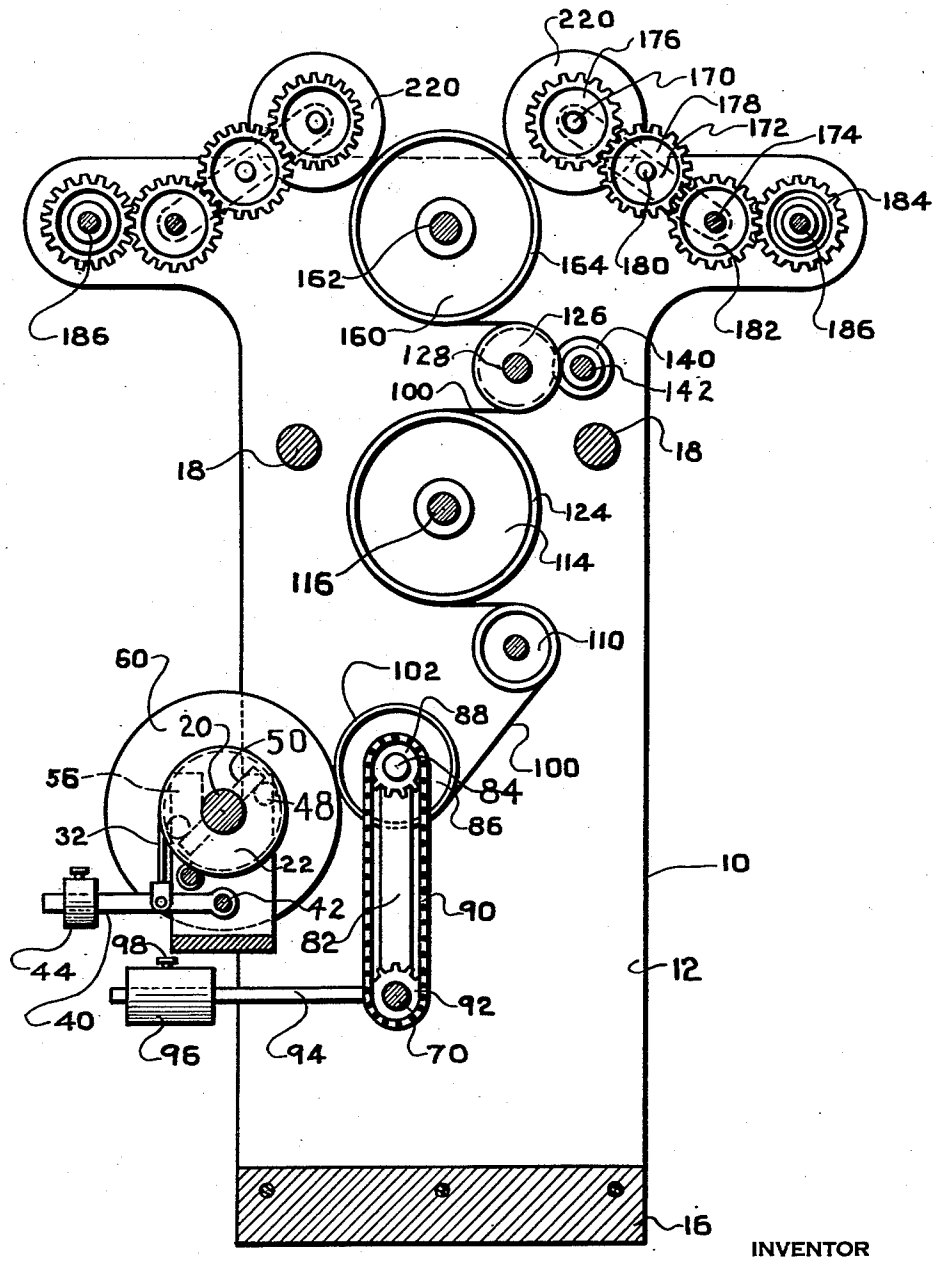
Aug. 10, 1943. A. O. RUSSELL 2,326,173

PROCESS AND APPARATUS FOR HANDLING MATERIAL

Filed Oct. 18, 1941 3 Sheets-Sheet 1

Fig. 1.



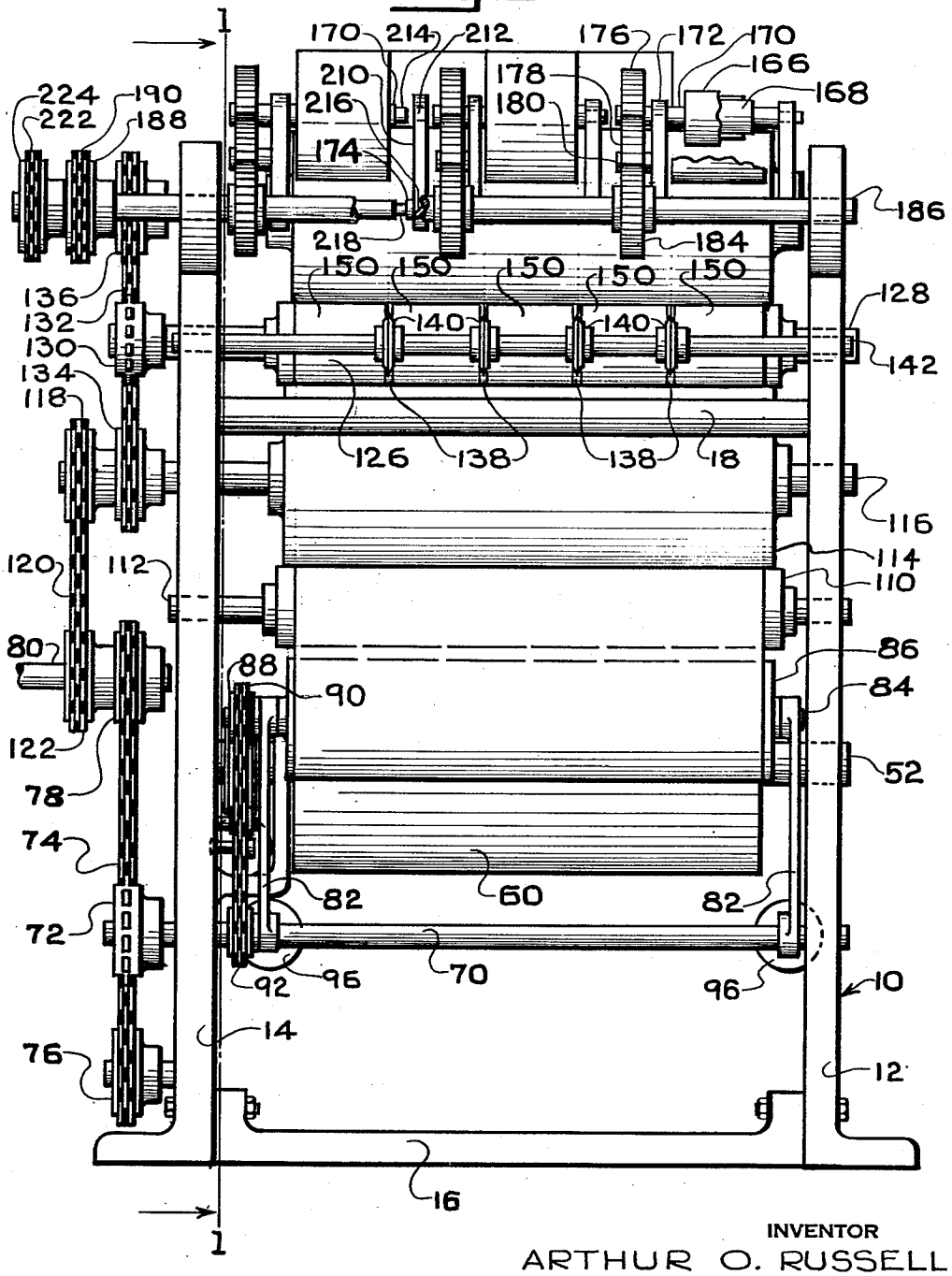
INVENTOR
ARTHUR O. RUSSELL
BY John M. Leach
ATTORNEY

Aug. 10, 1943. A. O. RUSSELL 2,326,173

PROCESS AND APPARATUS FOR HANDLING MATERIAL

Filed Oct. 18, 1941 3 Sheets-Sheet 2

Fig. 2.



INVENTOR
ARTHUR O. RUSSELL
BY
John Ky. Leach
ATTORNEY

Aug. 10, 1943. A. O. RUSSELL 2,326,173

PROCESS AND APPARATUS FOR HANDLING MATERIAL

Filed Oct. 18, 1941 3 Sheets-Sheet 3

Fig. 3.

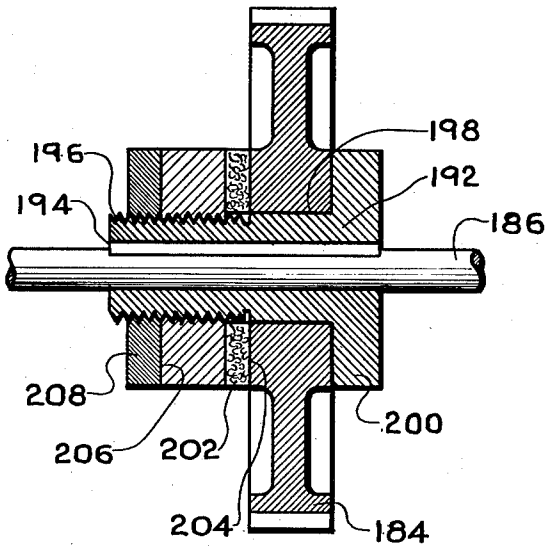


Fig. 4.

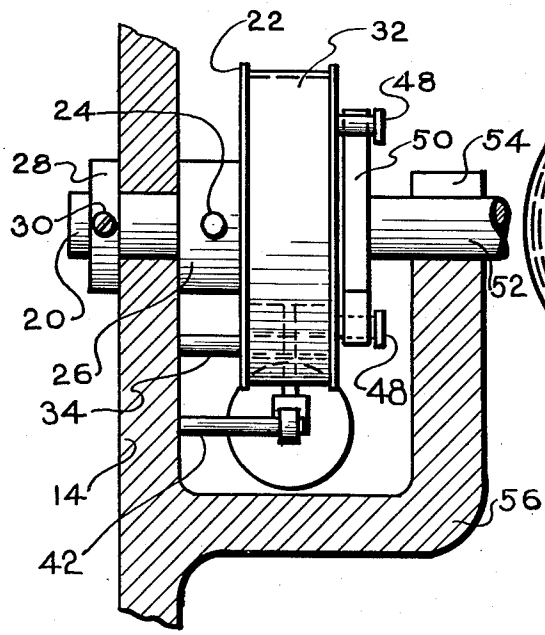
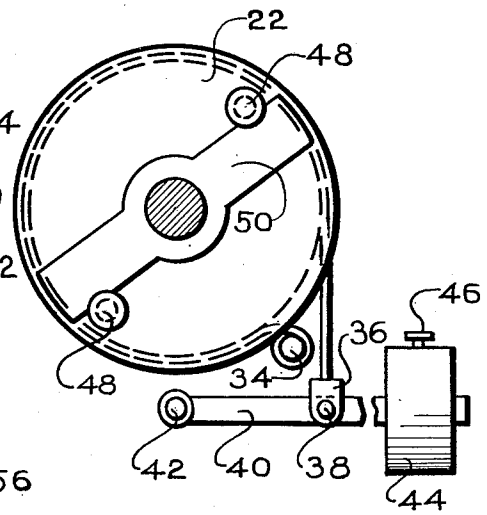


Fig. 5.



INVENTOR
ARTHUR O. RUSSELL
BY
John M. Leach
ATTORNEY

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UNITED STATES PATENT OFFICE

2,326,173

PROCESS AND APPARATUS FOR HANDLING MATERIAL

Arthur O. Russell, Fredericksburg, Va., assignor to Sylvania Industrial Corporation, Fredericksburg, Va., a corporation of Virginia

Application October 18, 1941, Serial No. 415,540

10 Claims. (Cl. 164—65)

The present invention relates to the handling of elongate materials. More particularly, it relates to a process and apparatus for winding and unwinding webs of material, either solely for the purpose of winding the material or incidental to some operation being performed on the material, for example, slitting, coating, printing or the like, or in the use of such materials such as wrapping commodities and other using operations.

Many elongate materials, particularly those types having smooth and rather slippery surfaces, such as nonfibrous cellulosic materials, for example, Cellophane (cellulose hydrate), cellulose acetate, cellulose nitrate, hard sized papers and textiles, and coated papers and textiles, are difficult to wind into rolls because air is trapped between overlying convolutions and adds to the natural tendency for the convolutions to slip one on the other and causes such rolls, particularly when the webs and strips are of relatively narrow widths, to telescope and form rolls which are not only unsightly but do not operate well on various types of machines such as slitters, coaters, and wrapping machines. This condition is not avoided even when considerable tension is placed on the material during winding, and tension is usually undesirable because it creates what is known as hard rolls which are difficult to handle and produces undesired stretch and distortion in the webs.

Even rolls which have only one or two convolutions telescoped relative to the remainder of the convolutions are undesirable, since the telescoped convolutions protrude and are invariably bent over with the result that breakage of the web occurs when that convolution is reached during a wrapping or other using or treating operation. Stoppages caused by such breakage frequently ruin considerable lengths of the web and in addition produce delays which are costly. In addition to this, loosely wrapped rolls having air between the convolutions are difficult to handle and transport because they are prone to lose their shape during handling.

It is an object of the present invention to provide a process and apparatus for winding elongate materials which overcome all of the foregoing difficulties.

It is another object of the present invention to provide a process of winding web materials into uniform and stable rolls.

It is also an object of the present invention to provide an apparatus for winding web materials into uniform and stable rolls.

It is a further object of the present invention to provide a method of slitting web materials and winding the slit materials into uniform rolls.

It is a still further object of the present invention to provide an apparatus for slitting web materials and winding the slit materials into uniform rolls.

It is also an object of the present invention to provide a process and apparatus for unwinding web materials incidental to performing some operation on the materials and/or using the materials.

Other objects and advantages, if not specifically pointed out, will be apparent to those skilled in the art from the following detailed description of what are now considered the preferred embodiments of the invention.

The present invention will be described as embodied in a slitting apparatus for the sake of explanation but it is to be understood that the invention may be used in connection with many other treating and/or using operations.

The process of the invention in general comprises winding a film or web of material upon a suitable form by driving the surface of the form and the winding which builds up on the form by frictionally contacting and rotating the surface of the form and thereafter the winding and at the same time applying sufficient rotative force to the winding form independently of any contact with the periphery of the winding to exert a relatively weak force through the winding which tends to drive the winding ahead of the surface drive to thereby maintain the winding convolutions in a tight but substantially untensioned condition. The winding operation may be preceded by any desired treating operation such as slitting and the rolls so wound may be used for any further treating and/or using operation desired. The web material fed to the slitting or other operation is fed from a supply roll which is provided with some suitable mechanism for lightly resisting its rotation and is rotated in a direction to unwind the material therefrom by frictionally contacting the surface of the winding. The speed of removal of the material from the supply roll, the speed of passage of the material incidental to the treating operation, and the speed of the winding of the material are made substantially equal so that the material is passed through the entire series of operations without being subjected to tension which stretches or otherwise distorts the material.

The apparatus of the present invention comprises means for rotatably mounting and yieldably rotating a winding form, means for rotating

the winding form and the winding which builds up thereon by frictionally contacting the surface of the winding form and thereafter the winding which builds up thereon, means for performing some operation upon the web prior to the winding operation such as a slitting means, means for rotatably mounting and yieldably resisting the rotation of a supply roll of web material, means for frictionally contacting and rotating the surface of the supply roll and means for conveying the web material to the treating operation.

The term "yieldably rotating" is used throughout this specification and the appended claims to mean producing rotation of a member in any suitable manner so that the angular velocity of the rotation can be reduced as desired by a retarding force applied to the rotating member. The term "yieldably resisting rotation" is used to mean applying a braking force to a rotating member.

The invention accordingly comprises the several steps and the relation of one or more such steps with respect to each of the others, and the apparatus embodying features of construction, combinations of elements and arrangement of parts which are adapted to effect such steps, all as exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the invention, reference is made to the following detailed description of what are now considered the preferred embodiments of the invention and to the accompanying drawings throughout the figures of which the same reference characters are used to refer to common elements and in which:

Fig. 1 is a cross-sectional, elevational view of an apparatus of the invention taken substantially along the plane indicated by the line 1—1 in Fig. 2 and looking in the direction of the arrows;

Fig. 2 is a side elevational view of the apparatus illustrated in Fig. 1;

Fig. 3 is a central-sectional, detailed view on an enlarged scale of a friction drive included in the apparatus;

Fig. 4 is a cross-sectional fragmentary view on an enlarged scale of a demountable drive for the supply roll, and

Fig. 5 is a fragmentary view of a portion of the apparatus of Fig. 4 illustrating the friction-applying device.

Description of apparatus

Referring to Figs. 1 and 2, the apparatus comprises a frame **10** which includes upright end members **12** and **14** suitably connected at the bottom by a plate **16** and near the top by cross members **18**. The upright **14** (see Fig. 4) has a stub shaft **20** suitably journaled for rotation therein. The shaft carries at its inner end a friction brake drum **22** which is fastened to the shaft **20** by a pin **24** passed through a hub **26** on the drum and through the shaft **20**. The shaft **20** is prevented from endwise movement by the hub **26** and a collar **28** suitably adjustably connected with the shaft as by means of a set screw **30**. The drum **22** has a friction brake band **32** disposed around it and one end of the band **32** is suitably attached to a stud **34** carried by the upright **14**, and the opposite end of the band is attached to a clevis **36** which is pivotably connected at **38** to a movable arm **40** rotatably mounted on a stud **42** carried by the upright **14**. An adjustable weight **44** is received over the outer end of the arm **40** and is held in adjusted position on the arm by set screw **46**. The drum **22** has two studs **48** extending from the inner face thereof and positioned to contact an arm **50** carried at the end of a shaft **52** which is journaled at one end in a slot **54** formed in a bracket **56** carried by the upright **14** and is journaled at the opposite end in a slot formed in a bracket (not shown) similar to the bracket **56** and carried by the upright **12**.

The shaft **52** is adapted to receive a supply roll of web material **60** which may be passed over the shaft **52** while the shaft is removed from the machine, following which the shaft bearing the supply roll **60** is dropped into position in the slots in the bracket members and the arm **50** is rotated into contact with the studs **48**. The friction brake mechanism just described is adjusted to exert the desired amount of resistance to rotation to the supply roll **60** by suitably adjusting the weight **44** along the arm **40**.

Surface drive for supply roll

This part of the apparatus comprises a shaft **70** suitably journaled for rotation in the uprights **12** and **14** and provided at one end with a sprocket **72**. The sprocket is driven by a chain **74** carried by an idler sprocket **76** suitably mounted for rotation on the upright **14** and a drive sprocket **78** rigidly mounted on a shaft **80** which is driven by any desired prime mover such as an electric motor (not shown).

Arms **82** are each mounted at one end for rotation on the shaft **70** and at the opposite ends rotatably support a shaft **84** which has rigidly mounted thereon a driving roll **86** and a sprocket **88**. The sprocket **88** is rotated by means of a chain **90** from a sprocket **92** rigidly mounted on shaft **70**. Each of the arms **82** is rigidly connected to an arm **94** which extends substantially at right angles from the arm **82** in the position shown in Fig. 1. Weights **96** are mounted for sliding movement on the arms **94** and are locked in adjusted position by thumb screws **98**. The weights **96** are adjusted on the arms **94** so as to urge the driving roll **86** against the supply roll **60** with sufficient pressure to cause the supply roll **60** to be rotated and feed web material **100** from the supply roll. As the web material **100** is used from the supply roll the weights **96** move the arms **82** counterclockwise, as viewed in Fig. 1, and maintain the roll **86** in tight contact with the supply roll **60** until it is entirely dissipated. The roll **86** may be made of any desired material but it is preferably a steel roll provided with a facing **102** which may be formed of rubber, vulcanized fiber or other materials which will give the roll **86** a good tractive grip on the surface of the supply roll **60**.

Slitting apparatus

The web material **100** is passed over a roll **110** carried by shaft **112** which is suitably journaled for rotation in the uprights **12** and **14**. The roll **110** may be a light idler roll or may be suitably driven by chain and sprocket (not shown) from any desired moving part of the apparatus. From the idler roll **110** the web **100** is passed around a relatively large driven roll **114** which is carried by a shaft **116** suitably journaled for rotation in the uprights **12** and **14** and provided at its other end with a sprocket **118** which is driven by a chain **120** from a sprocket **122** carried by the drive shaft **80**. The roll **114** is suitably faced with some material **124** which may be felt, rubber,

vulcanized fiber or some other relatively soft material.

From the roll 114 the web 100 is passed around a roll 126 carried by shaft 128 suitably journaled in the uprights 12 and 14 and provided at one end with a sprocket 130 which is driven by a chain 132 from a driving sprocket 134 carried by the shaft 116 and drives in addition to the sprocket 130 a sprocket 136 which will be later described. The roll 126 is provided with grooves 138 which extend for a short distance into the roll and each groove has a rotary knife blade 140 received therein. The rotary knife blades 140 are mounted on a shaft 142 suitably mounted for rotation at its ends in uprights 12 and 14. It can thus be seen that passage of the web 100 over the roll 126 results in its being slit into a plurality of more narrow webs 150, in the present case into five such webs.

Description of the winding apparatus

From the roll 126 the narrow webs 150 are passed around a drum 160 mounted for rotation with a shaft 162 suitably journaled at its ends in the uprights 12 and 14. The roll 160 is provided with a facing 164 which is preferably of semi-soft rubber although other desired materials may be used. The shaft 162 rigidly carries the sprocket 136 driven by chain 132 as previously described.

From the driving roll 160 each of the narrow webs 150 is wound onto a winding form 166 received over a form holder 168 of any desired type carried by a shaft 170. The winding form 166 may comprise a laminated paper tubing of which there are many known types available commercially. All of the five mechanisms for winding the narrow webs 150 are identical so that only one of them will be described in detail. As shown, three such winding mechanisms are located upon one side of the machine and two such winding mechanisms on the opposite side of the machine, which arrangement permits winding of the five narrow webs without changing the relative positions which they occupied in the large web 100. Each of the shafts 170 is rotatably carried by an arm 172 pivotably mounted on a shaft 174 mounted for rotation in the uprights 12 and 14. Each of the shafts 170 rigidly carries a gear 176 which meshes with a gear 178 carried by a stub shaft 180 mounted on the arm 172. The gear 178 in turn meshes with a gear 182 mounted for rotation on the shaft 174. Each of the gears 182 is in turn rotated by a gear 184 mounted for rotation with a shaft 186 suitably mounted for rotation in the uprights 12 and 14 and provided at one end with a sprocket 188 which is connected by a chain 190 with a sprocket (not shown) rigidly carried by shaft 162 which, as previously described, is driven by the sprocket 136.

Each of the gears 184 is provided with a friction drive as illustrated in detail in Fig. 3. The friction drive comprises a sleeve 192 suitably attached to the shaft 186 as by means of a key 194 and threaded at one end as shown at 196. The gear 184 rotates on a bearing surface 198 formed on the sleeve 192 and is prevented from endwise movement by a flange 200 carried by the sleeve. A leather, fibrous, or other friction washer 202 contacts with a face 204 on the gear 184 and is forced against the face 204 by a clamping nut 206 which can be adjusted so as to exert any desired amount of friction on the gear face 204 by the friction washer 202. A locking nut 208 holds the clamping nut 206 in adjusted position. In this manner each of the winding mechanisms for the webs 150 is provided with a friction transmission for transmitting rotative force to the winding form holders 168.

If desired, provision may be made to prevent undue strain from being brought to bear on the bearings in the arms 172 and to this end adjustable arms 210 are mounted for relative rotating and sliding movement on the shafts 174 and are provided near their outer ends with bearing openings 212 which are intended to receive reduced extensions 214 on the ends of the shafts 170. After the forms 166 are slipped over the form holders 168 the arms 210 are moved along the shafts 174 until the extensions 214 of the shafts 170 are received in the bearing openings 212. Thumb screws 216 carried by the arms 210 are then threaded inwardly until their inner ends protrude into slots 218 formed in the shafts 174 at the proper positions to cause the arms 210 to support the ends of the shafts 170.

The shaft 186 shown to the left of Fig. 1 is driven by a chain 222 driven by a sprocket 224 carried by the shaft 162 and a sprocket (not shown) mounted on the shaft 186.

Operation of the apparatus

A roll 60 of the web material to be slit is supported on the shaft 52 and the weight 44 for the tension-applying device is adjusted so as to cause the brake band 32 to apply a light friction to the drum 22 of sufficient magnitude to prevent the roll 60 from freely revolving. The web 100 is then fed up through the machine over the roll 110 around the drum 114 over the roller 126 where the web is slit by the knives 140 into the five narrow webs 150, and the narrow webs are then passed over the drum 160 and wrapped initially around their respective winding forms 116. The prime mover for shaft 80 is then started in any desired manner as by switch or clutch and the machine continues in operation until all of the web 100 has been removed from the roll 60, slit into the narrow webs 150 and each narrow web 150 is rewound into a new roll 220.

The diameters of the various sprockets are selected so that the lineal speed of the web 100 and the slit webs 150 is the same throughout the entire travel of the web through the machine. This means that the web 100 is subjected to practically no tension as it passes through the entire operation. The surface-driving roller 102 acts against the roll 60 to rotate the same and in so doing removes the web 100 without tensioning the web. The roll 110 is of such small size and is mounted in substantially frictionless bearings and, if desired, may be driven so that no tension is exerted on the web as it passes from the roll 60 onto the drum 114. The drum 114 is itself driven as is the slitting roller 126 and the drum 160 so that the web is passed over these members without exerting substantial tension on the web. It is merely necessary that the web be originally started in a fairly taut condition so as to cause it to be smoothly slit by the knives 140 and the roller 126.

The gears comprising gear train 176, 178, 182 and 184 and the driving sprockets for the shaft 186 are selected of such size as to cause the shafts 170 to be rotated at such speed as to cause the winding forms 166 to tend to feed slightly more of the web material onto the form 166 at the start than is fed by the drum 160. This very slight difference in speed is taken care of by the friction mechanisms on the gears 184 and as the

windings 220 build up on the forms 166 the amount of slippage gradually increases but the friction never becomes of sufficient magnitude to impose sufficient rotative force on the windings 220 to cause the windings to slip on the drum 160 and exert tension in the webs 150 being wound. In view of the fact that the friction mechanisms are out in the open instead of being located within the hub 168 of the winding form holder, any heat which is generated by the friction mechanism is readily dissipated by the atmosphere.

The coaction between the frictionally driven winding forms 166 and the surface drive 160 produces an outstanding result which has never heretofore been obtained by known winding processes and apparatus. Let it be assumed for the purpose of explanation that a very smooth material, such as cellophane, is being operated upon by the slitting mechanism. If an attempt were to be made to wind up the webs 150 by means of a surface drive, such as the drum 160 alone, the slippery nature of the material being wound would cause the convolutions of the material to slip one over the other and a very loose and unsightly as well as unserviceable winding would be formed. Such winding would not be capable of maintaining its shape during handling and would fall off of the form 166 of its own weight if placed on end and then raised without supporting the entire under side of the winding. On the other hand, if an attempt should be made to wind such a material by means of the drive for the winding forms 166 alone, the material would be undesirably tensioned to a large extent and still would not retain its position on the winding form because of the air which would be trapped between overlying convolutions. Also, the winding would be fairly loose at the beginning and would tend to become tighter as the winding grew larger. The result would again be an unserviceable winding.

Windings produced in accordance with the present invention comprise closely contacting, uniformly positioned convolutions which remain in place during handling, shipping and using. This is due to the fact that the yieldable rotative force exerted on the winding forms 166 by the shaft 186 and gear train provides for the rotation of the winding forms and the windings thereon irrespective of the surface drive provided by the drum 160 which thereby makes it unnecessary for the drum 160 to transmit rotative force through the winding to the winding form. Coacting with the rotative force exerted by the form 166, the drum 160 lays the convolutions smoothly upon the winding 220 while uniformly expelling air from between the convolutions and without exerting tension upon the material. The resulting winding has straight sides and does not telescope when supported solely by the winding form 166.

The windings heretofore produced with winding apparatus of the prior art were frequently softer wound toward the center or beginning of the winding than toward the outside due to the fact that friction mechanisms employed to retard rotation of the supply rolls exerted more resistance to rotation as the size of the supply rolls decreased and thereby exerted a constantly increasing tension on the web which caused the web during rewinding to tighten up on the rewinding roll as the supply roll diminished in size and the rewinding roll increased in size. This frequently caused the inner convolutions to become crushed and distorted so as to cause the web forming the inner convolutions to become crinkled and not fit for many uses. This unsatisfactory situation is entirely eliminated in the process and apparatus of the present invention because the web from the supply roll 60 is always removed by the surface-driving roll 86 without exerting any appreciable tension on the web 100 either at the beginning of or at any other point throughout the operation.

The process of the present invention and the combination of features comprising the apparatus have advanced the art of winding and contributed largely to the successful use of nonfibrous types of webbed materials for many wrapping and other operations. The winding 220 formed by the apparatus and process of the present invention, when employed on an automatic wrapping machine for example, can be unwound by an apparatus similar to that illustrated for unwinding web from the drum 160, that is, employing a surface-driving roller and a retarding friction mechanism, and deliver the web to the using operation without ever subjecting it to any substantial amount of tension. This has peculiar value in regard to some forms of web material, for example, webs of Cellophane regenerated from viscose. Such webs undergo considerable transverse shrinkage during the manufacturing process. This shrinkage occurs to a larger extent towards the margins of the sheet than towards the center of the sheet because the margins can slip on the conveying roller used in the forming process while the center area of the web does not, with the result that uneven stresses are set up within the material during manufacture. Thus, a web such as 100 will include thereacross sections which have undergone various amounts of shrinkage and are, therefore, under different internal stresses. This means that when the large web 100 is slit into several smaller webs 150, there will be a tendency on the part of the smaller webs to stretch when any appreciable amount of longitudinal tension is placed upon them and in stretching relax the internal stresses which may cause distortions in the smaller webs, for example, may throw the edges of the slit webs into uneven forms. Such distortions prevent the webs from winding up evenly with the result that unsatisfactory final windings 220 are frequently produced. However, the process and apparatus of the present invention make it possible to rewind the slit webs 150 without exerting sufficient tension thereon to bring about any distortion of the web with the result that well-shaped and serviceable windings 220 are formed. When the windings 220 are unwound in the same manner incidental to being used, the slit web can be finally used without ever being distorted.

Although the present process and apparatus for handling web-like materials have been disclosed in connection with a slitting apparatus, it is to be understood that the handling process and apparatus may be used in conjunction with many other treating and/or forming operations, such as those performed by the use of printing presses, coating machines, tenter frames and the like where winding without the application of tension is desirable. The invention finds particular use in the handling of weak textile materials which cannot withstand or are adversely affected by high tensile stresses as well as with nonfibrous cellulosic materials, hard sized papers and textiles, sheets of synthetic resins as well as rubber hydrohalides, milled rubber, soft rubber sheets and other materials having elastic prop-

erties, smooth surfaces or other characteristics which render them difficult to wind or unwind without undergoing distortion.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

The invention having been described, what is claimed is:

1. A process of handling web materials comprising rotating a supply winding of the material by frictional contact with a rotating member, yieldably resisting rotation of the supply winding, applying a yielding rotative force to a winding form, applying a rotative force to the surface of the winding form and to the winding which builds up thereon by frictional contact with a rotating member having the same peripheral speed as the rotating member for the supply winding, and conveying the web material from the first of the rotating members to the other and then onto the winding form.

2. The process of handling regenerated cellulose and the like nonfibrous materials or relatively weak fibrous materials comprising rotating a supply roll of the material by frictionally contacting the surface of the roll with a rotating member having a given peripheral velocity to unwind the web material from the supply roll, applying a yielding rotative force to a winding form, applying a rotative force to the surface of the winding form and thereafter to the winding which builds up thereon by frictionally contacting first the form and then the winding with a rotating member having the same peripheral velocity as the aforementioned member, and conveying web material from the first rotating member to the second rotating member without exerting substantial tension thereon and feeding the material from the second rotating member onto the winding form.

3. The process of handling regenerated cellulose and the like nonfibrous materials or relatively weak fibrous materials comprising rotating a supply roll of the material by frictionally contacting the supply roll with a rotating member having a given peripheral velocity, yieldably resisting rotation of the supply roll, yieldably rotating a winding form, applying a rotating force to the surface of the winding form and to the winding which builds up thereon by frictionally contacting the winding form and thereafter the winding surface by a rotating member having the same peripheral velocity as the first mentioned rotating member, and feeding the web material from the supply roll over the first rotating member to a treating operation then to the second rotating member and onto the winding form.

4. A process of slitting comprising rotating a supply roll of the material to be slit in a direction to unwind material therefrom by frictionally contacting the surface thereof with a rotating member having a given peripheral velocity, yieldably resisting rotation of the supply roll, yieldably rotating a winding form, applying a rotating force to the winding form by frictionally contacting the surface thereof and thereafter the winding which builds up thereon with a rotating member having the same peripheral velocity as the first-named rotating member in a direction to wind up the material on the winding form, passing material from the supply roll over the first rotating member, over the knives of a slitting mechanism, then to the surface of the second rotating member and onto the winding form.

5. An apparatus for handling web materials comprising means for rotatably supporting a supply roll of the web material, means for frictionally and yieldingly resisting rotation of the supply roll, means for frictionally contacting the surface of the winding on the supply roll to rotate the supply roll in a direction to remove web material therefrom, means for rotatably supporting a winding form, means for applying a yieldable rotative force to the winding form, means for frictionally contacting the surface of the winding form and thereafter any winding which builds up thereon to rotate the winding form and any winding thereon, and means for passing web material unwound from the supply roll to the winding form.

6. A slitting apparatus comprising means for rotatably supporting a supply roll of web material, means for yieldably resisting rotation of the supply roll, means for frictionally contacting the surface of the supply winding to rotate the same in a direction to unwind web material therefrom, means for rotatably supporting a winding form, means for applying a yieldable rotating force to the supply winding, means for frictionally contacting the surface of the winding form and thereafter any winding which builds up thereon to rotate the supply winding in a direction to wind material thereon, cooperating slitter knives and a grooved slitter roll, and means for passing the material unwound from the supply roll over the slitter roll in contact with the slitter knives and then onto the winding form.

7. A process of slitting sheet material into a multiplicity of relatively narrow webs comprising passing the sheet material over a plurality of cutters to separate the sheet into the plurality of webs, passing the webs onto a common rotating member, passing each individual web from the common rotating member onto a winding form rotated by frictional contact between the periphery of the winding form or the winding which builds up thereon and the rotatable member, and also driving each winding form by application of a yieldable force thereto while permitting each winding form to move away from the rotatable member independently of any other winding form as the diameter of the winding thereon increases.

8. A process of slitting comprising rotating a supply roll of the material to be slit in a direction to unwind material therefrom by frictionally contacting the surface thereof with a rotating member having a given peripheral velocity, passing the material to be slit over a plurality of cutters to divide the material into a plurality of relatively narrow webs, passing the webs onto a common rotating member, passing each web from the common rotating member onto a winding form rotated by frictional contact between the periphery of the winding form or the winding which builds up thereon and the rotatable member, applying a yieldable rotating force to each winding form independently and permitting each winding form to move away from the common rotatable member independently of any other winding form as the diameter of the winding thereon increases.

9. A slitting apparatus comprising means for rotatably supporting a supply roll of web material, means for frictionally contacting the surface of the supply winding to rotate the same in a direction to unwind web material therefrom,

cooperating slitter knives and a grooved slitter roll, means for passing the material unwound from the supply roll over the slitter roll in contact with the slitter knives, a rotatable member for receiving thereon all of the strips of material from the slitter roll, means for driving the rotatable member, means for independently and rotatably supporting winding forms in contact with the said rotatable member for receiving the slit strips of material thereon, the said common rotatable member rotating the winding forms by frictional contact with the periphery of the forms and thereafter with the periphery of the winding which builds up thereon, and means for independently applying yieldable, rotative forces to each of said winding forms, whereby each of the winding forms is permitted to move away from the common rotatable member independently of any other winding form as the winding thereon increases in diameter.

10. In a winding apparatus, a rotatable member, means for driving the rotatable member, means for feeding a plurality of separate narrow webs to said rotatable member, means for independently rotatably supporting a plurality of winding forms in contact with said rotatable member in positions to receive the webs from said rotatable member and for movement away from said rotatable member, the said winding forms being rotated by frictional contact between the periphery of the rotatable member and the peripherics of the winding forms and later with the peripheries of the windings which build up thereon, and means for applying a yieldable, rotating force to each winding form, whereby each winding form is enabled to move away from the rotatable member independently of any other winding form as the winding builds up upon said winding form.

ARTHUR O. RUSSELL.