

[54] FOIL SEPARATOR AND REWIND MACHINE

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[58] Field of Search.....242/56, 56.2, 56.4, 58.1, 65, 242/67.1, 67.2, 67.3, 67.4, 67.5, 68.1, 68.4, 75.43, 75.53

[56]

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[57]

ABSTRACT

This invention relates to a machine for continuously separating and rewinding webs of foil material wherein the supply roll, dancer roll, separator roll, rewind rolls, ironing rolls, rewind roll shaft's driving coupling and rewind roll core mounting means are all constructed and arranged to permit high speed and high quality operation.

15 Claims, 11 Drawing Figures

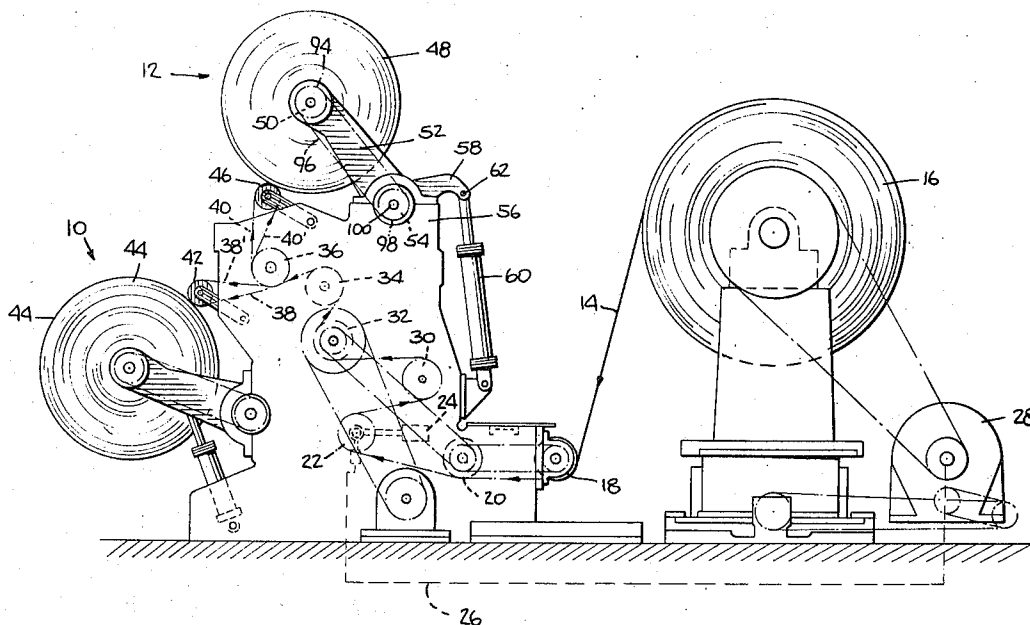
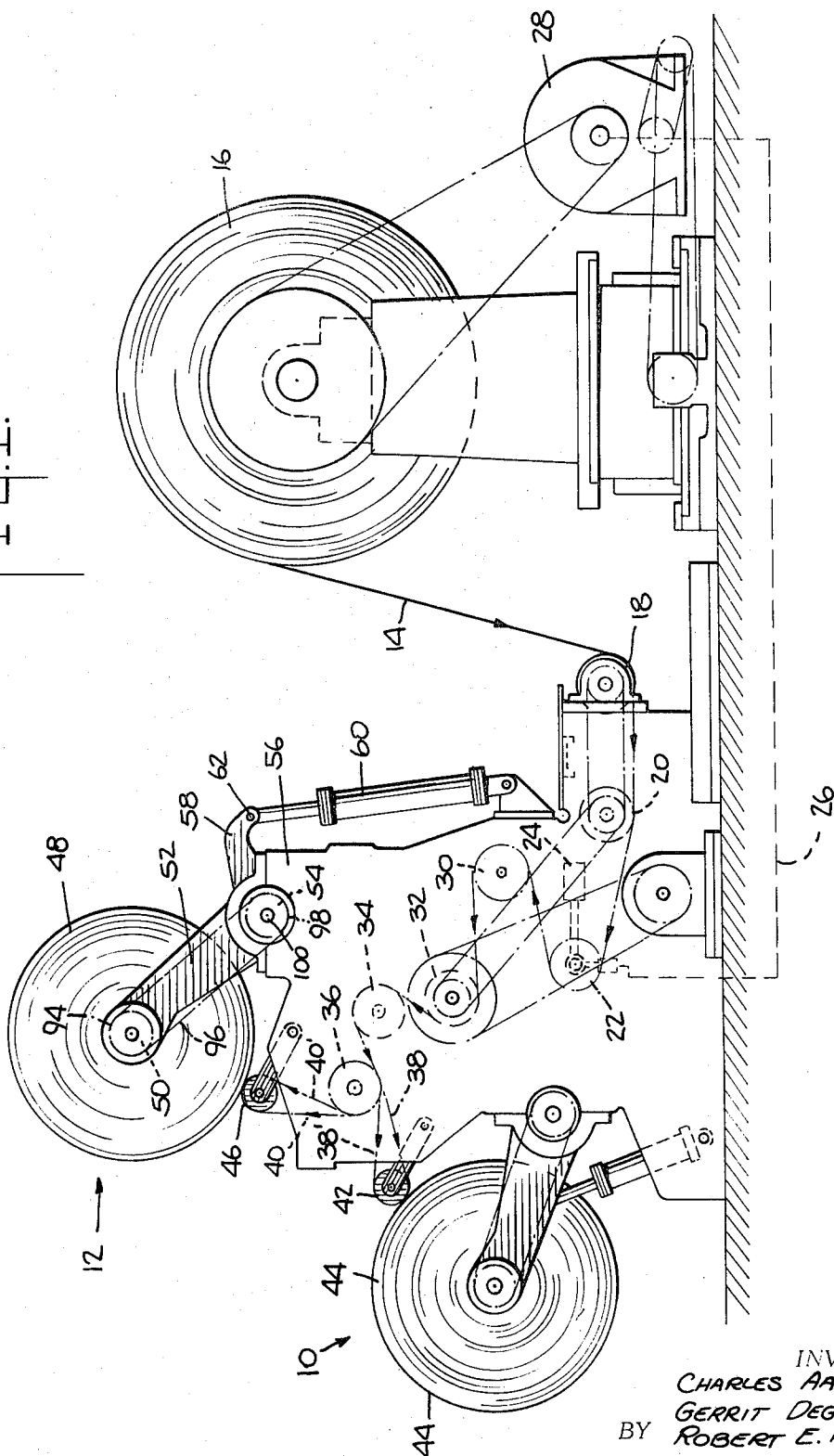
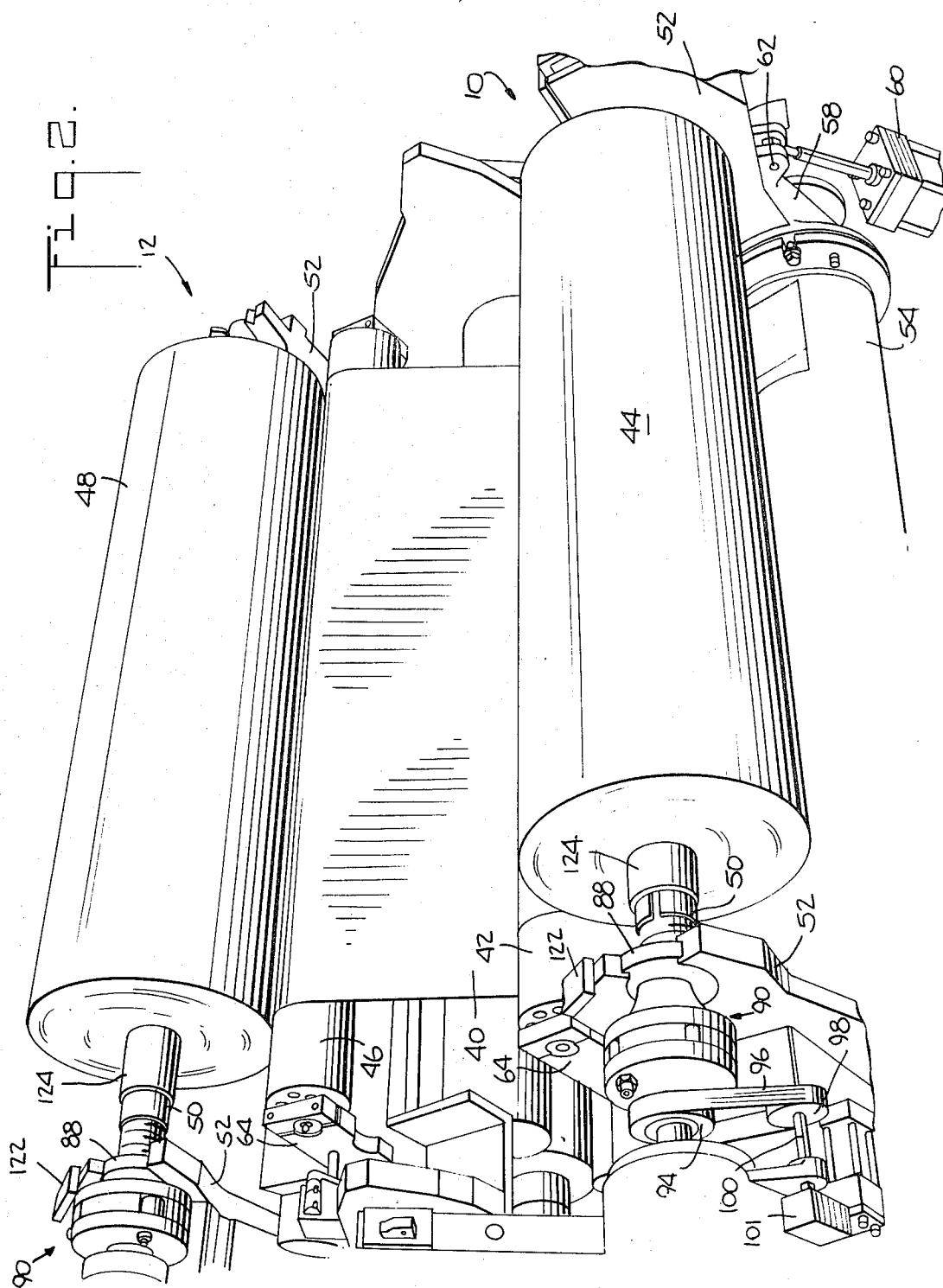


Fig. 1.



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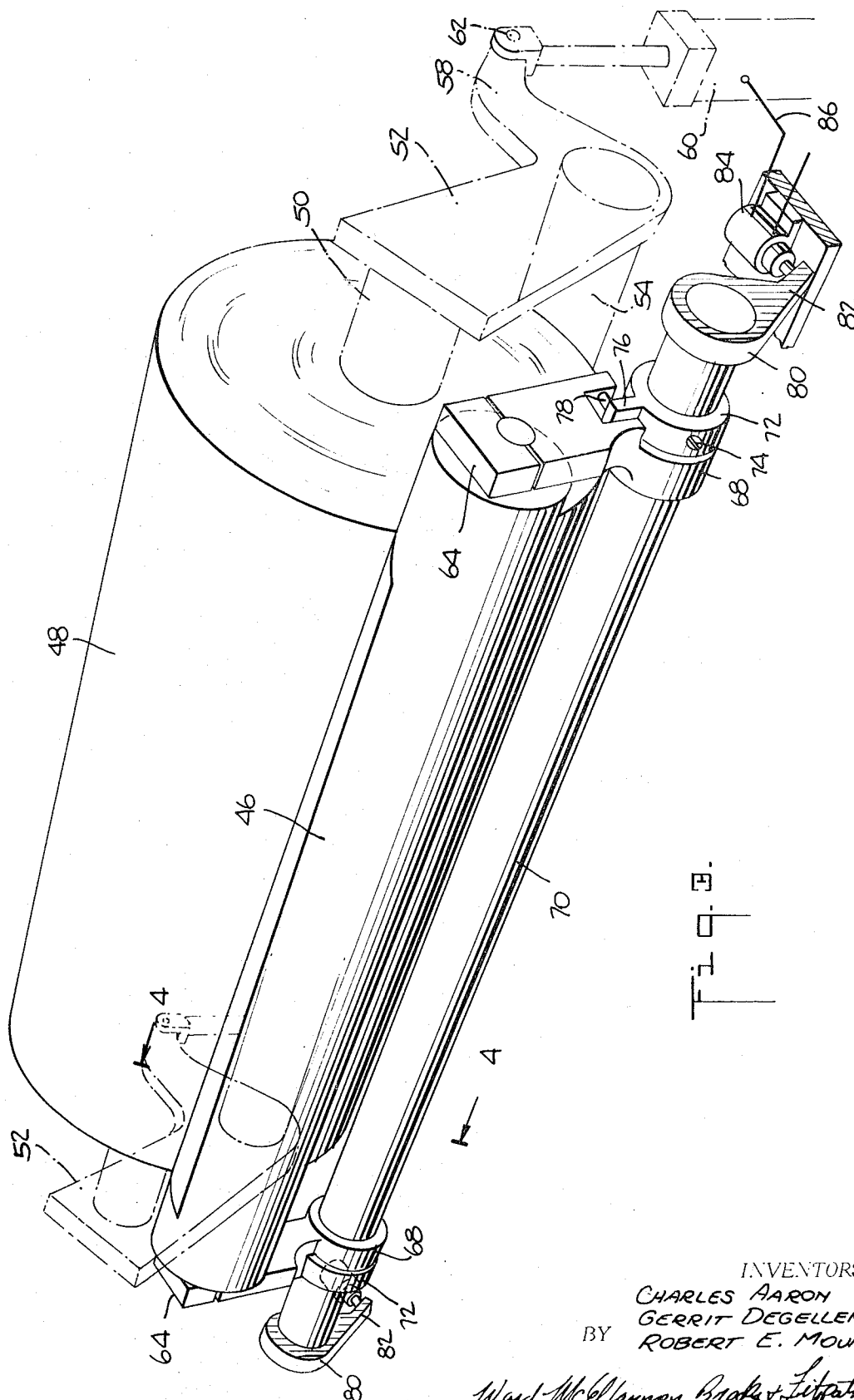


Fig. 3.

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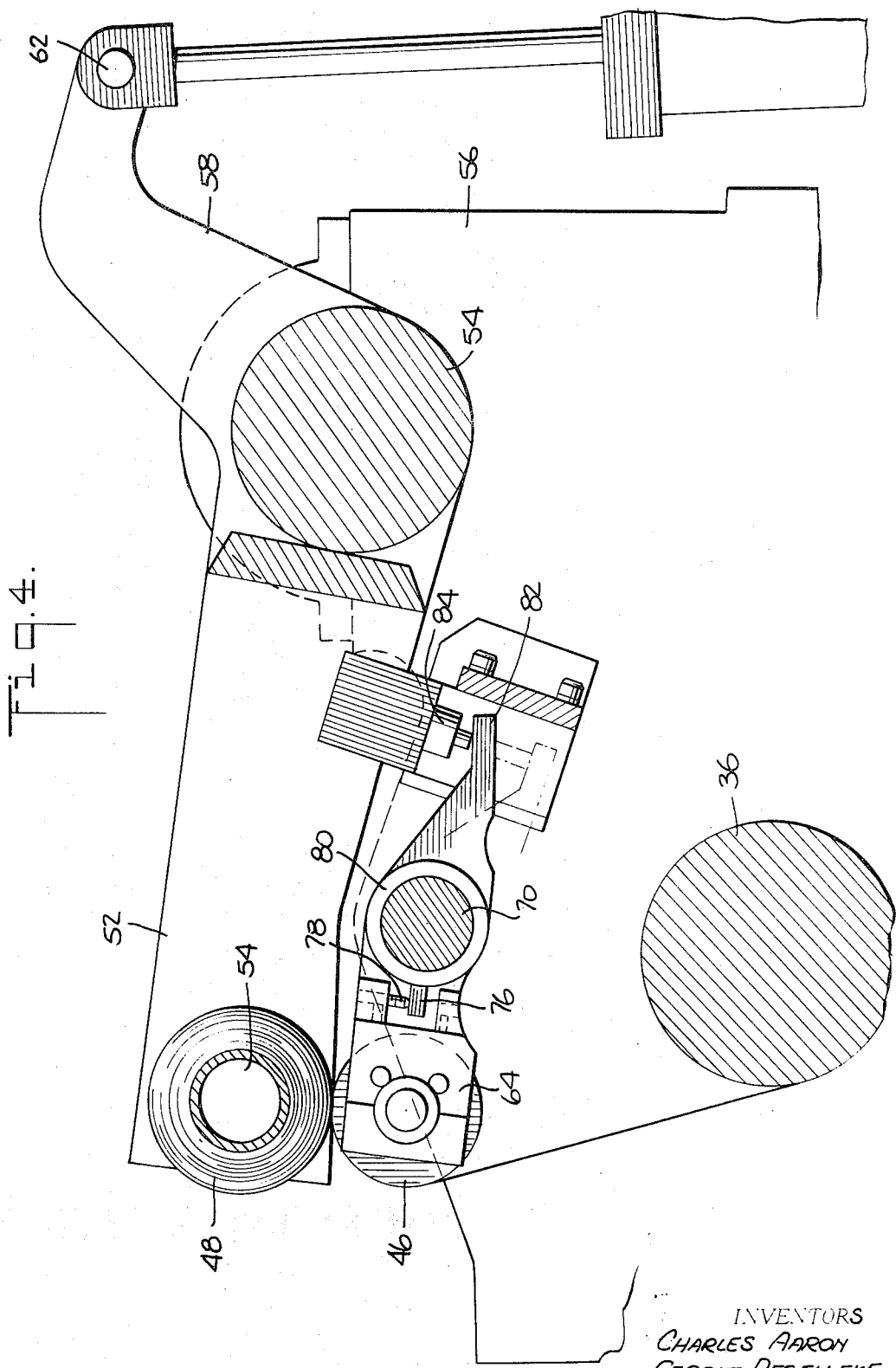
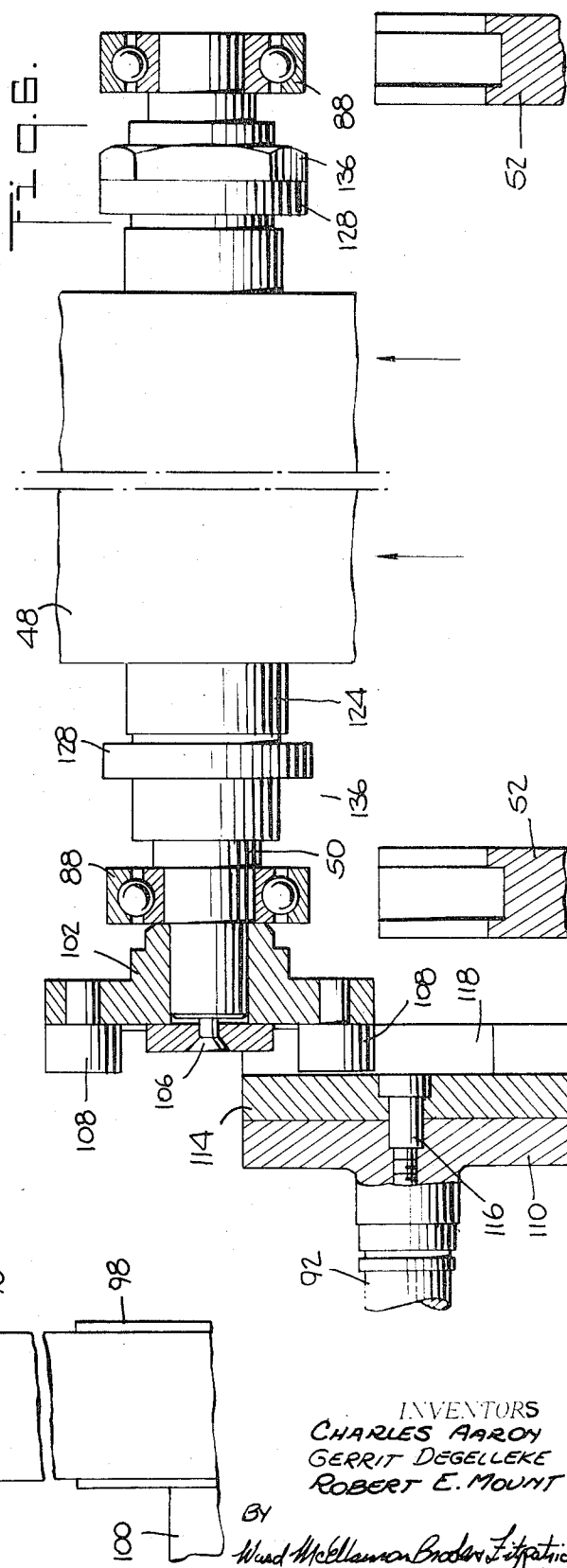
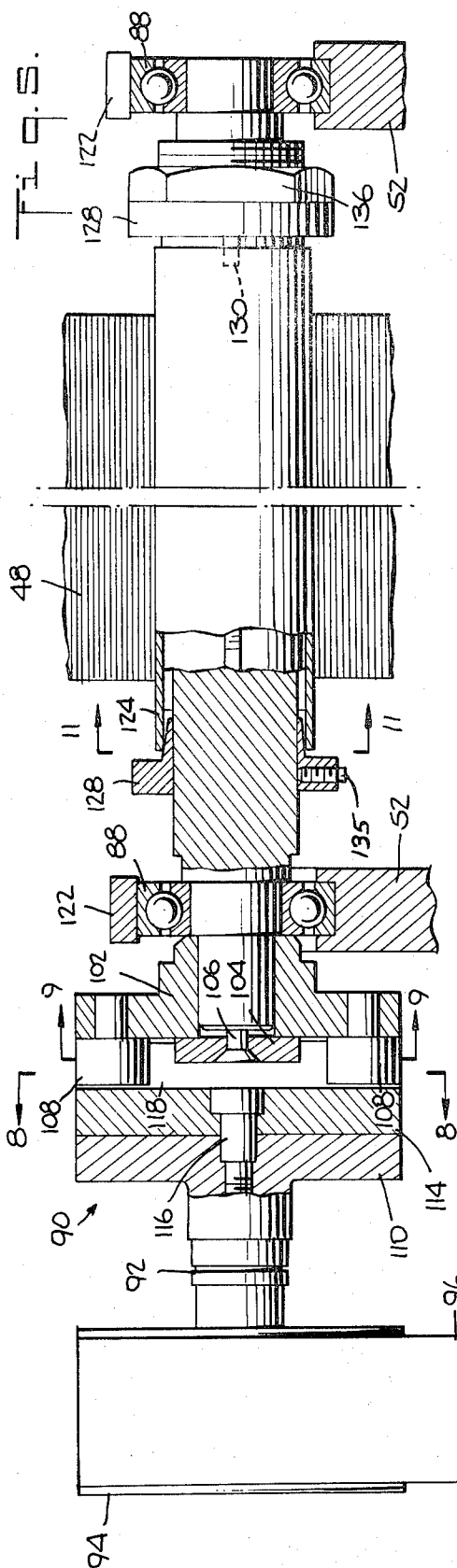


Fig. 4.

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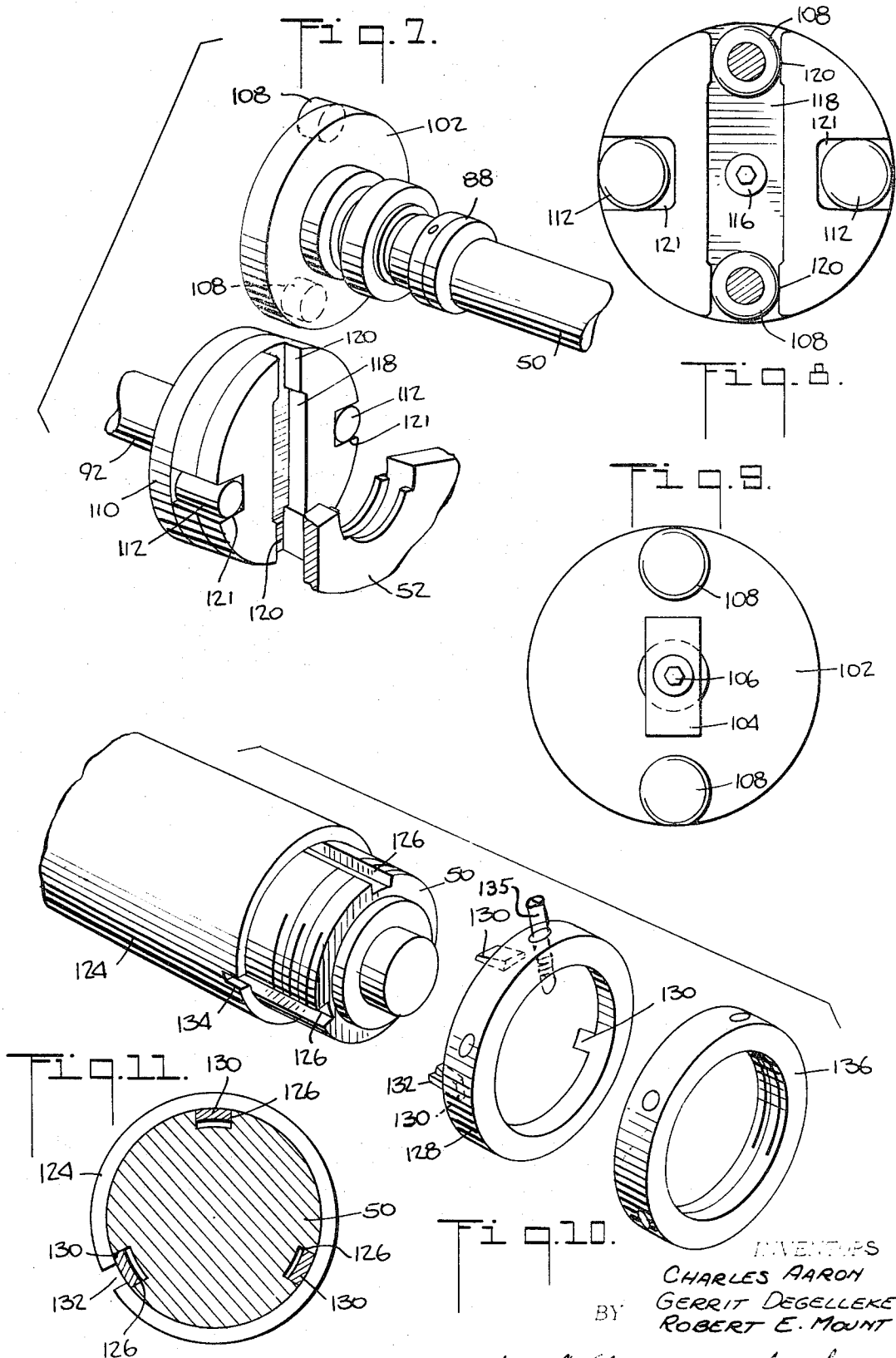
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FOIL SEPARATOR AND REWIND MACHINE

This invention relates to a foil separator and rewind machine and more particularly to apparatus for receiving a relatively wide two-ply mill supply roll, separating the plies and rewinding each ply into a separate rewind roll. Prior art apparatus of this general type have not been completely successful in controlling all of the factors required for producing a high quality rewind roll, particularly with such foil materials as are of a non-uniform caliper over the sheet width, or with certain very thin foils. Applicants have discovered a novel combination of elements combined in such a way as to afford a very economical, efficient and practical solution of the difficulties in the prior art, as will become apparent as the description proceeds.

In one form, the present invention contemplates the provision of a new and improved foil separator and rewind machine having a front section and a rear section. The rear section is upwardly and rearwardly disposed with respect to the front section, and each section has a pair of rewind arms pivotally supported at their inner ends. Each pair of rewind arms is adapted to support a driven rewind shaft at their outer ends on which a web of foil material is to be wound into rewind roll. Ironing rolls are adapted to resiliently engage the peripheries of the rewind rolls respectively, and means are provided for actuating moving the rewind arms in response to the buildup of the rewind rolls respectively. A separating roll is mounted between and closely adjacent the rewind rolls, and the ironing rolls are mounted substantially between the separating roll and the rewind rolls, respectively. The rewind rolls are rotatable in both directions, respectively, for winding the foil with the desired side thereof facing outwardly.

According to one aspect of the invention, each pair of ironing roll arms are adapted to support at their outer ends an ironing roll which is resiliently urged against its corresponding rewind roll. A servo valve is actuable by movement of the ironing roll arms for actuating the rewind arms to index its corresponding rewind roll outwardly in a direction away from the ironing roll for accommodating buildup of the foil.

According to another aspect of our invention, a coupling is provided which drives the rewind shaft, and motive means, which may include an electrical motor, are provided for driving the coupling. The coupling is characterized by a first member mounted on the end of the rewind shaft which carries a pair of diametrically opposed cam rollers adjacent the periphery thereof. A second coupling member is fixedly attached to the end of the motive means, and a pair of diametrically opposed cam rollers are carried thereby, adjacent the periphery thereof. An intermediate member is mounted on the second member, and it is free for radial movement. The intermediate member has a diametrical slot for receiving the cam rollers carried by the first member, and it is also provided with recesses for receiving the cam rollers which are carried by the second member. This arrangement provides a new and improved drive coupling which is substantially free from vibration and backlash.

Another aspect of our invention resides in the provision of means for driving the rewind shaft which, in effect, permits essentially a full diameter shaft with tapered collar feature. A core is interposed between

the rewind shaft and the rewind roll. The rewind shaft is provided with a plurality of spaced longitudinally extending slots, and driving collars at each end of the rewind shaft are provided each having a corresponding plurality of spaced wedge-shaped lugs. The lugs are adapted to fit in the slots and act as a wedge between the core and the rewind shaft. The driving collars are secured to the shaft by means of set screws. In place of the set screws a locking nut could be threadably mounted on the shaft at each end thereof for locking the collars against the ends of the core.

Foil separator and rewind machines constructed in accordance with the concept of this invention are, among other possible uses, particularly useful for high-speed, large capacity production wherein exceptionally fine roll quality is a very important consideration.

A feature of this invention resides in the provision of a new and improved rewind machine which has a web path of substantially constant length throughout the rewinding cycle of operation, which has a relatively short draw length between the rewind roll and the separating roll, which provides convenient space for conventional ultrasonic welding splicing apparatus adjacent the rewind rolls, which allows the operator to clearly view the rewinding operation, which can readily be started and stopped. As another feature of the invention, we contemplate the provision of a machine which can rewind foil having either side of the foil disposed outwardly, which separates the two foils on a common drum, which can rewind rolls up to a large diameter, which has an ironing roll that engages the rewind roll substantially adjacent the point where the web enters the rewind roll.

As still another feature of this invention, we provide a new and improved rewind machine which maintains positive control of the nip pressure against each individual rewind roll, which compensates for the caliber variation of the material being rewound, which substantially eliminates tracking vibration, and which substantially eliminates pounding of the ironing roll.

According to another feature, there is provided a foil separator and rewind machine which substantially eliminates backlash in the rewind roll shaft driving mechanism, and which provides rigidity in the rewind roll shaft mounting means.

Assignee's own U.S. Pat. No. 3,291,412 dated Dec. 12, 1966, is related to the rewinding art, but is not directed specifically to the foil separating art.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception on which this disclosure is based may readily be utilized as the basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that this disclosure be regarded as including such equivalent constructions as do not depart from the spirit and scope of the invention.

One embodiment of the invention has been chosen for purposes of illustration and description, and is

shown in the accompanying drawings, forming a part of the specification wherein:

FIG. 1 is an end elevation of a foil separator and rewind machine constructed in accordance with the invention, and with portions broken away to more clearly show certain features;

FIG. 2 is an enlarged perspective view showing the means for supporting the rewind rolls and the ironing rolls;

FIG. 3 is an enlarged perspective view showing the means for supporting the rewind rolls and the ironing rolls similar to FIG. 2, but from a different angle.

FIG. 4 is a sectional view taken along the line indicated at 4—4 in FIG. 3 and showing the construction and operation of the means for controlling the angle of inclination of the ironing rolls and the rewind rolls;

FIG. 5 is a side elevation, partially in section, showing the rewind roll mounted on the end of the rewind arms;

FIG. 6 is a side elevation, partially in section, similar to FIG. 5 but showing the rewind roll removed from the rewind arms;

FIG. 7 is an enlarged, exploded, perspective view showing the driving coupling for the rewind shaft;

FIG. 8 is an enlarged sectional view taken along the line indicated at 8—8 in FIG. 5;

FIG. 9 is an enlarged sectional view taken along the line indicated at 9—9 in FIG. 5;

FIG. 10 is an enlarged exploded view of the means for mounting a rewind roll core; and

FIG. 11 is an enlarged sectional view taken along the line indicated at 11—11 of FIG. 5.

In the illustrated embodiment of the invention, the foil separator and rewind machine comprises a front section and a rear section designated generally at 10 and 12, respectively. As best seen in FIG. 1, a two-ply web of foil material 14 is received from over or under a mill or supply roll 16 and passes partially around various rolls such as 18 and 20, from whence it passes to a dancer roll 22 which is mounted for horizontal movement against an air cylinder and piston assembly 24. The dancer roll serves to take the pulses out of the supply roll. The dancer roll movement, through a cam, strokes an electrical device (not shown) which signals an electric motor 28, connected to the supply roll 16, to motor or to generate as required to maintain a given tension. The tension level is established by the air pressure at the dancer roll cylinders 24. The operating position of the dancer is mid-range of its stroke so that movement fore or aft is sensed electrically, thereby providing optimum strip control and handling characteristics particularly for light gauge foils.

After the web 14 passes partially around the dancer roll 22, it passes around a series of rolls 30, 32 and 34, which may include razor blades or a backup roll for edge slitting means, and thence to a separator roll 36. The plies of foil material are separated and a first ply 38 passes directly to the front section 10 of the rewind machine and a second ply 40 passes directly to the rear section 12 of the machine. The ply 38 passes partially around a steel tracking or ironing roll 42 and onto a rewind roll 44, and the ply 40 passes partially around a steel tracking or steel ironing roll 46 and onto a rewind roll 48. It will be appreciated that foil material is normally fabricated with a shiny surface on one side and a

matte surface on the other. Accordingly, sometimes it is desirable to rewind it with one side out and sometimes it is desirable to rewind it with the other side out. The rewind rolls 44 and 48 may be rotated in either direction, and hence when one side of the foil is on the outside the ply may pass around the ironing roll 42 along the path indicated at 38, whereas if the other side of the ply is to be on the outside the ply will follow the path indicated at 38', and in like manner in the rear section 12 the ply may follow the path indicated at 40 or the path indicated at 40', as desired. For purposes of reducing the friction as much as possible, the rolls 18, 20, 30, 32, 34 and 36 are all center driven. Also, the rolls may be chrome-plated and ground steel.

As best seen in FIGS. 1 and 2, the rear section 12 is upwardly and rearwardly disposed with respect to the front section 10. This allows the operator to visually observe the operation of both sections and keep the machine under better control. In addition, such arrangement of the rewind rolls 44 and 48 provides space for a conventional ultrasonic splicing means (not shown) to be interposed therebetween for conveniently and rapidly splicing the webs of foil material.

It will be appreciated that the front section 10 and the rear section 12 are of similar construction and operate in a similar manner, and, therefore, some portions of one of these sections will be described in detail hereinafter, it being understood that the corresponding portions in the other section are of similar construction and operate in a similar manner. As seen in FIGS. 1, 2 and 3, rewind roll 48 is mounted on rewind roll shaft 50, which is carried by the outer ends of the rewind arms 52. The inner ends of the rewind arms are secured to a rewind arm supporting pivot shaft 54, FIGS. 3 and 4, which in turn is mounted on the main frame 56. A pivot arm 58 forms an extension of the rewind arm 52 and a piston and fluid cylinder assembly 60 is connected thereto, as at 62, for purposes of pivoting the rewind roll 48 in a clockwise direction, as viewed in FIG. 1, during buildup.

Positive control of the nip pressure between the rewind roll 48 and the ironing roll 46 is provided at the lowest possible value to remove air from between adjacent layers of web being rewound and to prevent slippage of the web and, thus, providing accurate tracking of the web onto the rewind roll. Further, it will be appreciated that the rewind torque is independent of the nip force, and hence the nip force can be as heavy or light as desired without affecting the rewind torque. Control of the nip force is very important. Usually the web of metallic foil is annealed after rewinding to remove the rolling oils on the surface thereof. If the nip force is excessive, the layers of web will stick together during annealing. If the nip force is not sufficient, then the web will go out of control.

As best seen in FIGS. 3 and 4, the ironing roll 46 is supported at its ends by ironing roll arms 64. The ironing roll support system is a soft vibratory system to insure uniform ironing and wrinkle-free operation at all speeds and with uniform pressure across the strip. Each of the inner ends of the ironing roll arms 64 is in the form of an outer collar 68, FIG. 3, which is mounted on an ironing roll pivot shaft 70 for pivotal movement. An inner collar 72 is fixedly attached to the shaft 70, as by means of a pin 74, provided for the purpose. The inner

collar 72 has an upstanding projection 76 which is engaged by a pin or screw 78 attached to the ironing roll arm 64. At one end of the pivot shaft 70 is a collar 80 having an arm 82 for engaging a rotary spool servo valve 84 which is connected to the piston and fluid cylinder assembly 60, as at 86. That is, when the foil builds up a predetermined infinitesimal amount, the pin 78 on the arm 64 on either the right side or the left side, as viewed in FIG. 3, serves to rotate the pivot shaft 70 to stroke the servo valve 84 to move the rewind arms 52 to pivot the rewind roll 48 in the direction away from the ironing roll 46. However, momentary movement of the ironing roll, such as passing over a slight bump, for example, does not provide sufficient time for the servo valve to respond, and hence the rewind arms are not indexed. The ironing roll is free to move toward the rewind roll 48 without actuating the servo valve. During normal operation, a steady state condition results wherein the tracking or ironing roll maintains a basically constant position and the rewind arms are moved outwardly in a steady uniform motion. Rewind roll weight and ironing roll weight are isolated from the ironing roll-rewind roll contact and, therefore, the ironing pressure can be selected as desired through the pneumatic loading of the ironing roll arms. If there is a bump on one side of the rewind roll, the entire ironing roll is not pivoted because there is no rigid cross support, and the support does not act like a spring. One side does not bounce off with the other side and the irregularities on either side are taken care of independently. Basic pressure levels are easily established with consideration given to the strip tension components and the desired ironing roll nip pressures for the particular strip width, gauge and tension level requirements. With this structure, rewind rolls which are not perfectly circular or concentric may be rewound. Vibration or pounding of the ironing roll is substantially eliminated, which could otherwise cause sticking of the metal during annealing. Large diameter rewind rolls may be wound. It will be appreciated that the rewind roll can be free of wrinkles in one or two revolutions, thereby reducing scrap. This is important because the foil may be extremely thin, such as about 0.0002 inch, for example, and hence it takes a long time, even at rapid speeds of 2,000 feet per minute or more, to rewind a roll and the machine must be stopped periodically during a cycle to splice the foil. Hence, deceleration and acceleration are important considerations.

As best seen in FIG. 1, the draw length between the separating roll 36 and the rewind rolls 44 and 48 is as short as possible and it remains constant throughout the rewind cycle regardless of the diameter of the rewind rolls. In addition, the ironing rolls engage the rewind rolls at substantially the point of contact of the web, thereby improving the winding operation.

As pointed out hereinbefore, vibration in the machine causes uneven rewind roll buildup. Therefore, backlash has been substantially eliminated in the driving mechanism. As best seen in FIG. 5, the rewind roll shaft is rotatably mounted on the rewind roll arms 52 as by means of bearings 88. The shaft overhangs at one end, and a flexible coupling, indicated generally at 90, is mounted thereon. The coupling is mounted on one end of a drive shaft 92 and a pulley 94 is mounted on

the other end thereof. A drive belt 96 having teeth thereon connects the pulley 94 to a pulley 98, which is mounted on a shaft 100 on the main frame 56, FIG. 1. The shaft 100 is driven by an electric motor 101, FIG. 2. The coupling 90 comprises a first coupling member 102, which is mounted on the end of the rewind shaft 50 by means of a plate 104 and a screw 106, FIG. 9. A pair of diametrically opposed cam rollers 108 is carried by the member 102. The drive shaft 92 has a second coupling member 110, fixedly attached to the end thereof. The coupling member 110 carries diametrically opposed cam rollers 112 as seen in FIGS. 7 and 8. A center piece or intermediate member 114, FIG. 5, is mounted on the second member 110 by means of a shoulder screw 116. The intermediate member is free for radial movement and, in addition, it is provided with a slot 118 for receiving the cam rollers 108. It is noted that the ends of the slot are slightly narrower, thereby providing a close fit with the cam rollers 108, as at 120, FIG. 8. The intermediate member 114 has a pair of diametrically disposed recesses 121 for receiving the cam rollers 112. In operation, for purposes of removing a rewind roll such as when it is completed, the rewind shaft may be lifted upwardly from the machine from its position as seen in FIG. 5, to its position as seen in FIG. 6. This is done by means of removing the bearing caps 122, FIG. 5, and lifting the shaft upwardly, rollers 108 sliding up and out through the slot 118 in the intermediate member 114. It will be appreciated that in this manner the rewind shaft may be removed or installed without axial movement, thereby reducing the mechanical difficulties. Accordingly, a flexible coupling is provided having only backlash between the rollers and their respective grooves. However, such backlash is substantially negligible because the rollers are mounted at a relatively large radius with respect to the rewind shaft. In this manner vibration in the driving mechanism is substantially eliminated.

As best seen in FIG. 5, the rewind roll 48 is mounted on the rewind shaft 50 by means of a rewind roll core 124. Conventionally the core is fabricated from aluminum tubing or steel with a wall thickness of the order of between about one-eighth inch and three-sixteenths inch. In prior art structures the rewind roll shaft had a reduced diameter with respect to the inside diameter of the core and collar-shaped wedges were used at the ends to center the core and to provide a driving connection. Such a small diameter shaft tended to spring and bounce during operation. According to the present invention, as best seen in FIGS. 10 and 11, the rewind shaft 50 is of increased diameter and is provided with three spaced grooves or slots 126. A cap or driving collar 128 has three spaced wedge-shaped lugs 130 which, when the driving collar is placed on the shaft 50, fit in the slots 126 and act as a wedge between the core 124 and the shaft 50. The width of the slots 126 are of the order of about three-eighth inch, for example. The driving collar 128 carries a lug 132 which is disposed adjacent one of the lugs 30 for strength purposes. The core 124 has a slot 134 for receiving the lug 132. Set screws 135 secure the driving collar 128 to the shaft 50 and, thereby, lock the core 124 to the shaft 50. If desired, a locking nut 136 could be threadably mounted on the shaft 50 for the same purpose.

It will thus be seen that the present invention does indeed provide an improved foil separator and rewind machine which is superior in simplicity, economy and efficiency as compared to prior art such devices.

Although a particular embodiment of the invention is herein disclosed for purposes of explanation, various modifications thereof after study of this specification, will be apparent to those skilled in the art to which the invention pertains.

What is claimed and desired to be secured by Letters Patent is:

1. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms adapted to support at their outer ends a rewind shaft on which shaft a web of foil material is to be wound into a rewind roll, the inner ends of each pair of rewind arms being fixedly mounted on a rewind arm supporting pivot shaft, a fluid piston and cylinder assembly engaging at least one of said rewind arms to pivot said rewind roll during buildup, a pair of ironing roll arms adapted to support at their outer ends an ironing roll in engagement with said rewind roll, means mounting said ironing roll arms for pivotal movement, a servo valve actuatable by said means mounting said ironing roll arms for actuating said rewind arms to index said rewind roll outwardly in a direction away from said ironing roll for accommodating buildup of foil on said rewind roll, said means mounting said ironing roll arms for pivotal movement comprising an ironing roll pivot shaft, each of the ironing roll arms having an outer collar pivotally movable about said pivot shaft, an inner collar fixedly attached to said pivot shaft under each of said outer collars, each of said inner collars having an upstanding projection, each of said ironing roll arms having a pin engageable with its respective upstanding projection when said rewind roll has urged said ironing roll a preselected arcuate distance due to buildup of material on said rewind roll.

2. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms adapted to support at their outer ends a rewind shaft on which shaft a web of foil material is to be wound into a rewind roll, the inner ends of each pair of rewind arms being fixedly mounted on a rewind arm supporting pivot shaft, a fluid piston and cylinder assembly engaging at least one of said rewind arms to pivot said rewind roll during buildup, a pair of ironing roll arms adapted to support at their outer ends an ironing roll in engagement with said rewind roll, means mounting said ironing roll arms for pivotal movement, a servo valve actuatable by said means mounting said ironing roll arms for actuating said rewind arms to index said rewind roll outwardly in a direction away from said ironing roll for accommodating buildup of foil on said rewind roll, said means mounting said ironing roll arms for pivotal movement comprising an ironing roll pivot shaft pivotally movable responsive to movement of said ironing roll arms, said servo valve being mounted adjacent one end of said pivot shaft, a collar fixedly mounted on said pivot shaft adjacent said servo valve for engaging said servo valve responsive to rotation of said pivot shaft, said piston and fluid cylinder assembly for said rewind arms being actuatable by said servo valve.

3. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms adapted to support at their outer ends a rewind shaft on which shaft a web of foil material is to be wound into a rewind roll, the inner ends of each pair of rewind arms being fixedly mounted on a rewind arm supporting pivot shaft, at least one of said rewind arms having an extension, a fluid piston and cylinder assembly engaging said extension to pivot said rewind roll during buildup, a pair of ironing roll arms adapted to support at their outer ends an ironing roll in engagement with said rewind roll, an ironing roll pivot shaft, each of the ironing roll arms having an outer collar pivotally movable about said pivot shaft, an inner collar fixedly attached to said pivot shaft under each of said outer collars, each of said inner collars having an upstanding projection, each of said ironing roll arms having a pin engageable with its respective upstanding projection when said rewind roll has urged said ironing roll a preselected distance to buildup the material on said rewind roll, a rotary spool servo valve mounted adjacent one end of said pivot shaft, a collar fixedly mounted on said pivot shaft adjacent said servo valve for engaging said servo valve responsive to rotation of said pivot shaft, said fluid piston and cylinder assembly for said rewind arms being actuatable by said servo valve to index said rewind roll outwardly in a direction away from said ironing roll for accommodating buildup of foil on said rewind roll.

4. A foil separator and rewind machine comprising a front section and a rear section, said rear section being upwardly and rearwardly disposed with respect to said front section, each section having a pair of rewind arms pivotally supported at their inner ends, each pair of rewind arms being adapted to support rewind shaft at their outer ends on which shaft a web of foil material is to be wound into a rewind roll, each pair of rewind arms extending upwardly and forwardly, means for driving said rewind shafts, a separating roll mounted between and closely adjacent said rewind rolls, ironing rolls being mounted substantially between said separating roll and said rewind rolls respectively, said rewind rolls being rotatable in both directions respectively for winding the foil with the desired side thereof facing outwardly, a fluid piston cylinder assembly engaging at least one of said rewind arms to pivot said rewind roll during buildup, for each of said sections a pair of ironing roll arms adapted to support at their outer ends one of said ironing rolls in engagement with said rewind roll, means mounting said ironing roll arms for pivotal movement, a servo valve actuatable by said means mounting said ironing roll arms for actuating said rewind arms to index said rewind roll outwardly in a direction away from said ironing roll for accommodating buildup of foil on said rewind roll.

5. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms pivotally supported at their inner ends, each pair of rewind arms being adapted to support a rewind shaft at their outer ends on which shaft a web of foil material is to be wound into a rewind roll, ironing means adapted to engage the peripheries of said rewind rolls, means for arcuately moving said rewind arms in response to the buildup of said rewind rolls respectively, a coupling, motive means for driving said

coupling, said rewind shaft being driven by said coupling, said coupling comprising a first member mounted on the end of said rewind shaft, a pair of diametrically opposed cam rollers carried by said first member adjacent the periphery thereof, a second coupling member fixedly attached to the end of said motive means, a pair of diametrically opposed cam rollers carried by said second member adjacent the periphery thereof, an intermediate member mounted on said second member, said intermediate member being free for radial movement, said intermediate member having a diametrical slot for receiving the cam rollers carried by said first member, and said intermediate member having recesses for receiving the cam rollers carried by said second member.

6. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms pivotally supported at their inner ends, each pair of rewind arms being adapted to support a rewind shaft at their outer ends on which shaft a web of foil material is to be wound into a rewind roll, ironing means adapted to engage the peripheries of said rewind rolls, means for arcuately moving said rewind arms in response to the buildup of said rewind rolls respectively, a coupling, motive means for driving said coupling, said rewind shaft being driven by said coupling, said coupling comprising a first member mounted on the end of said rewind shaft, a pair of diametrically opposed cam rollers carried by said first member adjacent the periphery thereof, a second coupling member fixedly attached to the end of said motive means by a shoulder screw, a pair of diametrically opposed cam rollers carried by said second member adjacent the periphery thereof, an intermediate member mounted on said second member, said intermediate member being free for radial movement, said intermediate member having a diametrical slot for receiving the cam rollers carried by said first member, the ends of said slot adjacent the periphery thereof being of reduced width to provide a close fit with said cam rollers, said intermediate member having recesses for receiving the cam rollers carried by said second member, said motive means comprising a drive shaft mounted on said second member, a pulley mounted on said drive shaft, a second shaft having an electric motor connected to one end thereof and a second pulley connected to the other end thereof, a drive belt having teeth on its driving surface being connected between said two pulleys.

7. A foil separator and rewind machine comprising a front section and a rear section, said rear section being upwardly and rearwardly disposed with respect to said front section, each section having a pair of rewind arms pivotally supported at their inner ends, each pair of rewind arms being adapted to support a rewind shaft at their outer ends on which shaft a web of foil material is to be wound into a rewind roll, each pair of rewind arms extending upwardly and forwardly, ironing rolls adapted to engage the peripheries of said rewind rolls respectively, means for arcuately moving said rewind arms in response to the buildup of said rewind rolls respectively, a separating roll mounted between and closely adjacent said rewind rolls, said ironing rolls being mounted substantially between said separating roll and said rewind rolls respectively, and said rewind

rolls being rotatable in both directions respectively for winding the foil with the desired side thereof facing outwardly, a coupling, motive means for driving said coupling, said rewind shaft being driven by said coupling, said coupling comprising a first member mounted on the end of said rewind shaft, a pair of diametrically opposed cam rollers carried by said first member adjacent the periphery thereof, a second coupling member fixedly attached to the end of said motive means, a pair of diametrically opposed cam rollers carried by said second member adjacent the periphery thereof, an intermediate member mounted on said second member, said intermediate member being free for radial movement, said intermediate member having a diametrical slot for receiving the cam rollers carried by said first member, and said intermediate member having recesses for receiving the cam rollers carried by said second member.

8. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms adapted to support at their outer ends a rewind shaft on which shaft a web of foil material is to be wound into a rewind roll, the inner ends of each pair of rewind arms being fixedly mounted on a rewind arm supporting pivot shaft, a fluid piston and cylinder assembly engaging at least one of said rewind arms to pivot said rewind roll during buildup, a pair of ironing roll arms adapted to support at their outer ends an ironing roll in engagement with said rewind roll, means mounting said ironing roll arms for pivotal movement, a servo valve actuatable by said means mounting said ironing roll arms for actuating said rewind arms to index said rewind roll outwardly in a direction away from said ironing roll for accommodating buildup of foil on said rewind roll, a coupling, motive means for driving said rewind shaft being driven by said coupling, said coupling comprising a first member mounted on the end of said rewind shaft, a pair of diametrically opposed cam rollers carried by said first member adjacent the periphery thereof, a second coupling member fixedly attached to the end of said motive means, a pair of diametrically opposed cam rollers carried by said second member adjacent the periphery thereof, an intermediate member mounted on said second member, said intermediate member being free for radial movement, said intermediate member having a diametrical slot for receiving the cam rollers carried by said first member, and said intermediate member having recesses for receiving the cam rollers carried by said second member.

9. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms pivotally supported at their inner ends, each pair of rewind arms being adapted to support a rewind shaft at their outer ends on which shaft a web of foil material is to be wound into a rewind roll, ironing means adapted to engage the peripheries of said rewind rolls, means for arcuately moving said rewind arms in response to the buildup of said rewind rolls respectively, a core interposed between said rewind shaft and said rewind roll, said rewind shaft having a plurality of spaced longitudinally extending slots, a driving collar having a corresponding plurality of spaced wedge-shaped lugs mounted at each end of said core, said lugs fitting in said slots and acting as a wedge

between said core and said rewind shaft, and means for locking said driving collars against said core on each end of said shaft.

10. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms pivotally supported at their inner ends, each pair of rewind arms being adapted to support a rewind shaft at their outer ends on which shaft a web of foil material is to be wound into a rewind roll, ironing means adapted to engage the peripheries of said rewind rolls, means for arcuately moving said rewind arms in response to the buildup of said rewind rolls respectively, a core interposed between said rewind shaft and said rewind roll, said rewind shaft having three spaced longitudinally extending slots, a driving collar having three spaced wedge-shaped lugs mounted at each end of said core, said lugs fitting in said slots and acting as a wedge between said core and said rewind shaft, a longitudinally extending lug carried by said driving collar adjacent one of said wedge-shaped lugs, said core having a longitudinally extending slot for receiving said longitudinally extending lug, and means for locking said driving collars against said core on each end of said shaft.

11. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms pivotally supported at their inner ends, each pair of rewind arms being adapted to support a rewind shaft at their outer ends on which shaft a web of foil material is to be wound into a rewind roll, ironing rolls adapted to engage the peripheries of said rewind rolls, means for arcuately moving said rewind rolls in response to the buildup of said rewind rolls respectively, a separating roll mounted between and closely adjacent said rewind rolls, said ironing rolls being mounted substantially between said separating roll and said rewind rolls respectively, and said rewind rolls being rotatable in both directions respectively for winding the foil with the desired side thereof facing outwardly, a core interposed between said rewind shaft and said rewind roll, said rewind shaft having a plurality of spaced longitudinally extending slots, a driving collar having a corresponding plurality of spaced wedge-shaped lugs mounted at each end of said core, said lugs fitting in said slots and acting as a wedge between said core and said rewind shaft, and means for locking said driving collars against said core on each end of said shaft.

12. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms adapted to support at their outer ends a rewind shaft on which shaft a web of foil material is to be wound into a rewind roll, the inner ends of each pair of rewind arms being fixedly mounted on a rewind arm supporting pivot shaft, a fluid piston cylinder assembly engaging at least one of said rewind arms to pivot said rewind roll during buildup, a pair of ironing roll arms adapted to support at their outer ends an ironing roll in engagement with said rewind roll, means mounting said ironing roll arms for pivotal movement, a servo valve actuatable by said means mounting said ironing roll arms for actuating said rewind arms to index said rewind roll outwardly in a direction away from said ironing roll for accommodating buildup of foil on said rewind roll, a core interposed

between said rewind shaft and said rewind roll, said rewind shaft having a plurality of spaced longitudinally extending slots, a driving collar having a corresponding plurality of spaced wedge-shaped lugs mounted at each end of said core, said lugs fitting in said slots and acting as a wedge between said core and said rewind shaft, and set screws for mounting said driving collars against the ends of said core on each end of said shaft.

13. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms pivotally supported at their inner ends, each pair of rewind arms being adapted to support a rewind shaft at their outer ends on which shaft a web of foil material is to be wound into a rewind roll, ironing means adapted to engage the peripheries of said rewind rolls, a coupling, motive means for driving said coupling, said coupling comprising a first member mounted on the end of said rewind shaft, a pair of diametrically opposed cam rollers carried by said first member adjacent the periphery thereof, a second coupling member fixedly attached to the end of said motive means, a pair of diametrically opposed cam rollers carried by said second member adjacent the periphery thereof, an intermediate member mounted on said second member, said intermediate member being free for radial movement, said intermediate member having a diametrical slot for receiving the cam rollers carried by said first member, and said intermediate member having recesses for receiving the cam rollers carried by said second member, a core interposed between said rewind shaft and said rewind roll, said rewind shaft having a plurality of spaced longitudinally extending slots, a driving collar having a corresponding plurality of spaced wedge-shaped lugs mounted at each end of said core, said lugs fitting in said slots and acting as a wedge between said core and said rewind shaft, and means for locking said driving collars against said core on each end of said shaft.

14. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms pivotally supported at their inner ends, each pair of rewind arms being adapted to support a rewind shaft at their outer ends on which shaft a web of foil material is to be wound into a rewind roll, ironing means adapted to engage the peripheries of said rewind rolls, means for arcuately moving said rewind arms in response to the buildup of said rewind rolls respectively, a coupling, motive means for driving said coupling, said rewind shaft being driven by said coupling, said coupling comprising a first member mounted on the end of said rewind shaft, a pair of diametrically opposed cam rollers carried by said first member adjacent the periphery thereof, a second coupling member fixedly attached to the end of said motive means by a shoulder screw, a pair of diametrically opposed cam rollers carried by said second member adjacent the periphery thereof, an intermediate member mounted on said second member, said intermediate member being free for radial movement, said intermediate member having a diametrical slot for receiving the cam rollers carried by said first member, the ends of said slot adjacent the periphery thereof being of reduced width to provide a close fit with said cam rollers, said intermediate member having recesses for receiving the cam rollers carried by said

second member, said motive means comprising a drive shaft mounted on said second member, a pulley mounted on said drive shaft, a second shaft having an electric motor connected to one end thereof and a second pulley connected to the other end thereof, a drive belt having teeth on its driving surface being connected between said two pulleys, a core interposed between said rewind shaft and said rewind roll, said rewind shaft having three spaced longitudinally extending slots, a driving collar having three spaced wedge-shaped lugs mounted at each end of said core, said lugs fitting in said slots and acting as a wedge between said core and said rewind shaft, a longitudinally extending lug carried by said driving collar adjacent one of said wedge-shaped lugs, said core having a longitudinally extending slot for receiving said longitudinally extending lug, and means for locking said driving collars against said core on each end of said shaft.

15. A foil separator and rewind machine comprising a front section and a rear section, each section having a pair of rewind arms adapted to support at their outer ends a rewind shaft on which shaft a web of foil material is to be wound into a rewind roll, the inner ends of each pair of rewind arms being fixedly mounted on a rewind arm supporting pivot shaft, a fluid piston and cylinder assembly engaging at least one of said rewind arms to pivot said rewind roll during buildup, a pair of ironing roll arms adapted to support at their outer ends an ironing roll in engagement with said rewind roll, means mounting said ironing roll arms for pivotal movement, a servo valve actuatable by said means mounting said ironing roll arms for actuating said rewind arm to index said rewind roll outwardly in a direction away from said ironing roll for accommodating buildup of foil on said rewind roll, a separating roll mounted between and closely adjacent said rewind rolls, said ironing rolls being mounted substantially between said separating roll and said rewind rolls

respectively, and said rewind rolls being rotatable in both directions respectively for winding the foil with the desired side thereof facing outwardly, the linear distance between said separating roll and each of said rewind rolls being substantially constant throughout a cycle of operation, said ironing rolls engaging said rewind rolls substantially adjacent the contact points of said foils with respect to said rewind rolls respectively, a mill supply roll, said separator roll being mounted adjacent said rewind rolls, a dancer roll mounted between said mill supply roll and said separator roll, a fluid piston and cylinder assembly for dampening the movement of said dancer roll, a coupling, motive means for driving said coupling, said rewind shaft being driven by said coupling, said coupling comprising a first member mounted on the end of said rewind shaft, a pair of diametrically opposed cam rollers carried by said first member adjacent the periphery thereof, a second coupling member fixedly attached to the end of said motive means, a pair of diametrically opposed cam rollers carried by said second member adjacent the periphery thereof, an intermediate member mounted on said second member, said intermediate member being free for radial movement, said intermediate member having a diametrical slot for receiving the cam rollers carried by said first member, said intermediate member having recesses for receiving the cam rollers carried by said second member, a core interposed between said rewind shaft and said rewind roll, said rewind shaft having a plurality of spaced longitudinally extending slots, a driving collar having a corresponding plurality of spaced wedge-shaped lugs mounted at each end of said core, said lugs fitting in said slots and acting as a wedge between said core and said rewind shaft, and a locking nut threadably mounted on the shaft at each end thereof outwardly of said collars for locking said collars against the ends of said core.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,680,804 Dated August 1, 1972

Inventor(s) CHARLES AARON ET AL

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 8, Col. 10, line 36, after the word "said" insert the words --coupling, said--

Signed and sealed this 19th day of December 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents