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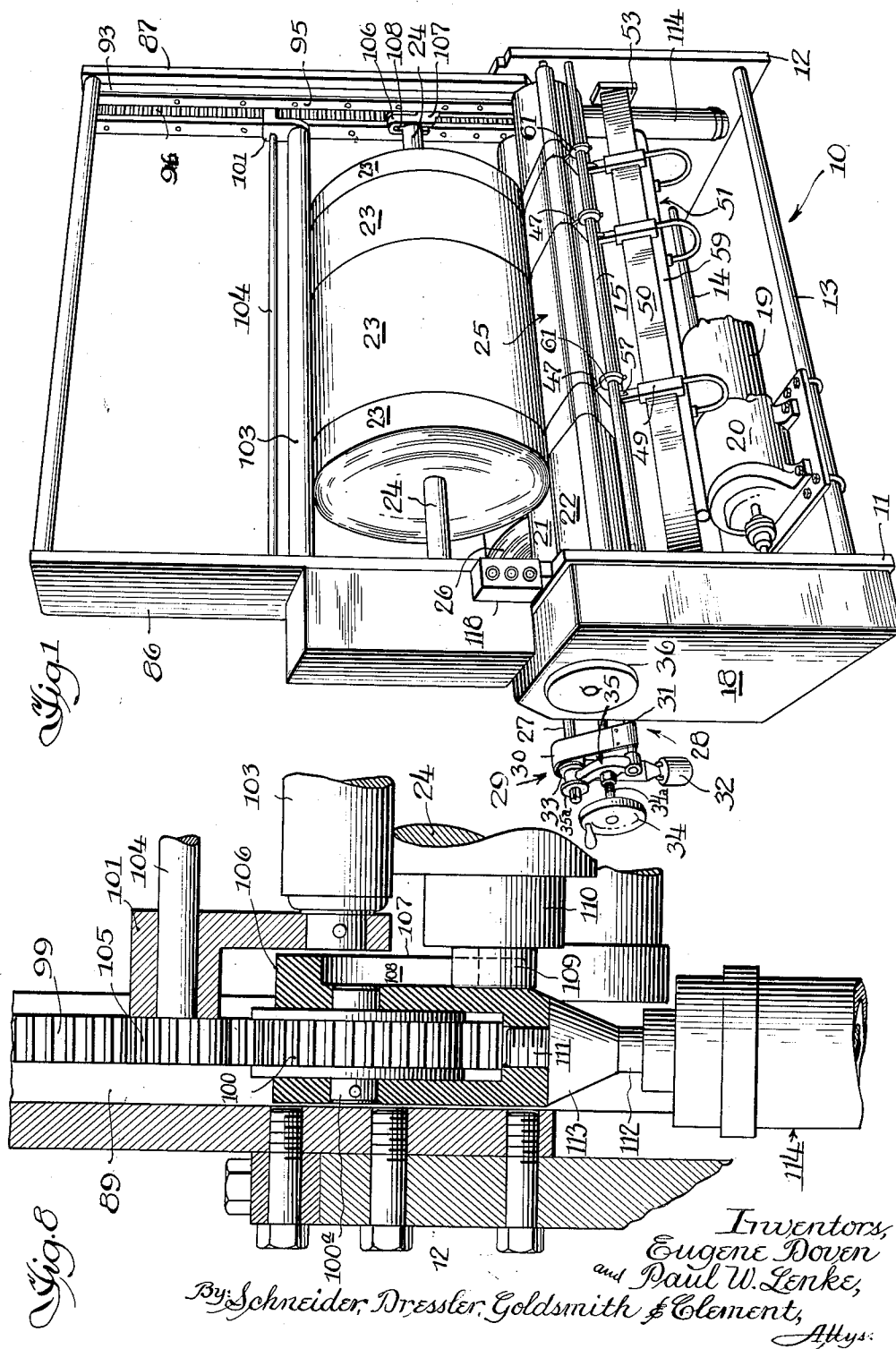
E. DOVEN ET AL

3,104,072

WINDING AND SLITTING MACHINE

Filed July 8, 1958

5 Sheets-Sheet 1



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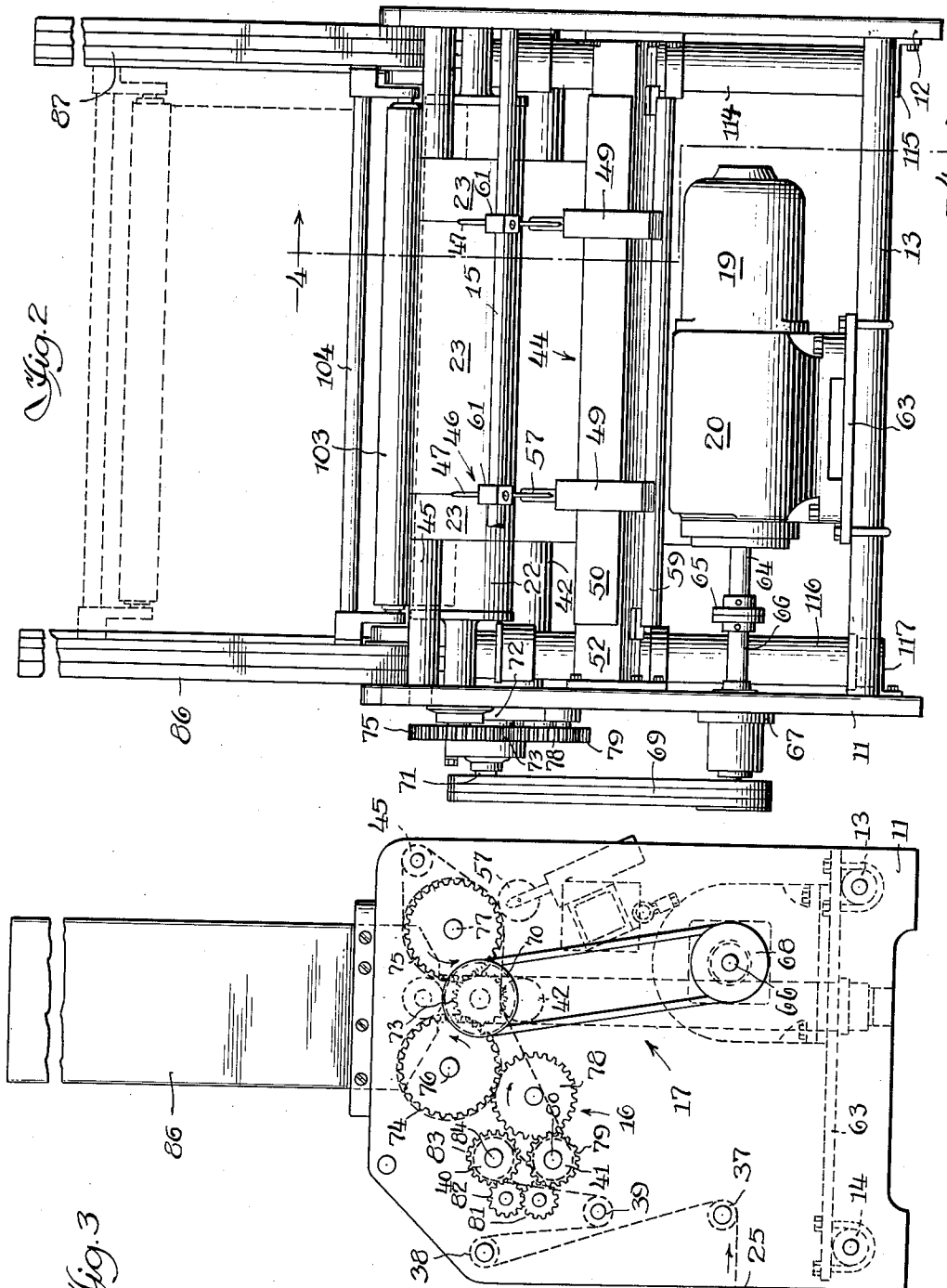
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5 Sheets-Sheet 2



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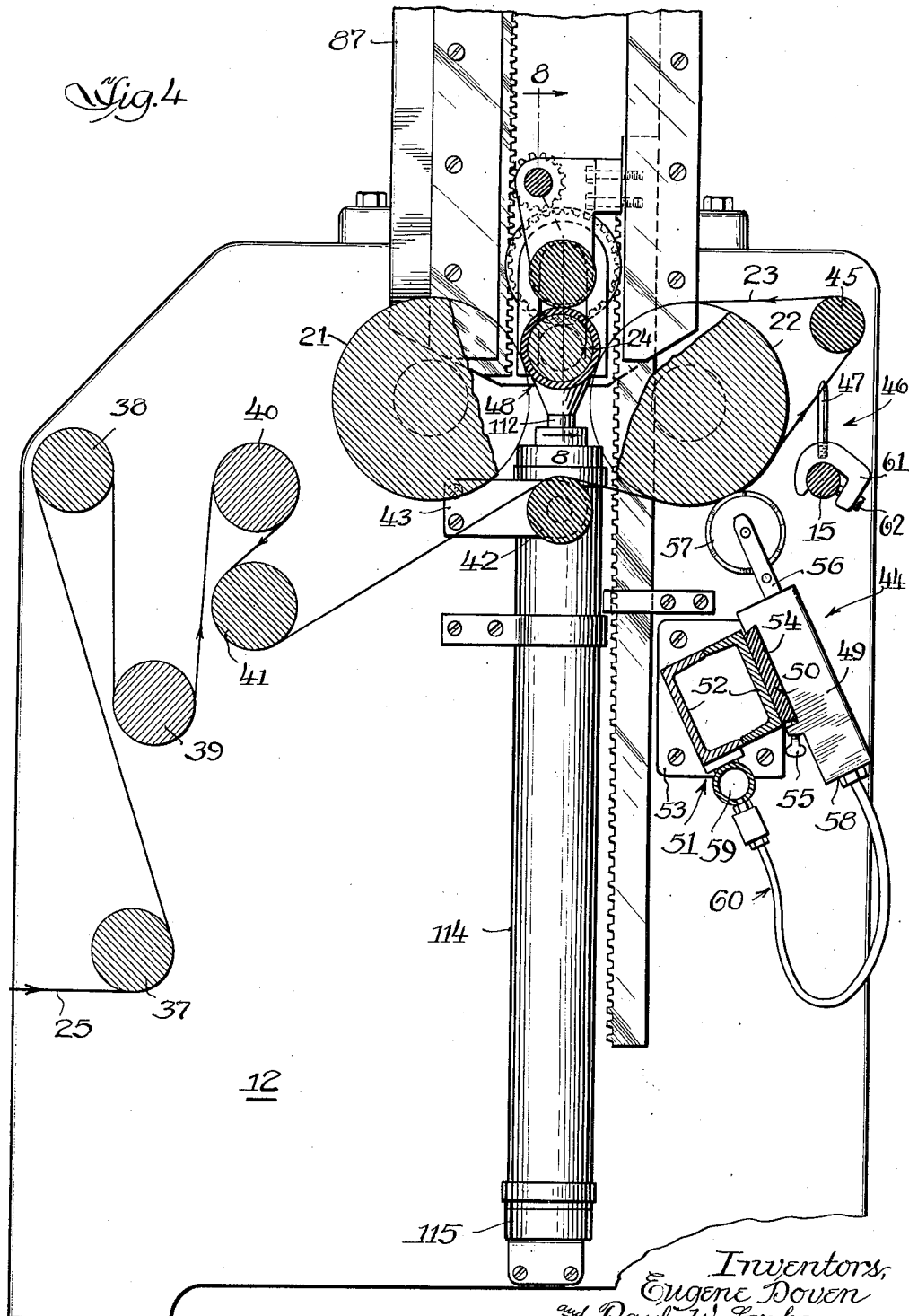
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5 Sheets-Sheet 3



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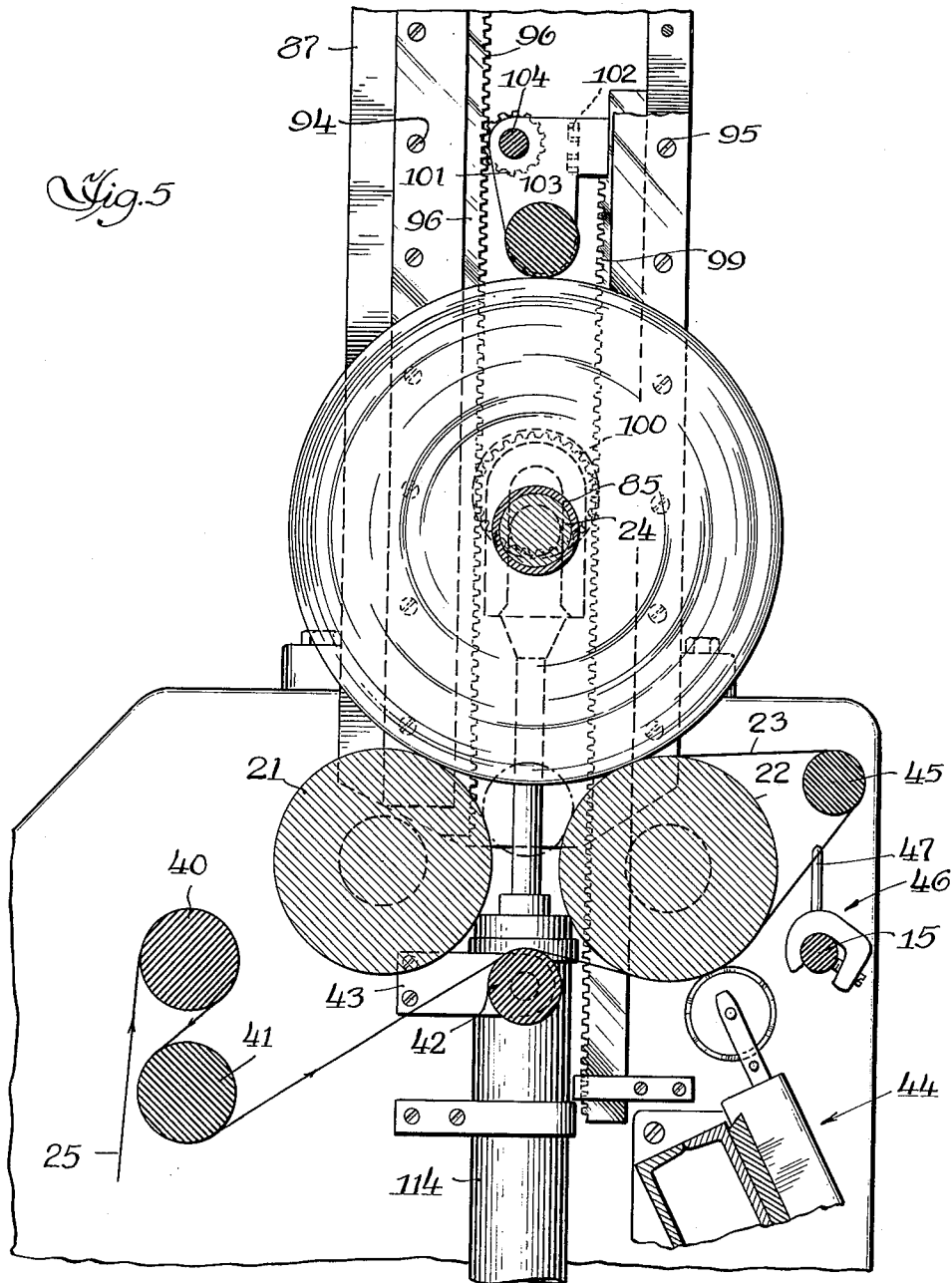
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WINDING AND SLITTING MACHINE

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5 Sheets-Sheet 4



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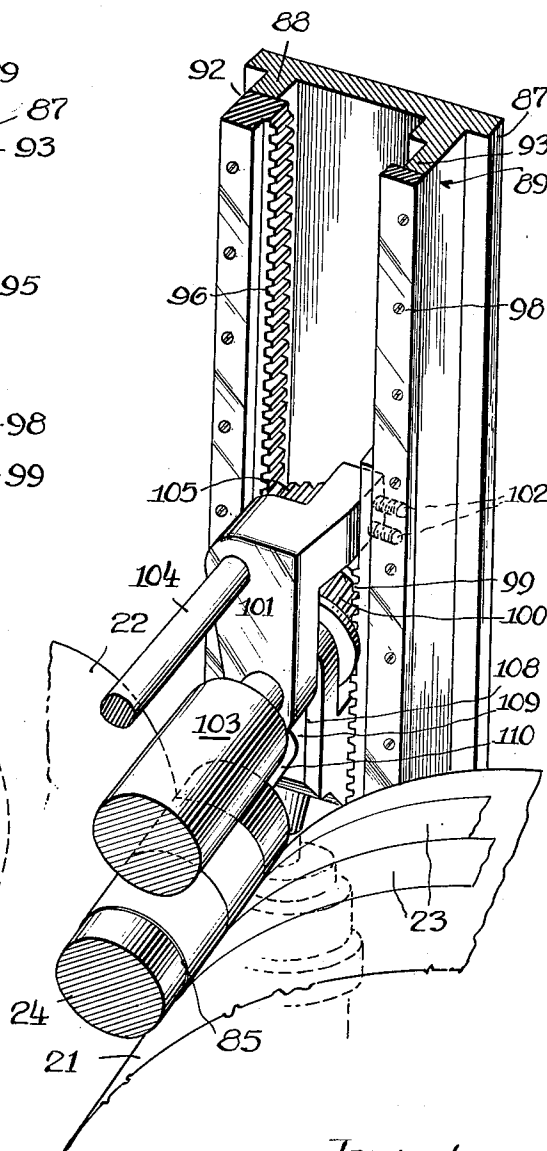
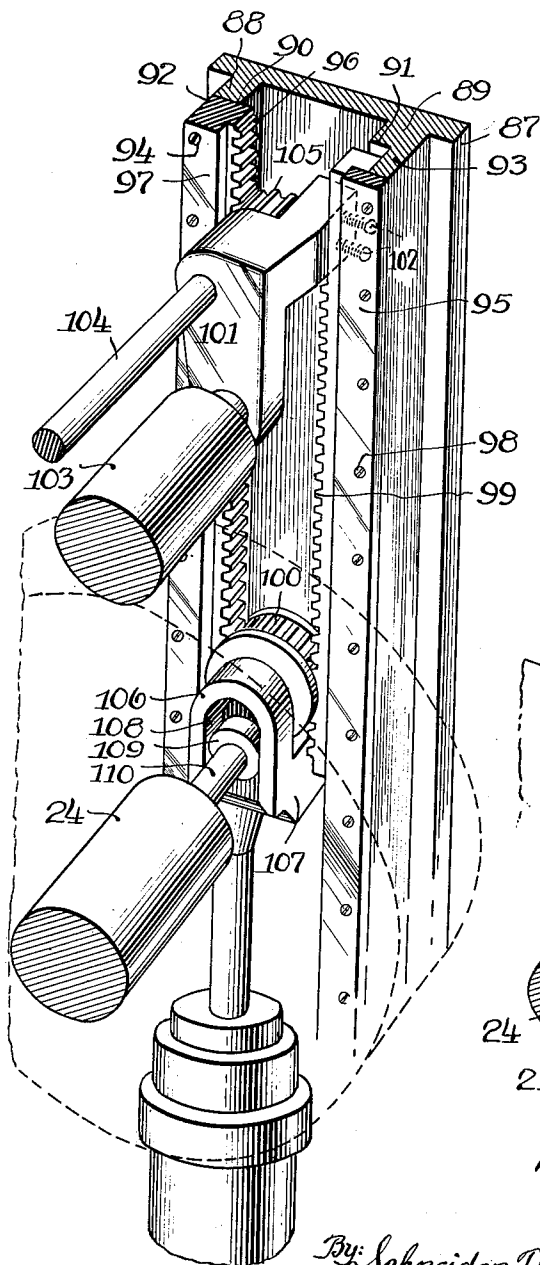
WINDING AND SLITTING MACHINE

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Fig. 7

Fig. 6



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3,104,072

WINDING AND SLITTING MACHINE

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9 Claims. (Cl. 242-66)

The present invention relates to winding and slitting or cutting machines and more particularly to two-drum winding and slitting or cutting machines.

Machines of this general type generally include a roll stand or means for supporting a roll of elongated material such as woven or nonwoven fabric, plastic, synthetic materials and metal foil, etc., for rotation about its axis. The web of material is pulled from the roll and threaded through the machine about several aligning and tensioning rolls. The web is slit or cut longitudinally as it passes through the machine and the strips are wound on cores which are supported on a core shaft.

The arrangement of the machine is such that the outer surface of the strips wound about the core shaft bear against a pair of driven drums or rolls which drive the rolls of strips to wind the strips onto the rolls.

Machines of this type which were in common use prior to the present invention were bulky, complex and difficult to operate. They were generally arranged to apply pressure on the rolls of strips to force the same against the winding drums by applying pressure to the roll cores and against the top of the rolls of strips. The pressure applying arrangement often took the form of a heavy frame which required massive counterweights. Another common form of pressure applying arrangement takes the form of a heavy pressure roller that rests on top of the rolls of strip material. A weighted chain trained over a pulley at the top of the machine and secured to the pressure roller provides a decreasing counterweight for the pressure roller as the diameter of the rolls of strip material increases.

The pressure applying arrangements often became extremely complex when efforts were made to provide a differential between the pressure applied at the roll core and the pressure applied at the top of the rolls.

Machines embodying the principles of the present invention, however, avoid all of these difficulties and are extremely simple and convenient to operate, easy to load and unload, and efficiently and automatically slit elongated webs of material and wind the strips into rolls.

A preferred embodiment of this invention utilizes an arrangement which applies pressure to the top of the rolls, guides and supports the core shaft and permits it to float freely.

One of the principal difficulties encountered with machines used heretofore arose from the variations in the geometric relations between the machine and the rolls of strips, which occurred as the rolls of strips increased in diameter. When the rolls of strips have a very small diameter, the axis of the core shaft and the portions of the outer surface of the rolls of strips tangent to the winding drums are closer to the plane containing the axes of the winding drums than they are when the rolls have a large diameter. Because of this change in the geometric relation between the rolls of strips and the winding drums, the core shaft and the top pressure roll which applies pressure to the top of the rolls of strips, move upwardly in the machine at different rates. The axis of the rolls of strip material moves upwardly at a rate slightly greater than one-half of the rate at which the tops of the rolls move upwardly.

Accommodation for these different rates of upward movement for the core shaft and the pressure roll, be-

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came extremely difficult and often was not provided for because of the complexity of the problem and the arrangements which were heretofore thought possible.

Mechanisms embodying the present invention, however, accommodate for this variation in the rates of movement in a very simple and efficient manner and operate automatically.

A preferred embodiment of the present invention, as illustrated in the accompanying drawings and described in detail hereinbelow, employs a double rack and gear arrangement with a floating bearing for the core shaft coupled to the axis of the gear shaft. The double rack and gear arrangement is coupled to the pressure roll and to the floating bearing for the core shaft in such a manner that the floating bearing will rise at one-half of the rate of rising movement of the pressure roll. The floating bearing for the core shaft, however, has sufficient play therein to accommodate the vertical difference between the horizontal line of tangency of a small diameter roll of material on the core shaft with a winding drum and the horizontal line of tangency of a large diameter roll of material on the core shaft with a winding drum.

This arrangement permits the core shaft and the pressure roll which bears against the top of the rolls of strips, to rise at different rates without difficulty since adjustment for the difference is accommodated automatically in the floating bearing for the core shaft.

The pressure roll is secured to the movable rack. The movable rack is coupled to the fixed rack through a gear journaled on the floating bearing assembly.

As the pressure roll rises due to an increase in the diameter of the rolls of strips, the movable rack rises with it thereby turning the gear and causing the floating bearing assembly to rise since the gear is also engaged with the fixed rack. The rate of upward movement of the axis of the gear will be exactly half of the rate of upward movement of the pressure roll but the floating bearing will accommodate the difference between the rate of rise of the gear and the rate of rise of the axis of the rolls of strips slit on the machine.

Machines embodying this invention may be used to cut or slit material by any desired slitting technique such as, for example, score slitting or razor slitting. When score cutters are employed with this machine to effect the slitting of the web of material, it is desirable in many instances to provide separating fingers to project through the score cuts to provide for complete separation of the strips of material, depending upon the fiber character of the material which is cut.

In addition to the foregoing, numerous other advantages and features of the present invention will become readily apparent from the following detailed description of the invention and a preferred embodiment thereof, from the claims and from the accompanying drawings in which each and every detail shown is fully and completely disclosed as a part of this specification, in which like reference numerals refer to like parts and in which:

FIGURE 1 is a perspective rear view of a two-drum winding and slitting or cutting machine embodying the principles of this invention;

FIGURE 2 is an elevational rear view of the machine of FIGURE 1;

FIGURE 3 is an elevational side view of the machine of FIGURE 1;

FIGURE 4 is a vertical sectional view of the machine of FIGURE 1 viewed substantially along the line 4-4 of FIGURE 2;

FIGURE 5 is a vertical sectional view like FIGURE 4 but showing the machine in a different operating position;

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FIGURE 6 is a fragmental perspective view of the gear and rack arrangement and corresponds to FIGURE 4;

FIGURE 7 is a fragmental perspective view like FIGURE 6 but showing the gear and rack arrangement in an operating position corresponding to FIGURE 5; and

FIGURE 8 is a fragmental sectional view of the gear and rack arrangement viewed substantially along the line 8-8 of FIGURE 4.

A two-drum winding and slitting or cutting machine 10 embodying this invention is shown assembled, housed and in operation in FIGURE 1. The machine 10 includes a pair of side frame plates 11 and 12 which are held in spaced parallel relation by a plurality of tie rods 13 and 14 adjacent to the base corners of the frame plates 11 and 12, and a tie rod 15 near the upper rear corners of the frame plates.

One of the side plates, the side plate 11, carries a driving train including a gear train 16 and a belt and pulley arrangement 17, shown in FIGURE 3, and enclosed by a shield or guard housing 18 seen in FIGURE 1. These driving arrangements couple a motor 19 and transmission 20 to a pair of driving drums 21 and 22. The driving drums, in turn, drive the rolls of strips 23 of material which are wound on cores on a core shaft 24. The strips are formed by cutting or slitting a web 25 which is drawn from a roll 26 of material supported on an unwind shaft 27 at the front of the machine. The unwind shaft is supported by a bearing and bracket arrangement 28 secured to the front of the side plates 11 and 12.

During normal operation, the web 25 is pulled from the roll 26 and the roll rotates. Any convenient means for holding the roll on roll shaft 27 may be employed. To keep the roll 26 from overrunning, a small belt-type brake 29 is employed. The brake includes a belt 30 one end of which is secured to a fixed bar 31 and the other end of which is weighted by weight 32. An intermediate portion of the belt 30 overlies a pulley or small brake drum 33 fixed on the shaft 27 for rotation therewith.

A hand wheel 34 secured to a screw shaft 34a is coupled to the unwind shaft 27 through an edge guide adjusting bar and nut 35. Rotation of the hand wheel 34 causes lateral movement of the bar and nut 35, which lateral movement is transmitted to the unwind shaft 27 through a thrust pulley 35a for axially adjusting the position of the roll 26 in the machine.

A small hand wheel 36 is provided outside of the guard shield or housing 18 to provide for manual rotation of the winding drums 21 and 22 during starting up operations to assist in threading the web of material through the machine. The hand wheel 36 is coupled directly to the winding drums 21 and 22.

The web 25 may follow any desired path through the machine, depending upon the desired tension to be applied to the web during the slitting or cutting and winding operation. The path shown in FIGURES 3, 4 and 5 for the web 25 is exemplary for a material which will permit the use of maximum tension on the web during the cutting or slitting and winding operation.

Referring particularly to FIGURE 4, it will be seen that as the web 25 leaves the roll 26, it is threaded about an idler roll 37 which is journaled at the lower front portion of the side plates 11 and 12 and extends across the space therebetween. The web 25 extends upwardly from the idler roll 37 to a pair of idler rolls 38 and 39 and then to a pair of driven rolls 40 and 41 about which it is threaded near the upper front portion of the machine. These rolls are also journaled in bearings in side plates 11 and 12 and extend across the entire width of the machine. The driven rolls 40 and 41 are arranged so that the web 25 forms an S-wind thereabout for increased surface engagement between

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the web 25 and the surface of the rolls 40 and 41 to improve the driving of the web through the machine.

The web 25, when it leaves the lower of the S-wind rolls 40 and 41, extends upwardly and rearwardly of the machine, over a further idler roll 42 which is journaled on bracket 43 secured to the side plates 11 and 12. The web 25 passes rearwardly of the machine from the idler roll 42 to engage the surface of the rear winding drum 22 at the lower portion thereof. As the web moves rearwardly of the machine in engagement with winding drum 22 it is cut or slit into strips by devices such as the score cutter arrangement indicated generally at 44.

After the web is cut or slit into strips, in this embodiment of the invention, it passes upwardly from the winding drum 22 to an idler roll 45 which is journaled in bearings at the upper rear corners of the side plates 11 and 12. As the slit web spans the gap between the winding drum 22 and the idler roll 45 it is engaged by a separating finger arrangement 46 having fingers 47 thereon which extend upwardly and project through the slits or cuts between the strips 23 of the web 25 as seen in FIGURES 1, 4 and 5.

After the strips 23 pass over the idler roll 45, they re-engage the winding drum 22 near the top thereof and remain in surface contact with the winding drum 22 until they engage the roll on which they are wound, as indicated generally at 48.

If the character of the fibers in the web of material is such that separation of the strips 23 by such a mechanism as the separating finger arrangement 46, is not required, it is preferred to retain the web and strips in engagement with the winding drum 22 from the point where the web is cut by the cutters in the cutting arrangement 44 to the point where the strips are wound about the rewind or core shaft 24. By retaining the web and strips in contact with the winding drum 22 between the cutting or slitting point and the rewinding point, the pressure and tension on the strips are held constant and the distance between the cutting point and rewinding point is held constant. When both of these factors are constant, separation of the strips from each other after the rolls thereof are removed from the rewind shaft 24, is improved and simplified and the strips are more uniformly wound. If these two factors are permitted to vary widely during the course of operation of the machine there is a tendency for the edges of the strips to reknit or to interleave thereby making separation of the rolls of strips extremely difficult.

The machine herein shown is also adapted to be used with razor slitting by mounting razor slitting mounting brackets and razor holder clamps on the tie rod 15 to slit the web as it passes from the winding drum 22 to the idler roll 45.

In the embodiment of the invention shown in the drawings the material of the web 25 is cut by a score cutting arrangement 44 which includes a plurality of score cutter heads 49 adjustably secured to a cutter mounting bar 50 that is fixed upon a supporting frame 51 comprised of a pair of channel members 52 secured to end plates 53 which are secured to the side plates 11 and 12 of the machine. The mounting bar 50 has a reverse wedge shape which cooperates with a groove 54 in each cutter head 49, as a tongue and groove arrangement. A thumb screw 55 permits tightening and loosening of the cutter 49 on the mounting bar 50 so that the cutter can be set in any adjusted position and fixed in place on the mounting bar 50 or removed therefrom.

The score cutters in this embodiment of the invention are pneumatically operated and each includes a piston 56 which carries an annular, sharp edged, score cutter blade 57 at the end thereof. Pressurized air is supplied to the head end 58 of each of the cutter heads 49 from a manifold 59 which is coupled to the cutter heads 49 through appropriate hoses and couplings 60. Control of

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the pneumatic energy supplied to the cutter heads 49 will control movement of the score cutter blades 57 toward and away from the winding drum 22 and will control movement of the pistons 56 and the pressure applied to the score cutter blades 57 for forcing them into and/or through the web of material to score cut the same.

Since the cutting operation with score cutters is effected against the winding drum 22, it is preferred that the winding drum 22 be a hardened drum or have a hardened surface or have a hard surface sheath thereon.

The nature of score cutting is such that use of the separating finger arrangement 46 is sometimes desirable. In such instances, the separating fingers 47 may be adjustably placed so that they will extend through the score cuts or slits in the web of the material to separate the strips 23. The separating finger arrangement 46 includes a plurality of clamps 61 having adjustable set screws 62 therein for adjustably clamping the same onto the tie rod 15. The separating fingers 47 are fixed on the adjustable clamps 61.

Power for driving the power driven rolls in the machine is supplied from the motor 19 mounted on the transmission 20, best seen in FIGURE 2. The output of the transmission is coupled through the belt and pulley arrangement 17 and gear train 16 to the rolls. The transmission 20 is mounted on a base plate 63 that is secured to the bottom tie rods 13 and 14 which are secured to the side plates 11 and 12. The output shaft 64 of the transmission 20 is coupled by direct coupling unit 65 to a shaft 66 which is journaled in a bearing 67 in the side plate 11. The outer end of the shaft 66 carries a multiple groove pulley 68 which is coupled by a plurality of V-belts 69 to a multiple groove pulley 70 mounted on a shaft 71 that is journaled in a bearing 72 mounted on the outer face of the side plate 11.

A gear 73 keyed to the shaft 71 for rotation therewith engages gears 74 and 75 on the outer ends of the shafts 76 and 77 of the winding drums 21 and 22, respectively.

By directly coupling the gear 70 to the gears 74 and 75, the winding drums 21 and 22 are rotated in the same direction and are thereby properly driven for driving the rolls of strip material.

The gear 74 on the shaft 76 for the winding drum 21 is coupled through an idler gear 78 to a gear 79 on the outer end of shaft 80 for the lower S-wind roll 41 to drive the gear 79 and the lower S-wind roll 41 in a counterclockwise direction as viewed in FIGURE 3. The gear 79 for the lower S-wind roll 41 is coupled through a pair of idler gears 81 and 82 to a gear 83 on shaft 84 for the upper S-wind roll 40 to drive the upper S-wind roll 40 in a clockwise direction as viewed in FIGURE 3.

With the gears operating in the directions described above, the winding drums 21 and 22 are driven in a counterclockwise direction to thereby drive the rolls of strip material wound about the core shaft 24 in a clockwise direction as viewed in FIGURES 4 and 5.

As the diameter of the rolls of strips build up by being wound on cores 85, FIGURE 5, on the core shaft 24, the core shaft 24 rises at a rate which is slightly greater than one-half of the rate of build up of the diameter of the roll. The core shaft is stabilized for movement in a vertical plane so that any tendency for the roll to ride off of the machine on one of the winding drums, particularly on the winding drum 22, is restrained. The mechanism for guiding the core shaft during its rising movement is also effective to assist in the application of controlled pressure to the top of the rolls of strip material to insure rewinding of the material in a tightly packed, uniform, cylindrical roll.

The guiding and pressure applying mechanism includes a pair of symmetrical, upright standards 86 and 87 at the sides of the machine, extending upwardly from and secured to the side plates 11 and 12. The upright standards 86 and 87 are formed as sturdy structural members and each have a pair of inwardly extending,

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parallel rack support bars 88 and 89 shown in detail in FIGURES 6 and 7. The rack support bars 88 and 89 are formed integrally with or are secured to the standards 86 and 87 and extend for the full height thereof.

The rack support bar 88 on the standard 87, as seen in FIGURES 6 and 7, is provided with a butt face 90 onto which a fixed rack 92 having teeth 96 is secured by screws 94 or the like which extend through the exposed face 97 thereof. The rack support bar 89 is provided with a shoulder 91 and a reduced transversely extending portion 93. A track plate 95 secured to the transversely extending portion 93 by screws 98 cooperates with the transversely extending portion 93 to form a slide track for a movable rack 99 having teeth which extend toward the teeth on the fixed rack 92.

The racks 92 and 99 are coupled together for relative movement by a tracking gear 100 which has a proper diameter and tooth pitch to engage both racks.

A pressure roller mounting bracket 101 is secured to the upper end of the movable rack 99 by means of screws 102 or the like which extend through an arm on the bracket and into the movable rack 99. An aperture near the upper end of the bracket 101 forms a bearing for a torque shaft 104 on the ends of which there are gears such as the gear 105 which engages the stationary or fixed rack 92. A depending arm on the bracket 101 is apertured to form a bearing for a top pressure roll 103 which extends across the machine to bear onto the top of the rolls of strip material wound on the cores 85 on the core shaft 24.

A tracking gear 100 is journaled in a horizontal recess in a floating bearing block 106, by a bearing pin 100a which is secured in a pair of aligned apertures in the floating bearing block. The floating bearing block 106 has a width slightly less than the space between the faces of the lands on the racks 92 and 99 so that the base portion 107 of the block can fit between the racks 92 and 99 and move vertically therebetween. Any movement of the movable rack will be transmitted through the gear 100 to the floating bearing block 106 for movement of the floating bearing block 106 at a rate of one-half of the rate of movement of the movable rack 99 since the gear 100 is coupled to the fixed rack 96.

The face of the floating bearing block extending inwardly toward the center of the machine is provided with a vertically extending groove 108 which is dimensioned to receive a sliding or roller bearing 109 on a reduced end 110 on the core or rewind shaft 24. This structure is shown in detail in FIGURE 8.

The groove 108 has a vertical height which is substantially greater than the diameter of the bearing roller 109. The groove 108 preferably has a height which is preferably about the same as or slightly less than the radius of the drive drums 21 and 22 plus the radius of the bearing roller 109. The operating function of the groove is explained in greater detail hereinbelow in the description of the operation of the machine. Essentially, however, the purpose of having a groove of that height in the floating bearing block is to permit the core shaft 24 to move upwardly at a rate slightly in excess of the rate of upward movement of the floating bearing block and to accommodate for the geometric difference between the relative positions of the core shaft 24 with respect to the winding drums 21 and 22 as the strips are rolled onto the cores on the core shaft.

At the lower end of the floating bearing block 106, it is provided with a threaded aperture which receives a screw threaded portion 111 at the upper end of a piston rod 112. An inverted conical core shaft aligning member 113 is secured onto the piston rod 112 near its upper end abutting the bottom of the floating bearing block 106. The piston rod is a part of a double acting piston-cylinder pressure applying assembly 114 which is aligned with the floating bearing block 106 and arranged vertically in the machine for vertical movement of the piston

rod 112. The lower end of the piston-cylinder assembly 114 is secured to a bracket 115 at the lower central portion of the side plate 12.

It should be understood that the arrangement and parts hereinabove described in connection with the floating bearing block 106, the tracking gear 100, the standard 87 and the racks 95 and 96 and the numerous other parts associated therewith are duplicated at the other side of the machine, i.e., at the side of the machine having the standard 86 which is fastened to the side plate 11, so that the machine is symmetrical from side to side and each part that extends across the machine has symmetrical or identical parts at its opposite end. For example, a piston cylinder assembly 116 is shown in FIGURE 2 adjacent to the side plate 11 and mounted on a bracket 117 secured to the side plate 11.

When the machine is in starting operating position for slitting an elongated web 25 of material that is to be pulled from a roll such as the roll 26 shown in FIGURE 1, and the web 25 has been threaded through the machine and fastened to cores 85 on the core shaft, which cores each have an axial length corresponding to the width of the strips to be cut, the mechanism is in the position shown therefor in FIGURES 4 and 6. That is, at the initiation of operation, the floating bearing block 106 is in its lowermost position, the core shaft is also in its lowermost position with the leading edges of the strips of material fastened against the cores and the cores are resting against the outer surfaces of the winding drums 21 and 22. The pressure roller 103 is, at the beginning of operation of the machine, resting on top of the cores and the movable rack is in lowered position extending downwardly alongside the piston-cylinder assembly at the side of the machine. Thus, the movable gear or tracking gear 100 is engaged with the teeth at the bottom of the fixed rack 96 and with the teeth at the top of the movable rack 99.

At this stage of the operation, the combined diameter of the core shaft 24 and the materials thereon including the cores 85 and the strips 23 is so small compared to the diameters of the winding drums 21 and 22 that the core shaft rests deeply nested in the tapered space between the winding drums with its axis in a plane slightly above the plane containing the axes of the winding drums 21 and 22.

After the machine has been placed into operation by energization of the motor 19 through actuation of the controls 118 therefore, the material begins to build up on the core shaft so that the rolls enlarge substantially in diameter. While the material is building up on the rolls, pressure is held thereagainst by pneumatic pressure in the piston-cylinder assemblies 114 and 116. The piston pressure from the pneumatic pressure in the piston-cylinder assemblies 114 and 116 is transmitted to the pressure roll 103 through the floating bearing blocks 106, the tracking gears 100, and the movable racks 99 which are fastened to the brackets 101 that support the pressure roll 103. That is, by applying downward pressure on the piston rod 112, a downward force is applied to the pressure roll 103 to apply a downward pressure to the top of the rolls of strip material 23. This pressure is automatically bled-off and reduced as the diameter of the rolls of strip material builds up by bleeder valves provided in the pneumatic controls for the piston-cylinder assemblies.

As the diameter of the rolls of strip material 23 builds up, however, it pushes the pressure roll 103 upwards. Upward movement of the pressure roll 103 causes the movable rack 99 to move upward. Movement of the movable rack 99 in turn rotates the tracking gear 100 to move it upwardly along the fixed rack 96 and thereby moves the floating bearings 106 upwardly. The movement of the floating bearing 106 is at a rate which is one-half of the upward rate of movement of the pressure roller 103.

The rate of movement of the bearing block 106, however, is not exactly equal to the upward rate of movement of the core shaft 24 nor is it equal to one-half of either the rate of increase in the diameter of the rolls of strips 23 or the rate of rise of the tops of the rolls of strips 23. This is due to the fact that as the diameter of the rolls of strip material 23 increases, the lines of contact of the surface portions thereof with the driving drums 21 and 22 move relatively upward on the driving drums 21 and 22 from the position shown in FIGURE 4 to the position shown in FIGURE 5. Thus, as the rolls of strip material 23 build up to a large diameter, the lines of tangency between the rolls of strip material 23 and the winding drums 21 and 22 tend to approach the tops of the winding drums 21 and 22. The length of the slot 108 in the floating bearing blocks, however, accommodates this nonlinear, relatively greater rate of rise of the core shaft 24 with respect to the other elements which are moving upwardly.

When the rolls of strip material 23 have reached a maximum diameter, the bearing roll 109 is adjacent to the top of the recess 108 in the floating bearing block and the mechanism has moved smoothly and automatically to slit or cut the web 25 into strips 23 and to rewind the strips into large diameter, compact rolls.

The mechanism of this invention also may be used in such a manner as to transfer the downward pressure force applied by the cylinder assemblies 114 and 116, from the pressure roller 103 to the core shaft 24 as the rolls of strips increase in diameter by decreasing the height of the recess 108 in the bearing blocks 106. With this construction the bearings 109 will engage the tops of the recesses 108 and cause the pressure to be smoothly transferred to the core shaft. Continued operation will cause the gear and rack arrangement to lift the pressure roller 103 off the tops of the rolls of strips 23.

When the rolls of strip material 23 have reached the desired diameter, or all of the material from the roll 26 has been wound into rolls of strips 23, the rolls of strips may be easily and conveniently removed from the machine by reversing the direction of pneumatic actuation in the piston-cylinder assemblies 114 and 116. By reversing the pneumatic actuation, the floating bearing blocks 106 are driven upwardly. As the floating bearing blocks 106 move upwardly, the movable racks 99 move upwardly through their coupling to the floating bearing blocks through tracking gears 100. This removes the pressure from the top of the roll and separates the pressure roll 103 from the top of the rolls of strip material. It also serves to drive the floating bearing blocks upwardly so that they pass above the bearing rollers 109 that are normally in the slot 108 in the floating bearing blocks.

With the bearing rollers 109 free from the recesses 108 in the floating bearing blocks 106, the core shaft may be easily lifted from the machine for unloading the rolls of strip material thereon and for placing new cores on the machine for reloading the core shaft into the machine to begin a new winding and slitting operation.

Reloading is easily simplified by merely placing the appropriate cores on the core shaft and placing the core shaft in the machine in the position shown in FIGURE 4 so that the cores are in contact with the driving drums 21 and 22. Thereafter all that is required is to reverse the pneumatic actuation of the piston-cylinder assemblies 114 and 116 to lower the gear and rack operating mechanisms to a point where the roller bearings 109 will be received in the slots 108 in the floating bearing blocks 106 and the machine will be in a starting position. If the core shaft is not properly centered, the bearings thereon will be engaged by the automatic aligning cones 113 on the piston rods to direct the bearings into the slots in the floating bearing blocks.

It will be readily observed from the foregoing detailed description of the invention and the preferred illustrative embodiment thereof that numerous variations and modi-

fications may be effected without departing from the true spirit and scope of the novel concepts and principles of this invention.

We claim:

1. In a winding machine for winding a strip of material into a roll thereof, a core shaft about which the strip of material is to be wound in a roll, a pair of winding drums to engage the outer surface of the roll of strip material to drive the same and wind the strip material on the roll on the core shaft, a pressure roller to engage the top of the roll of strip material, a floating bearing to guide the core shaft upwardly as the diameter of the roll of strip material increases, and coordinating means interconnecting said floating bearing and said pressure roller to raise said floating bearing at a rate of about one-half of the rate of upward movement of the pressure roller as the diameter of the roll of strip material increases and means accommodating a difference between the rates of rise of said core shaft and said floating bearing.

2. In a winding machine for winding a strip of material into a roll thereof, a core shaft about which the strip of material is to be wound into a roll, a pair of winding drums to engage the outer surface of the roll of strip material to drive the same and wind the strip material into a roll on the core shaft, a pressure roller to engage the top of the roll of strip material, a floating bearing to guide the core shaft upwardly as the diameter of the roll of strip material increases, and coordinating means raising said floating bearing at a rate of about one-half of the rate of upward movement of the pressure roller as the diameter of the roll of strip material increases, said coordinating means including a rack and gear assembly comprising a fixed rack, a movable rack having its upper end secured to said pressure roller and a floating gear interconnecting said fixed rack and said floating rack and means accommodating a difference between the rates of rise of said core shaft and said floating bearing.

3. In a winding machine for winding a strip of material into a roll thereof, a core shaft about which the strip of material is to be wound into a roll, a pair of winding drums to engage the outer surface of the roll of strip material to drive the same and wind the strip material into a roll on the core shaft, a pressure roller to engage the top of the roll of strip material, a floating bearing to guide the core shaft upwardly as the diameter of the roll of strip material increases, and coordinating means raising said floating bearing at a rate of about one-half of the rate of upward movement of the pressure roller as the diameter of the roll of strip material increases, said coordinating means including a rack and gear assembly comprising a fixed rack, a movable rack having its upper end secured to said pressure roller and a floating gear interconnecting said fixed rack and said floating rack, said floating gear being journaled on said floating bearing.

4. In a winding machine for winding a strip of material into a roll thereof, a core shaft about which the strip of material is to be wound into a roll, a pair of winding drums to engage the outer surface of the roll of strip material to drive the same and wind the strip material into a roll on the core shaft, a pressure roller to engage the top of the roll of strip material, a floating bearing to guide the core shaft upwardly as the diameter of the roll of strip material increases, and coordinating means raising said floating bearing at a rate of about one-half of the rate of upward movement of the pressure roller as the diameter of the roll of strip material increases, said coordinating means including a rack and gear assembly comprising a fixed rack, a movable rack having its upper end secured to said pressure roller and a floating gear interconnecting said fixed rack and said movable rack, said core shaft having a bearing member at an end thereof, and said floating bearing having means

therein to receive said bearing member on said core shaft permitting vertical movement of said core shaft with respect to said floating bearing whereby variations in the geometric relation between the roll of strip material and the winding drums are accommodated so that the core shaft may rise at a rate in excess of one-half of the rate of rise of the pressure roller on the top of the roll of strip material.

5. In a two-drum winder for winding a longitudinal extending strip of material into a roll, a pair of parallel winding drums, a core shaft to be disposed parallel to said winding drums and adapted to have the strip of material wound thereon by engagement between the strip of material and the winding drums, a pressure roller disposed parallel to said winding drums and above said core shaft to engage the top of the roll of strip material on said core shaft, and pneumatic pressure means connected to said pressure roller to force said pressure roller downwardly against the top of the roll as said strip material is being wound, said pneumatic pressure means including control means to directly decrease the pressure applied by said pressure roller to the top of said roll of strip material as the diameter of said roll of strip material increases and to raise said pressure roller relative to said roll of strip material to permit easy removal of said roll from said winder.

6. In a winding machine for winding a longitudinal strip of material into a roll thereof, a core shaft about which the strip of material is to be wound into a roll, a pair of winding drums to engage the outer surface of the roll of strip material to drive the same and wind the strip material into a roll on the core shaft, a pressure roller to engage the top of the roll of strip material, a floating bearing to guide the core shaft upwardly as the diameter of the roll of strip material increases, and interconnected gear means to controllably raise and lower said pressure roller and said floating bearing.

7. In a winding machine for winding a longitudinal strip of material into a roll thereof, a core shaft about which the strip of material is to be wound into a roll, a pair of winding drums to engage the outer surface of the roll of strip material to drive the same and wind the strip material on the roll on the core shaft, a pressure roller to engage the top of the roll of strip material, a floating bearing to guide the core shaft upwardly as the diameter of the roll of strip material increases, means to controllably raise and lower said pressure roller and said floating bearing, and means on said floating bearings to automatically align said core shaft therewith when said floating bearings are lowered to engage said core shaft.

8. In a winding machine for winding a longitudinal strip of material into a roll thereof, a core shaft about which the strip of material is to be wound into a roll, a pair of winding drums to engage the outer surface of the roll of strip material to drive the same and wind the strip material into a roll on the core shaft, a pressure roller to engage the top of the roll of strip material, a floating bearing to guide the core shaft upwardly as the diameter of the roll of strip material increases, a pneumatic piston and cylinder assembly connected to said floating bearing, and an automatic aligning cone secured to said piston and cylinder assembly adjacent to the underside of said floating bearing to align the core shaft with said floating bearing when the floating bearing is brought into engagement with said core shaft upon operation of said pneumatic piston and cylinder assembly.

9. In a machine for slitting and winding an elongated web of sheet material, a frame, a pair of parallel winding drums rotatably mounted on said machine adjacent to each other, a pair of upright standards disposed on said frame adjacent to the ends of said winding drums, a core shaft removably mounted on said machine parallel to said winding drums, a pair of floating bearings slidably disposed in said standards and adapted to engage said core shaft, a fixed rack in each of said upright standards,

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a movable rack in each of said standards, a tracking gear disposed in each of said upright standards and engaging the movable rack and the fixed rack therein, said tracking gear being journaled on said floating bearing, a pressure roller secured to said movable racks, a pair of piston and cylinder assemblies mounted on said frame and secured to said floating bearings, a scoring assembly mounted on said frame and disposed to engage one of said winding drums, and a separating finger mounted on said frame and disposed in alignment with said scoring assembly.

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