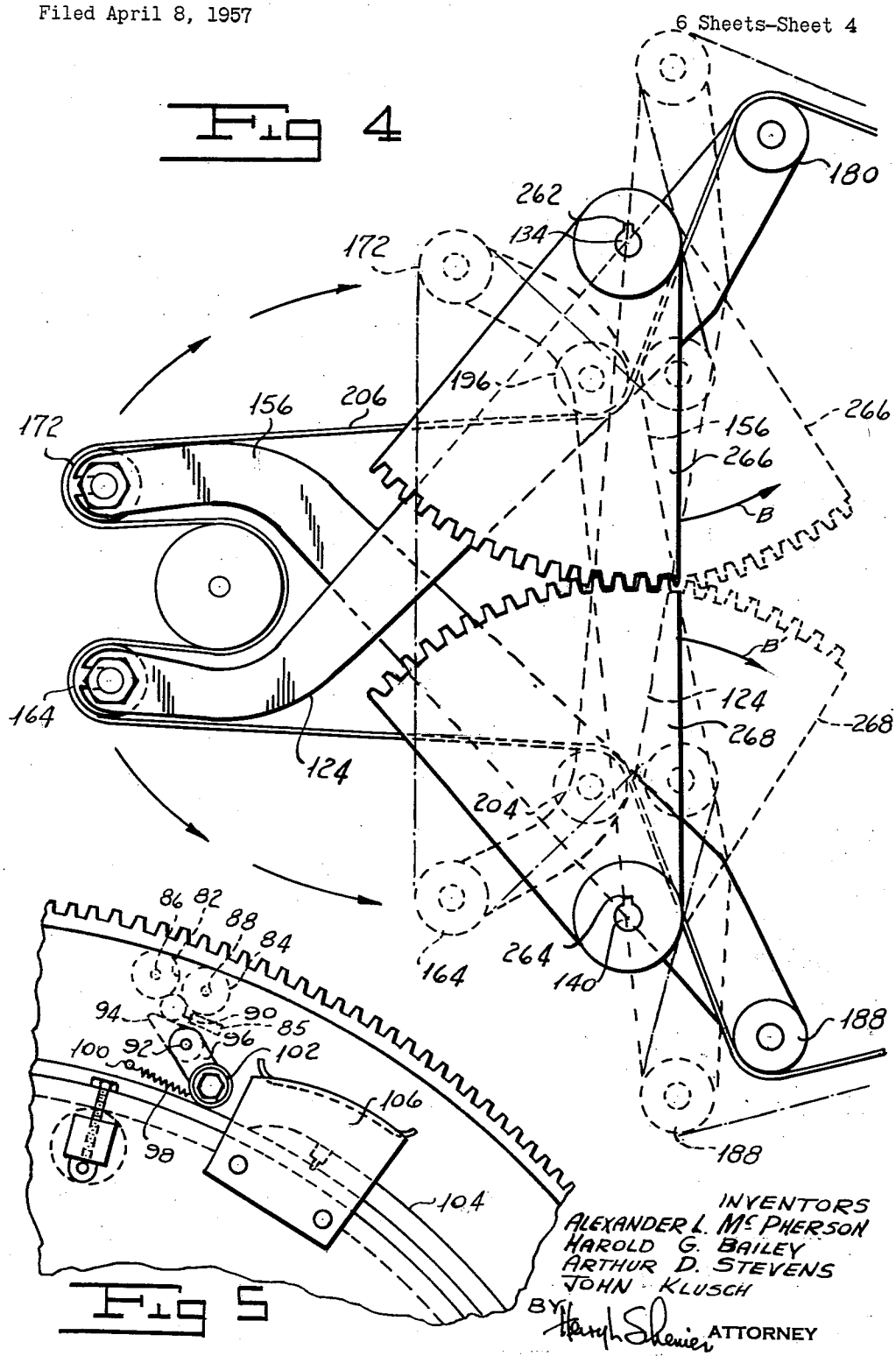


Fig 5

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REEL FEED MAT WINDING MACHINE

Filed April 8, 1957 6 Sheets-Sheet 5

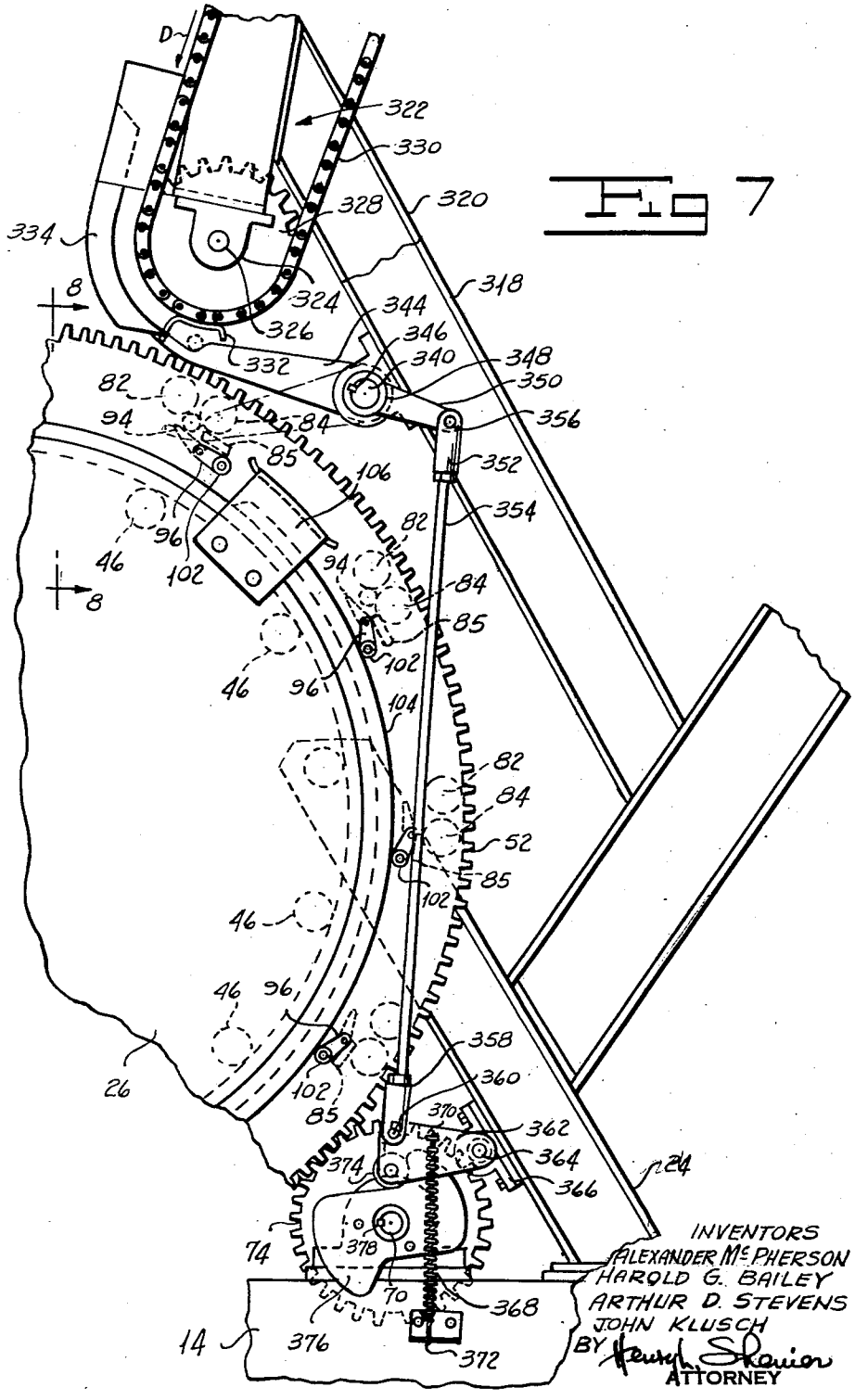


Fig 7

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REEL FEED MAT WINDING MACHINE

Filed April 8, 1957 6 Sheets-Sheet 6

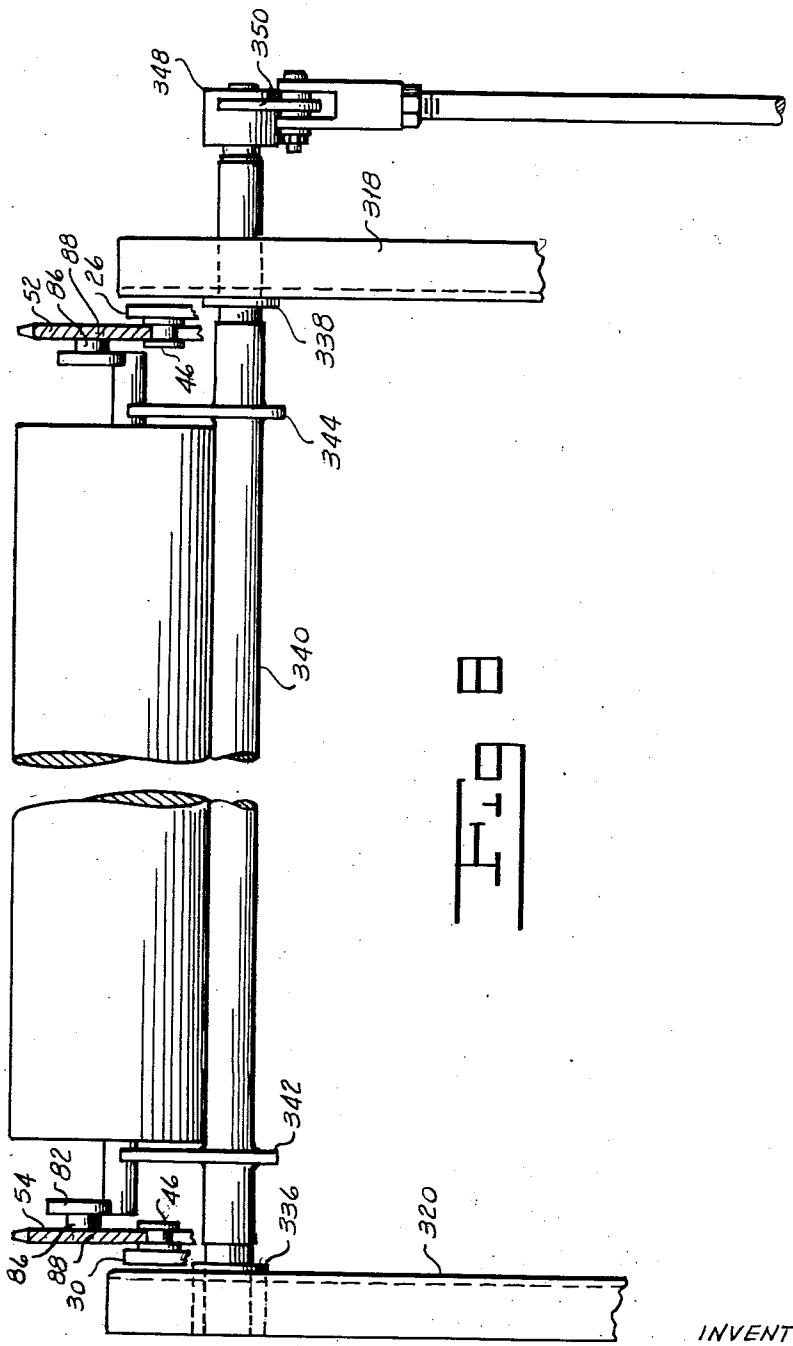


FIG. 11

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United States Patent Office 3,010,668 Patented Nov. 28, 1961

3,010,668

REEL FEED MAT WINDING MACHINE

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Filed Apr. 8, 1957, Ser. No. 651,341
11 Claims. (Cl. 242—55.1)

Our invention relates to a reel feed mat winding machine and more particularly to a reel feed mat winding machine which represents an improvement over mat winding machines of the prior art.

As is known in the prior art, lengths of a mat or bat of resin-impregnated fibrous material are wrapped about mandrels in the manufacture of tubes of insulating material. If a satisfactory tube having a uniform wall thickness and density is to be made, it is essential that the mandrel being wrapped be firmly held and accurately located in a fixed position during the winding operation.

The copending application of Frederick N. Stephens et al., Serial No. 430,012, filed May 17, 1954, now Patent No. 2,848,175, discloses a linear feed mat winding machine in which mandrels to be wrapped are supported by a pair of chain conveyors which are driven to move the mandrels to a position at which they may be acted upon by the mat winding unit of the machine. We have invented a mat winding machine which embodies an improvement over the machine disclosed in the said copending application. Our improved machine provides a firmer support for and more accurately locates mandrels being fed to a mat winding unit than does the chain conveyor disclosed in the copending application. Our improved machine firmly supports a mandrel being wrapped in a fixed position during a winding operation. Our machine is compact in that it occupies a relatively small space as compared with machines of the prior art. Our improved machine includes a simple winding unit for wrapping lengths of impregnated fibrous material about mandrels.

One object of our invention is to provide a reel feed mat winding machine which firmly supports and accurately locates mandrels being fed to a mat winding unit.

Another object of our invention is to provide a reel feed mat winding machine which firmly holds a mandrel being wrapped in a fixed position during a winding operation.

A further object of our invention is to provide a reel feed mat winding machine which is compact.

Yet another object of our invention is to provide a reel feed mat winding machine which includes a simple mat winding unit for wrapping lengths of material about mandrels.

In general our invention contemplates the provision of a reel feed mat winding machine including a reel having means for firmly supporting mandrels fed to the reel. The reel receives mandrels to be wrapped at a location remote from the winding unit of the machine. We provide means for driving the reel to move the mandrel supporting means from the location at which mandrels are fed to the reel to the mat winding unit. The mat winding unit of our machine includes a pair of pocket forming rolls and an endless belt carried by the rolls. Our machine includes means for moving the pocket forming rolls from positions at which they form a pocket of the belt about a mandrel to be wrapped to positions at which a length of belt is extended between the rolls.

In the accompanying drawings which form part of the instant specification and which are to be read in conjunction therewith and in which like reference numerals are used to indicate like parts in the various views:

FIGURE 1 is a side elevation of our reel feed mat winding machine.

FIGURE 2 is a front elevation of our reel feed mat winding machine taken along the line 2—2 of FIGURE 1.

FIGURE 3 is a perspective view of our reel feed mat winding machine with some parts removed and with other parts broken away.

FIGURE 4 is a schematic view of the winding unit of our reel feed mat winding machine showing the action of the pocket forming rolls.

FIGURE 5 is a fragmentary view of our reel feed mat winding machine showing the mandrel support means used on our reel.

FIGURE 6 is a fragmentary view showing one of the reel supporting rollers of our reel feed mat winding machine.

FIGURE 7 is a fragmentary side elevation of our reel feed mat winding machine showing an alternate form of mandrel feed mechanism.

FIGURE 8 is a fragmentary elevation of our reel feed mat winding machine showing the alternate form of mandrel feed mechanism shown in FIGURE 7 with parts removed and other parts broken away taken along the line 8—8 of FIGURE 7.

Referring more particularly to FIGURES 1 to 3 of the drawings, our reel fed mat winding machine includes a retangular base, indicated generally by the reference character 10, having a front 12, sides 14 and 16, and a back 18. A plurality of respective supports 20, 22, and 24 carried by base 10 are bolted or otherwise secured to a first circular end plate 26 of our machine. A plurality of support members 28, 29 and 31 support the other circular end plate 30 of our machine. A plurality of beams 32, 34, and 36 are bolted or otherwise secured between plates 26 and 30.

As can be seen by reference to FIGURES 1 to 3 and 6, we form each of the end plates 26 and 30 with a plurality of slots 38 spaced around its periphery. The sides of each of the slots 38 engage grooves 40 formed in the sides of blocks 42. Each block 42 carries a fixed stub shaft 44 on which we rotatably mount a grooved roller 46. A plurality of bolts 48 threaded into blocks 42 have heads 50 which bear against the edge of the plate 26 or 30 carrying the associated blocks. It will readily be appreciated that the position of a block 42 in its slot 38 may be adjusted by turning the associated bolt 48. We hang one of the annular end members 52 of the reel of our machine on the rollers 46 carried by plate 26. We hang the other annular end member 54 of the reel of our machine on the rollers 46 carried by end plate 30. Each of the members 52 and 54 rests in the grooves of its supporting rollers 46. It will be appreciated that the positions of the blocks 42 may be adjusted to provide a firm support for members 52 and 54 while permitting the members to rotate.

A motor 56 carried by base 10 drives a shaft 58 which is the input shaft of a gear box 60 having an output shaft 62. A coupling 64 connects shaft 62 to the input shaft 66 of a gear box 68 having an output shaft 70 rotatably supported in a bearing 72 carried by the base 10. Shaft 70 carries for rotation therewith respective gears 74 and 76, the teeth of which engage respective sets of teeth 78 and 80 formed on the peripheries of members 52 and 54. It will be appreciated that when shaft 70 rotates, gears 74 and 76 drive the reel and members 52 and 54 as a unit.

Referring now to FIGURES 1 and 5, we rotatably mount pairs of rollers 82 and 84 on respective stub shafts 86 and 88 carried by each of the members 52 and 54 adjacent their peripheries. We space the pairs of rollers 82 and 84 around the peripheries of members 52 and 54. Each of the pairs of rollers is adapted to receive the end of a mandrel shaft indicated in phantom at 90 in FIGURE

5. Each of a plurality of respective pins **92** rotatably supported by the members **52** and **54**, adjacent the pairs of rollers **82** and **84**, carries a respective latch **94** for rotation with it. The end of each pin **92** remote from the end of the pin carrying a latch **94** supports for rotation with it a crank arm **96**. Each of a number of respective springs **98** connected at one end to an arm **96** and at the other end to a pin **100** normally urges its associated shaft **92** to rotate in a direction to move latch **94** toward the corresponding pair of rollers **84** and **86**. The end of each arm **96** remote from pin **92** pivotally supports a cam follow roller **102** adapted to engage a cam track **104** on an end plate **26** or **30**. Each of the plates **26** and **30** carries a guide **106** for ensuring that the rollers **102** leave the high portions of tracks **104** as the reel steps.

We provide a magazine **108** supported adjacent the reel including members **52** and **54** for feeding mandrels **110**, having shafts **90**, to respective pairs of rollers **82** and **84** carried by the members **52** and **54**. The magazine is provided with feed mechanisms **114** having fingers **116** which normally prevent a mandrel from moving out of the magazine. Guides **118** direct the mandrels toward the reel. When a mandrel is to be fed, the fingers **116** are withdrawn to permit the mandrel to fall into the space between members **52** and **54**. Each of the mandrel shaft ends falls into the space between a latch **94** and the associated pair of rollers **84** and **82**. It is to be noted that in this position of a corresponding pair of latches **94**, the contour of cam surface **104** is such that the latch ends are moved away from the associated pairs of rollers **82** and **84**. In this position of the latches, however, each of the ends of a mandrel shaft **90** coming from the magazine is caught between a latch and a pair of rollers. Blocks **85** associated with the respective pairs of rollers **82** and **84** and carried by reel members **52** and **54** form the backs of the mandrel shaft end receiving pockets when the latches are open. After a mandrel has been fed to the reel, the reel is stepped in the direction of the arrow A in FIGURE 1. As the reel is stepped, the rollers **102** ride off the high portion of cam **104** and springs **98** urge the latches **94** toward the pairs of rollers **86** and **88** to hold the ends of the mandrel shaft **90** firmly against the rollers.

Each time the reel is stepped, an empty mandrel is presented to the winding unit, indicated generally by the reference character **120**, of our machine. Referring now to FIGURES 1, 2, and 4 the unit includes a pair of respective upper arms **122** and **124** having hubs **126** and **128** intermediate the arm ends. Any convenient means such as set screws **130** and **132** secure hubs **126** and **128** to a shaft **134** for rotation therewith. Bearings **136** and **138** on the respective end plates **26** and **30** rotatably support shaft **134**.

We rotatably mount a lower arm shaft **140** in bearings **142** and **144** fixed on the respective plates **26** and **30**. Set screws **146** and **148** fix the hubs **150** and **152** of the winding unit lower arms **154** and **156** on shaft **140** for rotation with the shaft. We secure the ends of a shaft **158** to the lower ends of arms **122** and **124** as viewed in FIGURE 2 by means of nuts **160** and **162**. Shaft **158** rotatably carries a first pocket forming roll **164** of winding unit **120**. We secure the ends of a shaft **166** to the upper ends of arms **154** and **156** as viewed in FIGURE 2 by means of nuts **168** and **170**. Shaft **166** rotatably carries the second pocket forming roll **172** of unit **120**. Respective nuts **174** and **176** secure the ends of a shaft **178** to the upper ends of arms **122** and **124** as viewed in FIGURE 2. Shaft **178** rotatably carries a belt supporting roll **180** of unit **120**. Respective nuts **182** and **184** secure the ends of a shaft **186** to the lower ends of arms **154** and **156** as viewed in FIGURE 2. Shaft **186** rotatably carries a belt supporting roll **188** of the unit **120**.

A shaft **190** secured between arms **122** and **124** at a point intermediate the length of the arms by nuts **192** and **194** rotatably carries another guide roll **196**. A shaft **198** fixed between arms **154** and **156** at a position intermediate the length of the arms by nuts **200** and **202** rotatably carries a guide roll **204**.

Winding unit **120** includes an endless belt **206** carried by rolls **180**, **172**, **164**, and **188** and guided by rolls **196** and **204**. Belt **206** surrounds a drive roll **208** carried by a shaft **210** driven by a motor **212** disposed on a platform **214** carried by the base **10**. Respective shafts **216** and **218** extending between plates **26** and **30** rotatably carry respective idler rolls **220** and **222** around which belt **206** extends. Respective bearings **224** and **226** carried by plates **30** and **26** rotatably support a shaft **228**. We secure an arm **230** to the end of shaft **228** outboard of side plate **26** by any convenient means such as a set screw **232** or the like. We mount a pair of arms **234** and **236** on shaft **228** adjacent the inboard surfaces of plates **30** and **26** for rotation with the shaft **228**. A shaft **238** fixed between the ends of arms **234** and **236** remote from shaft **228** rotatably carries the belt tensioning roll **240** of unit **120**. We fix a spring **242** between the end of arm **230** remote from shaft **228** and the end of an arm **244** pivoted on a pin **246** carried by the plate **26**. We pivotally mount a block **248** adjacent the end of arm **244** remote from pin **246**. A threaded stud **252** pivotally carried by a pin **254** on plate **26** passes through a bore in block **248** and threadably engages the interior of a hollow rod **250**. The end of rod **250**, into which stud **252** extends, pivotally engages a socket in the block **248** under the action of spring **242**. It will be appreciated that as rod **250** turns in either direction, the arm **244** moves to vary the tension on spring **242** and thus the tension on the winding belt **206**. We provide the end of rod **250** remote from stud **252** with a crank handle **256** by means of which the rod may be rotated. A bracket **258** secured to the discharge conveyor structure, to be described hereinafter, by means of bolts **260** loosely supports rod **250**.

We employ respective keys **262** and **264** to mount meshing segmental gears **266** and **268** on the ends of shafts **134** and **140** outboard of plate **26**. An arm **270** pivotally carried by a pin **272** on plate **26** carries a pin **274** intermediate its length on which we mount the cylinder **276** of a piston and cylinder assembly including a piston **278**. We connect the end of arm **270** remote from pin **272** to a rod **280** by means of a pin **282**. Respective nuts **284** and **286** adjustably position the end of rod **280** remote from pin **282** in a bracket **288** carried by plate **26**. Piston **278** carries a rod **290** pivotally connected to gear **266** by a pin **292**. When fluid under pressure is admitted to cylinder **276** behind piston **278**, gears **266** and **268** are driven in the direction of the arrows B and B' shown in FIGURES 1 and 4 to move the pocket forming rolls **164** and **172** to the open position where a straight length of belt **206** extends between the rolls. This is the position of the rolls of winding unit **120** shown in broken lines in FIGURE 4. The assembly including arm **270** and rod **280** permits adjustment of the open and closed positions of rolls **164** and **172**.

Each of plates **26** and **30** carries a belt tracking device **294** of a type known to the art. Each of the devices **294** includes a roller **296** extending through an opening in the plate to engage an edge of the belt **206** to center the belt in a manner known to the art.

After a mandrel has been wrapped by the unit **120**, and as the reel including members **52** and **54** is stepped in the direction of the arrow A in FIGURE 1, the rollers **102** associated with the latches **104** engaging the mandrel shaft ends of the wrapped mandrel ride onto the high portion of track **104** to release the mandrel shaft ends. At a point in the reel rotation following the point at which the latches **94** engaging a wrapped mandrel are released, we dispose a discharge conveyor indicated generally by the reference character **298** including a pair of spaced pitch chains **300**, one of which is shown in FIGURE 1. Each of the chains **300** carries along its length spaced mandrel end engaging members **302**. The disposition of a chain is such that as it travels in the direction of the arrow C of

FIGURE 1, a member **302** on the chain engages the end of a wrapped mandrel shaft which has been released by a latch **94**. The shaft **70** which drives gears **74** and **76** to drive the reel including members **52** and **54** carries a pair of sprocket wheels **304**, one of which is shown in FIGURE 1, which drive the chains **300**. Idler sprocket wheels **306** adjustably mounted by studs **308** in slots **310** formed in brackets **312** supported on the machine frame provide a means for adjusting the discharge conveyor tension.

Our machine includes a conveyor, indicated generally by the reference character **314** for feeding a length **316** of a mat of impregnated fibrous material to the lower nip between belt **206** and the mandrel to be wrapped.

Referring now to FIGURES 7 and 8 we have invented an alternate form of the means for feeding empty mandrels to the reel of our machine. A pair of supports **318** and **320** carried by the frame of discharge conveyor **298** support a framework indicated generally by the reference character **322**. We mount a pair of spaced bearings **324** on framework **322** for rotatably carrying a feed conveyor shaft **326** on which we mount respective pitch chain sprocket wheels **328**, one of which is shown in FIGURE 7. Respective chains **330** one of which is shown in FIGURE 7 are driven by sprocket wheels **328** to form the feed conveyor for our machine. Mandrel end support members **332** fixed on chains **330** are constructed to support mandrels on the conveyor. Any suitable means known to the art such as a motor (not shown) may be used to drive shaft **326** to drive the sprocket wheels **328** to move the conveyor formed by chains **330**. We space successive supports **332** along the length of chains **330** and select the speed of the chain drive to coordinate the action of the feed conveyor with the remainder of the machine.

It will be seen that as chains **330** move in the direction of the arrow D in FIGURE 7, empty mandrels from discharge conveyor **298** placed on the carriers **332** of the feed conveyor will be carried around to a guide **334** which guides the mandrel to a position at which they may be fed to the reel. Respective bearings **336** and **338** carried by members **320** and **318** rotatably support a shaft **340**. We mount a pair of spaced mandrel end receiving arms **342** and **344** on shaft **340** for rotation with the shaft. Any convenient means such as a key **346** fixes the hub **348** of a crank arm **350** on an end of shaft **340** extending outboard of member **318**. A fitting **352** pivotally connects one end of a rod **354** to a pin **356** supported in the end of crank **350** remote from hub **348**. A fitting **358** connects the other end of rod **354** to a pin **360** carried by a crank **362** fixed on a shaft **364** rotatably supported in a bearing **366** secured to member **24**. A spring **368** extending between a bracket **370** on crank **362** and a bracket **372** carried by frame member **14** actuates the crank to move a cam follower roller **374** into engagement with the surface of a cam **376** secured to shaft **70** for rotation with the shaft by any suitable means such as a key **378**. It will be remembered that shaft **70** is driven to step the reel of our machine and to drive discharge conveyor **298**. As shaft **70** rotates a high portion of cam **376** engages roller **374** to move rod **354** upwardly to pivot shaft **340** in a counterclockwise direction to move arms **342** and **344** to the broken line position shown in FIGURE 7. When the high portion of cam **376** leaves the roller **374** the parts return to the full line position shown in FIGURE 7. We so arrange the feed conveyor that in the full line position of arms **342** and **344** an empty mandrel is fed to the arms.

On the next step in operation of the reel the arms are swung downwardly to position the mandrel shaft ends so that respective open pockets each formed by a latch **94**, a pair of rollers **82** and **84** and a block **85** pass over the mandrel ends to lift the mandrel off the arms **342** and **344**. As the step of the reel is completed a high portion of cam **76** leaves roller **374** to permit arms **342** and **344** to return to the full line position under the action of spring **368**. In this position the arms are again ready to receive an empty mandrel from the feed conveyor formed by chains **330**. It is to be understood that we have arranged the parts of our machine so that a fresh mandrel is fed to the reel each time a wrapped mandrel is removed from the reel.

In operation of our reel feed mat winding machine, mandrels **110** to be wrapped are fed to the reel from magazine **108** by the release mechanisms including fingers **116**. Each time the reel including members **52** and **54** is stepped, a pair of corresponding open latches **94** adapted to receive an empty mandrel shaft are presented to magazine **108**. After the mandrel has been fed to the open latches, the reel is again stepped. It will be remembered that between each pair of successive steps of the reel, a winding operation is completed by the unit **120**. As the reel is stepped from a position where a pair of open latches **94** and blocks **85** received an empty mandrel, the followers **102** corresponding to the latches leave the high portion **104** of the machine cam track and springs **98** actuate latches **94** to move the mandrel shaft ends into engagement with the pairs of rollers **82** and **84**. As the machine continues in operation, the empty mandrel arrives at the mat winding unit **120**. It is to be understood, of course, that during movement of the reel including members **52** and **54** fluid under pressure is admitted behind piston **78** to move the mat winding unit **120** to the open position of rolls **164** and **172** shown in FIGURE 4 in broken lines. At the end of a step of rotation of the reel, fluid under pressure is admitted to cylinder **276** to act on the face of piston **278** to return the rolls **164** and **172** to the wrapping position shown in full lines in FIGURE 4. In this condition of a unit, rolls **164** and **172** form a pocket of belt **206** about an empty mandrel to be wrapped. In the course of a winding operation, motor **212** drives roll **208** to drive the belt and wrap a length of material **316** about the empty mandrel. Upon completion of the winding operation, the unit **120** again opens to permit the reel to step.

As the reel is stepped and a wrapped mandrel moves toward discharge conveyor **298**, the high portion of cam track **104** actuates latches **94** to permit members **302** of the discharge conveyor to lift the mandrel ends off the reel and to carry the mandrel away from the machine.

In use of the form of mandrel feed means shown in FIGURES 7 and 8 before the reel steps arms **342** and **344** occupy the full line position shown in FIGURE 7 and receive an empty mandrel from the feed conveyor formed by chains **330**. In the course of the next stepping operation of the reel cam **376** actuates rod **354** to move arms **342** and **344** to the broken line position shown in FIGURE 7 in which position a pair of mandrel end receiving pockets each formed by a latch **94**, a pair of rollers **82** and **84** and a block **85** may carry the mandrel off the arms. As the reel stepping movement is completed spring **368** returns the arms to the full line position shown in FIGURE 7.

It will be seen that we have accomplished the objects of our invention. We have provided a reel feed mat winding machine which firmly holds mandrels in a fixed position during a wrapping operation. Our machine accurately positions a mandrel for winding to ensure the formation of a tube of insulation having a uniformly thick and uniformly dense wall. Our machine is more compact than similar machines of the prior art.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of our claims. It is further obvious that various changes may be made in details within the scope of our claims without departing from the spirit of our invention. It is therefore to be understood that our invention is not to be limited to the specific details shown and described.

Having thus described our invention, what we claim is:

1. In a mat winding machine for wrapping lengths of a mat of fibrous material about mandrels a mat winding unit including respective pairs of arms, means pivotally

mounting said pairs of arms at respective pivot points intermediate the lengths of the arms of each pair, respective pocket forming rolls supported between one pair of corresponding ends of the arms of each pair, respective guide rolls supported between the other corresponding ends of the arms of each pair, an endless belt extending around said pocket forming rolls and said guide rolls and means moving said pairs of arms about their pivot points alternately to form a pocket of said belt about a mandrel being wrapped and to extend a length of said belt between said pocket forming rolls.

2. A mat winding unit as in claim 1 including second guide rolls supported by the respective pairs of arms at locations intermediate the length of the arms of the pair, said belt being arranged to pass over said second guide rolls.

3. A mat winding unit as in claim 1 in which said arm mounting means comprises respective shafts, and in which said arm moving means comprises means for rocking said shafts.

4. A mat winding machine for wrapping lengths of a mat of fibrous material about mandrels including in combination a frame, a mat winding unit, a rigid reel rotatably carried by said frame, means mounting said mat winding unit at a fixed location on said frame substantially within the space enclosed by said reel, means for supporting a plurality of respective mandrels on said reel, each of said mandrels supporting means being adapted to receive an empty mandrel at a first location remote from said winding unit, a feed conveyor for carrying empty mandrels to said reel, means for stepping said reel from said first location to said unit successively to present mandrels carried by said supporting means to said unit and means responsive to said stepping means for transferring an empty mandrel from said feed conveyor to said mandrel supporting means at said first location.

5. A mat winding machine as in claim 4 including a removal conveyor for removing a wrapped mandrel at a second location remote from said winding unit, said reel stepping means being adapted to move said reel from said unit to said second location and means for coordinating the operation of said removal conveyor with said transfer means.

6. A mat winding machine as in claim 4 in which said transfer means includes a shaft, means carried by said shaft for receiving an empty mandrel from said feed conveyor and means responsive to said reel stepping means for actuating said shaft to move said mandrel receiving means from a position at which it receives a mandrel from said feed conveyor to a position at which it delivers an empty mandrel to said mandrel supporting means.

7. A mat winding machine for wrapping lengths of a mat of fibrous material about mandrels including in combination a frame, a winding unit carried by said frame, a first rigid mandrel support member, means mounting said first mandrel support member for movement about an axis of rotation with respect to said frame and said winding unit carried by the frame, a second rigid mandrel support member, means mounting said second support member in spaced relationship to said first mandrel support member for movement about said axis of rotation with respect to said frame and the winding unit carried by the frame, said mandrel support member mounting means comprising rollers carried by said frame, said winding unit being disposed substantially within the space between said mandrel support members, means on said mandrel support members for carrying a mandrel in a fixed position on said members and means for driving said mandrel support members to move said mandrel carrying means from a position at which they receive a mandrel to a position at which a received mandrel may be acted upon by said unit.

8. A mat winding machine for wrapping lengths of a mat of fibrous material about mandrels including in combination a frame, a winding unit carried by said frame,

a first rigid mandrel support member, means mounting said first mandrel support member for movement about an axis of rotation with respect to said frame and said winding unit carried by the frame, a second rigid mandrel support member, means mounting said second support member in spaced relationship to said first mandrel support member for movement about said axis of rotation with respect to said frame and the winding unit carried by the frame, said winding unit being disposed substantially within the space between said mandrel support members, means on said mandrel support members for carrying a mandrel in a fixed position on said members, said mandrel carrying means comprising a pair of rollers adapted to receive a mandrel end and comprising means for latching said mandrel end into position on said rollers and means for driving said mandrel support members to move said mandrel support carrying means from a position at which they receive a mandrel to a position at which a received mandrel may be acted upon by said unit.

9. A mat winding machine for wrapping lengths of a mat of fibrous material about mandrels including in combination a frame, a winding unit carried by said frame, a first rigid mandrel support member, means mounting said first mandrel support member for movement about an axis of rotation with respect to said frame and said winding unit carried by the frame, a second rigid mandrel support member, means mounting said second support member in spaced relationship to said first mandrel support member for movement about said axis of rotation with respect to said frame and the winding unit carried by the frame, said winding unit being disposed substantially within the space between said mandrel support members, means on said mandrel support members for carrying a mandrel in a fixed position on said members, said mandrel carrying means comprising a pair of rollers adapted to receive a mandrel end and comprising means for latching said mandrel end into position on said rollers, means for driving said mandrel support members to move said mandrel carrying means from a position at which they receive a mandrel to a position at which a received mandrel may be acted upon by said unit and cam means carried by said frame for actuating said latching means.

10. A mat winding machine for wrapping lengths of a mat of fibrous material about mandrels including in combination a frame, a winding unit carried by said frame, a first rigid mandrel support member, means mounting said first mandrel support member for movement about an axis of rotation with respect to said frame and said winding unit carried by the frame, a second rigid mandrel support member, means mounting said second support member in spaced relationship to said first mandrel support member for movement about said axis of rotation with respect to said frame and the winding unit carried by the frame, said winding unit being disposed substantially within the space between said mandrel support members, means on said mandrel support members for carrying a mandrel in a fixed position on said members and means for driving said mandrel support members to move said mandrel carrying means from a position at which they receive a mandrel to a position at which a received mandrel may be acted upon by said unit, said mat winding unit comprising a pair of pocket forming rolls, an endless belt carried by said rolls, means mounting said rolls for movement toward each other to form a pocket of said belt about a mandrel carried by said mandrel support members and for movement away from each other to extend a length of said belt between said rolls and drive means for said mounting means.

11. A mat winding machine for wrapping lengths of a mat of fibrous material about mandrels including in combination a frame, a winding unit carried by said frame, a first rigid mandrel support member, means mounting

said first mandrel support member for movement about an axis of rotation with respect to said frame and said winding unit carried by the frame, a second rigid mandrel support member, means mounting said second support member in spaced relationship to said first mandrel support member for movement about said axis of rotation with respect to said frame and the winding unit carried by the frame, said winding unit being disposed substantially within the space between said mandrel support members, means on said mandrel support members for carrying a mandrel in a fixed position on said members and means for driving said mandrel support members to move said mandrel carrying means from a position at which they receive a mandrel to a position at which a received mandrel may be acted upon by said unit, said mat winding unit comprising a pair of pocket forming rolls, an endless belt carried by said rolls, means mounting said rolls for movement toward each other to form a pocket of said belt about a mandrel carried by said mandrel support members and for movement away from each other to extend a length of said belt between said rolls, drive means for said roll mounting means and

control means for operating said roll mounting means, drive means to move said rolls to extend a length of said belt between said rolls during movement of said mandrel support members and to move said rolls to form a pocket of said belt about a mandrel when said mandrel support members come to rest.

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