July 18, 1961 L. SCUSA 2,992,786

TOILET PAPER WINDING APPARATUS

Filed March 19, 1958 4 Sheets-Sheet 1

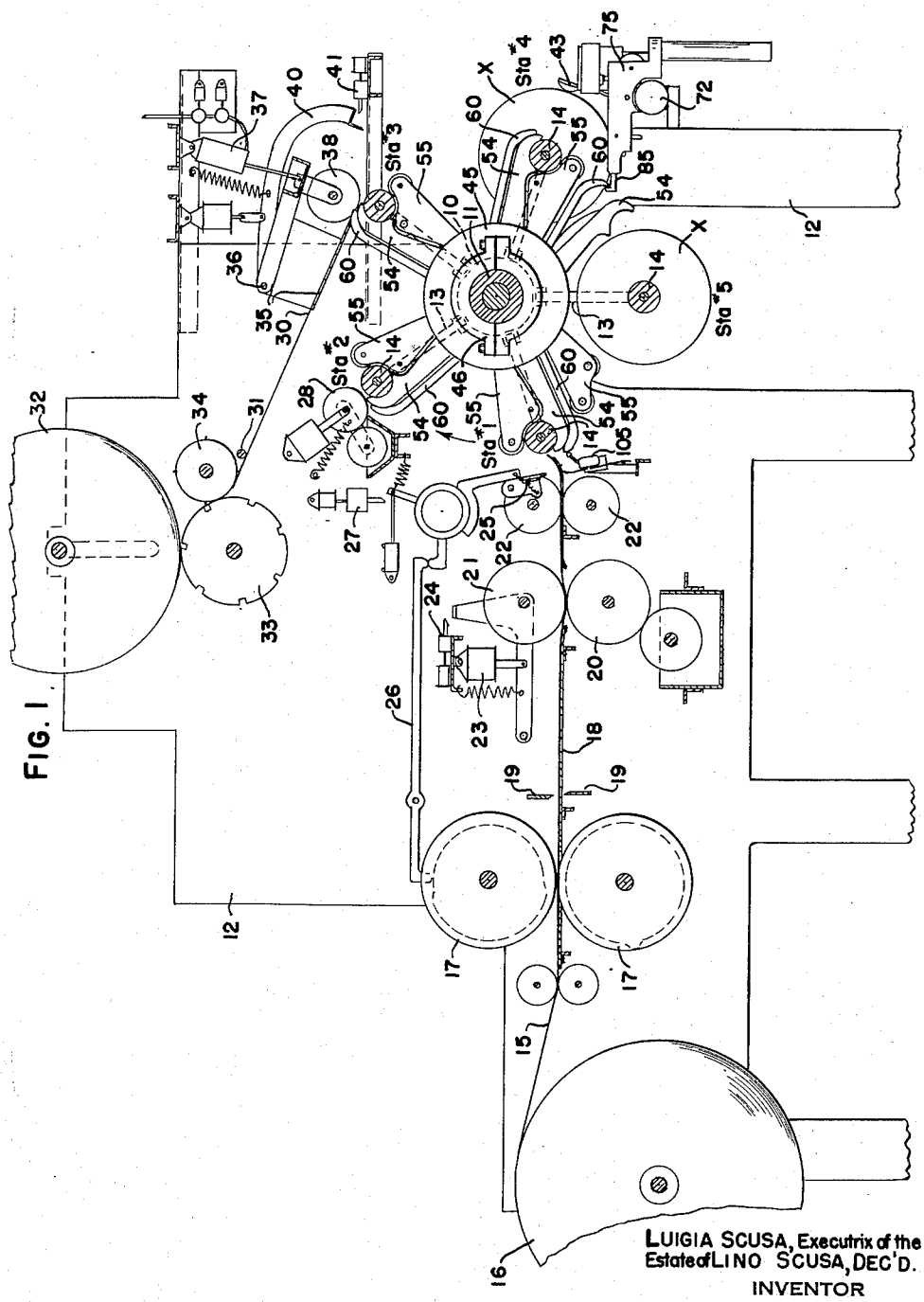


FIG. 1.

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TOILET PAPER WINDING APPARATUS

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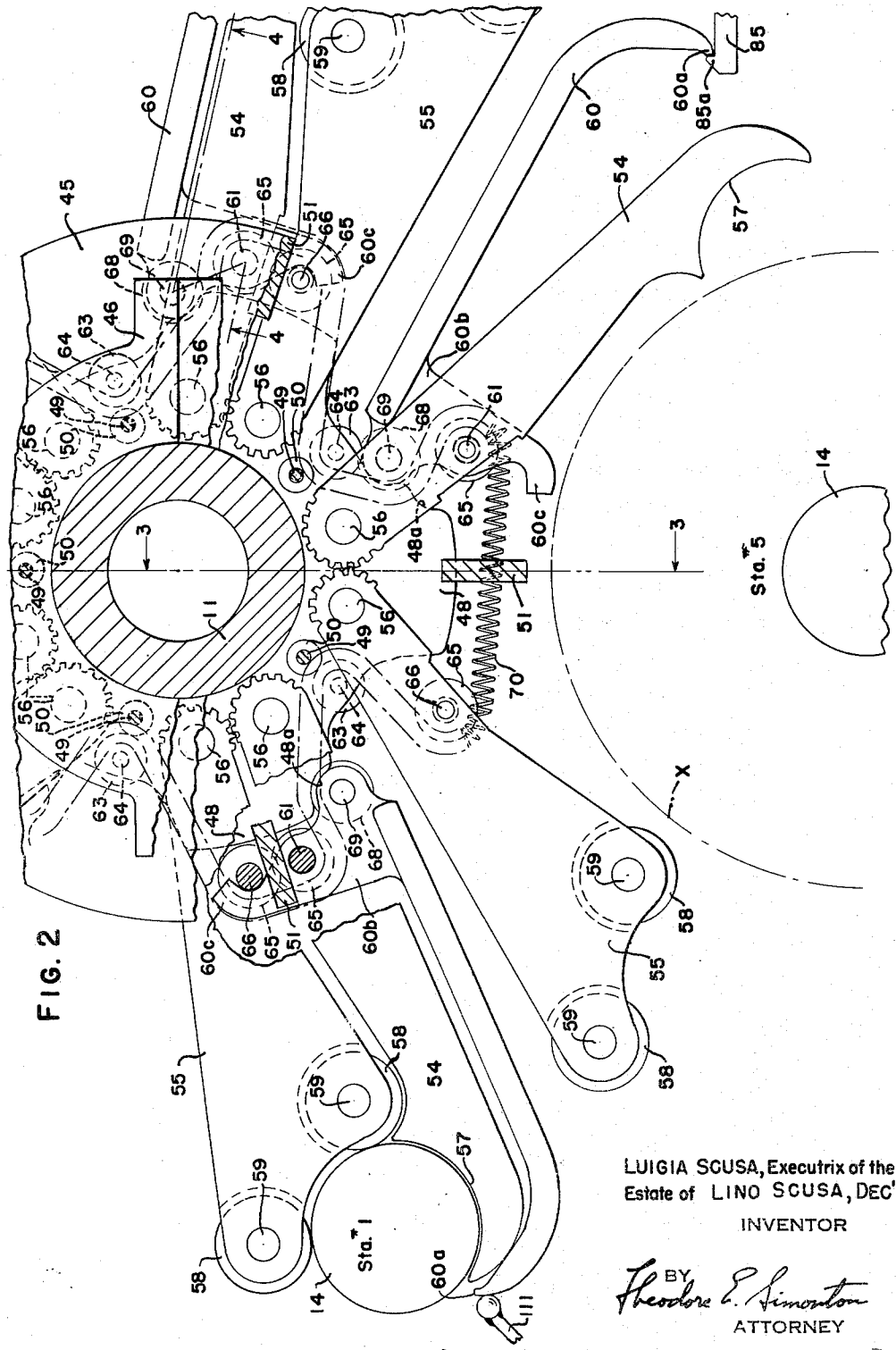


FIG. 2

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FIG. 3

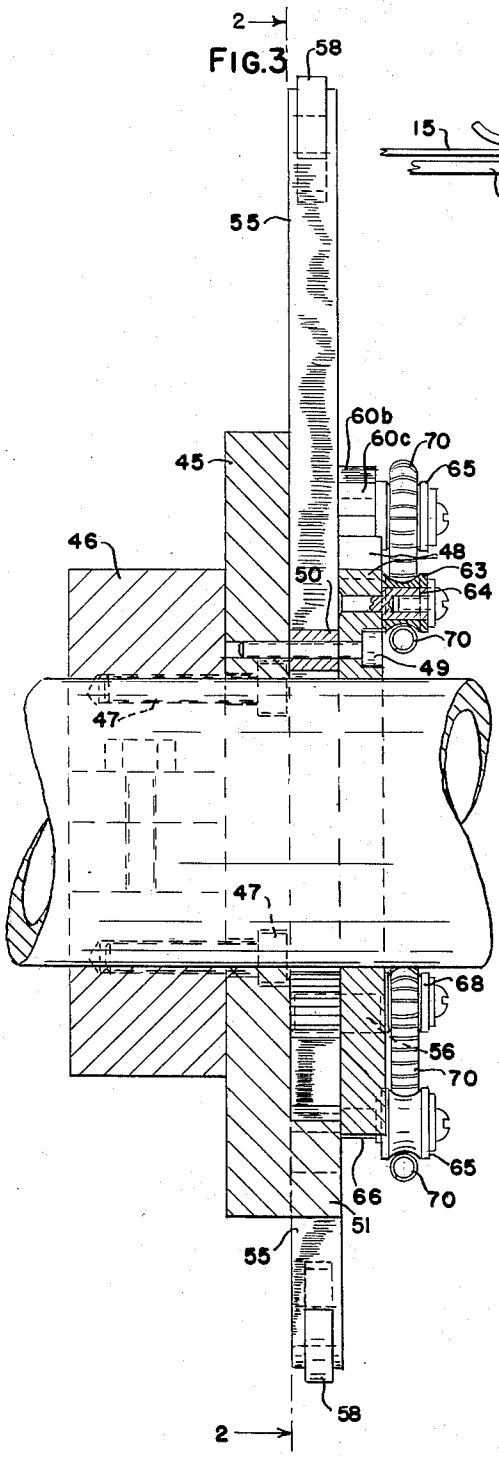


FIG. 5

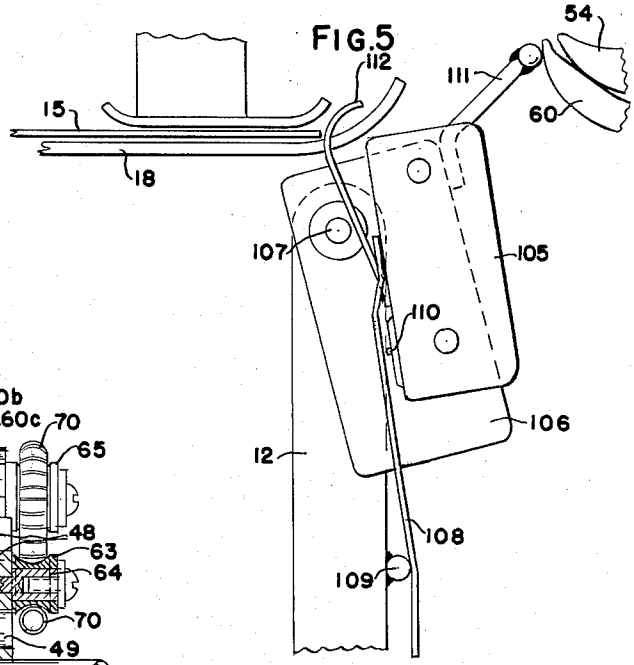
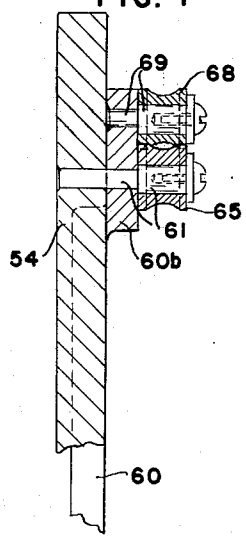


FIG. 4



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FIG. 8

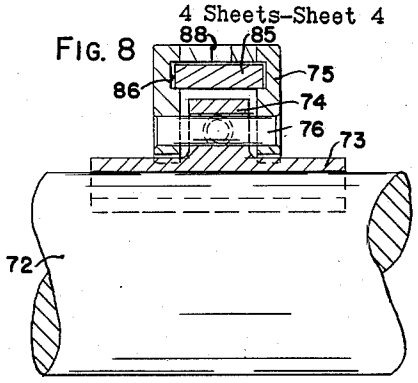
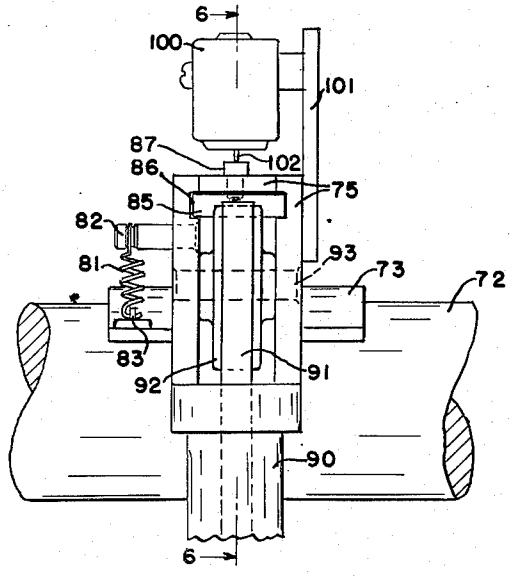


FIG. 6

FIG. 7



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United States Patent Office 2,992,786 Patented July 18, 1961

2,992,786

TOILET PAPER WINDING APPARATUS

Lino Scusa, deceased, late of West Phoenix, N.Y., by Luigia Scusa, executrix, West Phoenix, N.Y., assignor to Phoenix Gage Company, West Phoenix, N.Y., a partnership

Filed Mar. 19, 1958, Ser. No. 722,617
13 Claims. (Cl. 242—64)

This invention relates to improvements in machines for forming a plurality of paper cores on long mandrels journaled in a reel having a plurality of mandrels and for winding rolls of toilet tissue on the cores. More specifically, the invention is an improvement on the auxiliary bearing support apparatus of Lino Scusa Patent 2,334,793.

The principal object of the invention is to provide a support for the mandrels at the center thereof whereby the long mandrels may be rotated at high speeds without whip or lateral vibration.

A more specific object is to provide a support for the mandrels in a machine having a plurality of stations at each of which a different operation is performed on a different mandrel of the reel including a station at which the support may be automatically released from the mandrel for stripping the rolls from the mandrel.

Further objects are to provide a support which prevents vibration of the mandrels in any lateral direction, to provide a support which is released from the mandrels at only one station, and to provide, in an automatic machine, safety means to insure that the mandrels cannot be damaged.

Other objects and advantages will more fully appear from the following description taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a diagrammatic, longitudinal sectional view of a machine embodying the present invention;

FIGURE 2 is an enlarged fragmentary sectional view of the support portion of the machine of FIGURE 1, on the line 2—2 of FIGURE 3;

FIGURE 3 is a sectional view of the support on the line 3—3 of FIGURE 2;

FIGURE 4 is a fragmentary sectional view of one of the support arms and adjacent engagement pawl, on the arbitrary line 4—4 of FIGURE 2;

FIGURE 5 is an enlarged side elevational view of the engagement safety switch of the machine of FIGURE 1 and adjacent parts;

FIGURE 6 is an enlarged sectional view of the disengagement latch of said machine on the line 6—6 of FIGURE 7; a portion of the latch being shown in side elevation;

FIGURE 7 is a fragmentary front elevational view of the latch of FIGURE 6; and

FIGURE 8 is a sectional view of the latch on the line 8—8 of FIGURE 6.

In the toilet tissue roll winding machine illustrated in FIGURE 1 of the drawings, and more fully described in companion application Serial No. 722,533, filed March 19, 1958, and now abandoned, a reel 10 is shown, supported on a shaft 11 which is journaled in the sideplates of the frame 12 across the machine. The reel has arms 13 supporting a plurality, here five, of mandrels 14 shown positioned, respectively, at a core winding station, Sta #1; a core moistening station, Sta #2; a tissue winding station, Sta #3; a mandrel orienting station, Sta #4; and a roll stripping or ejection station, Sta #5.

A web of paper 15, for winding into cores, is fed from a large roll 16 by feed rolls 17—17 over a table 18 and cut transversely by knives 19—19 into suitable lengths for the cores. A glue roll 20 and a drop roll 21 also

act as feed rolls to lead the paper 15 past slit knives 22—22, which slit the paper into strips of suitable width, and on to the mandrel 14 at the first station. Suitable means 23 and 24 are provided for lifting and releasing the drop roll 21 so that glue is applied to the paper over the last portion only of each strip.

It will be understood that paper gripping means, not shown, are provided on the mandrels 14, and means, also not shown, are provided for rotating the mandrel 14. Heating pads 25 and suitable means 26 and 27 for swinging the pads against the cores at the first station and for releasing them therefrom are provided.

At the second station a moistening roll 28 is provided for moistening the cores at this station.

At the third station, a web of tissue 30 is led over a straightening rod 31 from a large roll 32 by means of a feed roll 33, perforations across the web being formed by the perforating roll 34. A movable table 35 is pivotally supported in frame 12 at 36, and means, including a pneumatic cylinder 37, are provided for lifting the table as the rolls are wound on the cores. Slit knives 38, on the table 35, slit the tissue into strips which are wound at high speed on the cores. A counting mechanism, not shown, slows the tissue feed mechanism to a very slow rate when the desired number of sheets have been wound on the rolls X and the reel 10 is then turned so that each mandrel moves to the next station.

A knife 40 is released at this time by control mechanism, not shown but including a latch 41, to drop and sever the web 30 as the rolls X move to the fourth station. The severed web 30 falls on the moistened cores moving from the second station and adheres thereto for further winding at the third station.

At the fourth station the rolls X are rotated for several turns, a pad 43 securing the moistened ends of the tissue strips to the roll. At this station, also, the mandrel 14 is oriented, by means not shown, so that the gripping means of the mandrel are properly oriented in the machine for receiving the leading edge of the core paper strips at the first station.

At the next advance of the reel 10 the rolls X are brought to the fifth or ejection station and are there stripped from the mandrel 14.

As thus far described, the machine is the same as that of the aforesaid companion application.

It will be apparent that the number of rolls which can be wound simultaneously on each mandrel is limited only by the rigidity which can be given to the mandrel. In the machine of this application a pair of axially aligned paper supply rolls 16 are used, and a pair of rolls 32, each pair being laterally spaced in the machine so that the novel auxiliary bearing support, now to be described, may give the mandrels additional bearing support at the center of each mandrel, and the length of the mandrels and hence the number of rolls wound on each mandrel can be accordingly increased.

A driving flange 45 is provided on the reel shaft 11 adjacent the center of the machine. The flange has a split hub 46 clamped to the shaft, the flange being secured thereto by four spaced bolts 47 (FIGURE 3). A cam plate 48 on shaft 11 is secured to flange 45 by the five evenly spaced bolts 49, the plate being spaced from the flange by the spacers 50 and the five angularly spaced spacing lugs 51 on the flange, as shown in FIGURES 2 and 3.

Five pairs of support arms 54—55 are piovtally supported on the cam plate 48 by stud shafts 56 secured in the plate. One arm 54 of each pair is a radius contact arm having a curved portion 57 adapted to fit around a rounded or journal portion of the mandrel 14. The other arm 55 of the each pair is a roller contact arm and has rollers 58 mounted on shafts 59, as shown in FIGURES

2 and 3, for engagement with the same journal portion of the mandrel. It will be noted that the roller contact support arm **55** lies beneath the mandrel **14** at the third station where the mandrel is rotated at its greatest speed. The arms **54** and **55** are supported in the space between plate **48** and flange **45** and one of each pair lies on either side of each spacing lug **51**, the arms being suitably notched to close about the lug.

The inner ends of the arms **54** and **55** are provided with meshing spur gear teeth as shown so that each pair may open and close in unison about their respective pivot shafts **56**. A latch engaging pawl lever **60** (FIGURES 2 and 4) is pivotally secured by a shouldered stud **61** to each radius contact arm **54** which is the trailing arm of each pair as said reel **10** is turned. The pawl **60** comprises a latch contacting lever portion terminating in a hooked end **60***a* and a flat plate portion **60***b* overlying the arm **54** and which terminates in a locking hook **60***c*.

Five angularly and equally spaced, pulley-like, spring retainers **63** are secured to the outer face of the cam plate **48** on the opposite side from and midway between the pairs of arms **54—55**. The retainers are rotatably supported on the plate by shouldered studs **64** and are retained on the studs by suitable screws and washers. Similar spring retainers **65** on lock arms **54—55** are supported on arms **55** by the shouldered studs **66** and on arms **54** by the shouldered studs **61**. The retainers **65** are radially more distant from shaft **11** than are the retainers **63**.

Radially intermediate the retainers **63** and **65**, the portion **60***b* of each pawl **60** is provided with a spring retainer **68** carried on a stud **69**, and retained by a suitable screw and washer. A continuous, or garter spring **70** is wound about the above retainers, as shown in FIGURE 2, to urge the pairs of arms **54** and **55** together and to urge the locking hooks **60***c* of the pawls **60** to engage with the studs **66**.

A latch support rod **72** is secured to frame **12** of the machine and extends across the machine in front of the auxiliary bearing support device above described. A saddle **73**, having an upstanding boss **74** (FIGURES 6 and 8) is secured to rod **72** as by welding.

The latch body or frame **75**, shown as constructed of plate members welded together, is pivotally supported on a pin **76** secured in the two sideplates of the body **75** and through a hole **77** in boss **74**, the interior of the body being hollow as shown to receive the boss. The body **75** is capable of a limited rocking movement as indicated in FIGURE 6 from the position shown in full lines to that shown in broken lines. The hole **77** is slotted as shown so that as the body **75** is rocked counterclockwise as seen in FIGURE 6, the body may move rearward for a short distance. The pin **76** is normally held in the forward end of the slot **77** by a spring **78** held in a hole in boss **74** by the plug **79**. A set screw **80** in the lower end of the body may be adjusted to limit the rocking movement in one direction by its contact with the rod **75**. A spring **81** connects a pin **82**, projecting from body **75**, with a boss **83** secured to the saddle **73** and resiliently holds the rear end of the latch from rocking downward.

A latch slide arm **85** is supported in a slide way **86** in the body **75** and normally projects rearward so that its hooked rearward end **85***a* is engageable by the hook **60***a* of the latch pawls of the support as reel **10** is turned as indicated in broken lines in FIGURE 6. A pin **87** is secured at the forward end of the slide **85** and projects upward through an appropriate slot **88** in the body **75**. The slide arm **85** is normally spring pressed forwardly so that the pin **87** in the top of the body **78** is at the forward end of the slot **88**.

To conserve space, the compression spring **89** is contained in a depending tube **90** secured to the body **75**. A flexible steel ribbon **91** is secured to the forward end of the slide **85** and is led down over a pulley **92** on a shaft **93** fixed in the sidewalls of body **75**. The other end of the ribbon **91** is secured to a piston **94** in the tube **90**, the spring **89** being compressed between the piston **94** and an annular plug **95** screwed in the top of the tube.

The slide **85** is normally prevented from moving forward by a trigger **96** pivotally secured in the body **75** by a pin **97** therethrough. The upper arm of the trigger **96** is engaged in a notch **85***b* in the underside of the slide **85** and is biased therein by the spring **98** contained in a well in the trigger **96**. The lower arm of the trigger is engageable by a trigger actuating arm **99** secured to the rod **72** when the latch body is rotated counterclockwise as shown in FIGURE 6.

The operation of the auxiliary bearing support and its associated latch will now be apparent.

The operation of the garter spring **70**, which in this instance is more conveniently used than separate springs for each pair of arms, biases the arms **54** and **55** to closed position. The position of the spring retainer **68** between retainers **63** and **65** assist in this closing action. Arms **54** and **55** move in unison about their pivots **56** because of the intermeshing spur gear teeth with which they are equipped. Moreover, each pair of arms is locked together by the hook **60***c* of the pawl engaging with the shouldered stud **66** on arm **55**, and the pawl is biased to its closed position by the spring **70**. It will be noted also that the plate portion **60***b* of the pawl lies in the plane of the cam plate which has a camming edge **48***a* which assists in the closing of the pawl **60**.

Upon rotation of the reel between cycles of the tissue winding machine, the pawl **60** of the pair of support arms moving from the fourth to the fifth station becomes engaged with the latch slide **85** as indicated in broken lines in FIGURE 6. The hook **60***a* of the pawl engages hook **85***a* of the slide and pulls the slide **85** rearward until the trigger **96** engages the end of notch **85***b* in the slide as shown in full lines in FIGURE 6. Pawl **60** is now prevented from moving further rearward with the support arms **54** and **55**.

Spring **81** of the latch resists any rocking movement of the latch and is sufficiently strong to resist the downward movement of motion of pawl **60** and overcomes the resiliency of spring **70** as the pawl flange **60***b* is rotated about the pin **61**, unlocking hook **60***c* from about pin **66**.

As the arms **54** and **55** are moved to the fifth station, the engagement of hooks **60***a* and **85***a* (FIGURE 2) rotate arm **54** about its pivot **56**. Arm **55** is rotated about its pivot **56** by the action of the gear teeth on the arms. When reel **10** is in register, arm **55** has come to rest against the pin **64** and the arms **54** and **55** are spread wide, allowing the ejection of the rolls X from the machine.

Upon turning the reel **10** again at the end of the next cycle, engagement of the arm **55** with pin **64** prevents further opening of the arms and pawl **60** is carried downward. The rear end of the latch is accordingly carried downward until the trigger **96** is engaged by the arm **99** and the slide **85** is released. Until the trigger **96** releases the slide, the slide **85** and latch body **75** move rearward as they are tilted, the pin **76** moving rearward in the slot **77**. When the slide is released by the trigger **96**, spring **78** restores the pin **76** to its forward position in slot **77** and slide **85** is carried further rearward and downward until pawl **60** leaves it at the position indicated **85***a*" in FIGURE 6.

As soon as pawl **60** is released by the slide **85**, spring **70** closes the arms **54** and **55** against the now empty mandrel and hook **60***c* again locks around pin **66**. Slide **85** is drawn forward again by the spring **89**, and the latch body is rotated back again to its normal position by the spring **81**. It will be noted that the normal position of the body **75** and hence the slide **85** may be regulated by the set screw **80** for best receiving the next pawl **60**.

A switch **100** mounted on a plate **101** attached to the latch body has its operating button **102** engaged by the pin **87** only so long as pawl **60** engages the slide **85** as

shown in full lines in FIGURE 6. This engagement maintains the contacts of the switch apart or open. The switch **100** is wired to stop the machine when closed, as, for example, in series with a switch which is closed during operations at the fifth station, and in circuit with an overload release clutch similar to that shown in Lino Scusa Patent 2,712,372.

During rotation of the reel **10** the slide **85** is in the position indicated at **85***a*′ or **85***a*″ and the pin **87** therefore is out of engagement with button **102**. During this time, therefore, or in the event the pawl **60** fails to properly engage the slide **85**, should the stripping at the fifth station commence, the machine is halted.

Another safety device is shown in FIGURE 5. A normally open switch **105** is secured to a support plate **106** which is pivotally secured to the frame **12** of the machine at **107**. A flat spring **108** is secured to the switch and bears against a rod **109** secured to frame **12** and is normally out of contact with operating button **110** of the switch so as to leave the switch open. The switch is wired to stop the machine when closed, as for example, in a circuit with the overload release clutch mentioned above.

A rigid operating arm **111** is secured to the support plate **106** so as to be normally engaged by the pawl **60** when the arms **54** and **55** of the support are fully closed about the mandrel at the first station. Another resilient operating arm **112** is disposed in the path of the core paper and is attached to the switch **105**.

It will now be seen that, if the pawl **60** is not in engagement with arm **111**, the passing of the core paper will depress the flexible arm **112** and tilt the switch **105**. Should the support arms **54** and **55** not be closed, pawl **60** would not be engaged with the arm **111** and the machine would be stopped. But if arm **111** and pawl **60** are in engagement, the passage of the core paper will flex the arm **112** and the switch will remain open, being prevented from tilting by the rigid arm **111**.

While there is herein described, and in the drawings shown, illustrative embodiments of the invention, it is to be understood that the invention is not limited thereto, but may comprehend other constructions, arrangements of parts, details and features without departing from the spirit of the invention. It is desired to be limited, therefore, only by the scope of the appended claims.

What is claimed is:

1. In a paper roll winding machine having a plurality of stations, and a reel journaled and rotatable in said machine and having a central longitudinally disposed shaft and a plurality of longitudinally disposed mandrels for successive registration at said stations; the combination of an auxiliary bearing support for said mandrels comprising arm supporting means secured on said shaft intermediate the ends of said reel, a plurality of pairs of arms pivotally secured to said supporting means, each pair being adapted to swing apart and together in unison and, when together, to provide a bearing support about one of said mandrels, a lever pivotally carried on one of each of said pair of arms and projecting radially from said reel beyond said arms, locking means on said lever adapted to engage a portion of the other arm of said pair for locking the arms of said pairs together, spring means for swinging each of said pairs of arms together and for biasing each of said levers toward its locked position, and lever-engaging means secured in said machine outside of said reel at one of said stations for engaging and holding the end of said lever when the reel is turned, whereby one of said pair of arms is swung apart at said one station for removal of the rolls from the mandrel and said lever is released when the reel is again turned after removal of the rolls.

2. The auxiliary bearing support of claim 1 having cam means on said arm supporting means adapted to move said locking means to locked position when said lever is released by said lever-engaging means and said pair of arms is swung together.

3. The auxiliary bearing support of claim 1 having meshing gear means on each arm of each pair for swinging said pairs apart and together in unison.

4. The auxiliary bearing support of claim 1 having the lever carried on the trailing arm of each of said pair of arms whereby engagement of said lever with said lever-engaging means first unlocks said pair and then swings said pair apart when the reel is turned.

5. In a paper roll winding machine having a reel rotatable on a shaft and carrying mandrels thereon for successive registration at a plurality of stations including a roll ejection station and a core forming station, the combination of an auxiliary bearing support for said mandrels comprising arm support means carried on and rotatable with said reel, a pair of arms for each mandrel pivotally secured to said support means, each pair being adapted for swinging apart in unison from a closed position adapted to provide a bearing support about one of said mandrels to an open position adapted for removal of said rolls from the mandrel, a lever pivotally carried on the trailing arm of each of said pairs and projecting radially from said reel beyond said arms, each of said levers being provided with locking means adapted to engage a projecting portion of the leading arm of said pair to lock said pair in closed position, spring means for biasing said arms toward closed position and for biasing said lever toward locked position, and a lever-engaging latch secured in said machine radially outward of said reel at said ejection station for engaging and holding the projecting end of said lever, when the reel is turned, whereby each pair of arms is swung apart at said ejection station and said lever is released for return of the arms to closed and locked position when the reel is again turned after removal of the rolls.

6. The machine of claim 5 having safety means insuring the complete closing of said arms about the mandrel at said core forming station, comprising a normally open switch pivotally supported at said core forming station, resilient means normally holding said switch from turning and adapted to close said switch when said switch is turned, a first flexible operating arm secured to said switch and disposed in the path of the core making paper and adapted to turn said switch, and a second rigid operating arm secured to said switch and adapted to contact said projecting lever when said mandrel is in register at said core making station and thereby prevent the turning of said switch, said switch when closed being adapted to stop the machine.

7. In a paper winding machine having a reel, a plurality of mandrels longitudinally disposed on and carried by said reel, and a shaft journaled in said machine on which said reel is rotatable, the combination of an auxiliary bearing support for said mandrels comprising support means on said shaft, a plurality of pairs of arms pivotally secured to said support means, each of said pairs being adapted to provide a journal support for one of said mandrels, gear means on said arms for swinging each of said pairs apart in unison thereby releasing said mandrel, locking means carried by one arm of each pair and adapted to engage a portion of the other arm of the pair for locking said pair together, spring means for closing each of said pairs of arms about said mandrel and for biasing said locking means toward locked position, a lever projecting radially of the reel beyond said mandrel and connected to said locking means, and latch means supported in said machine in the path of said lever as said reel is turned, said lever being adapted to unlock said locking means and swing said pair of arms apart when engaged with said latch while said reel is turned.

8. The bearing support of claim 7 wherein said latch comprises a lever contacting arm, a body in which said arm is supported, said body being tiltable in said machine,

and spring means for resisting the tilting of said body when said arm is engaged by said lever.

9. In a paper winding machine having a reel, a plurality of mandrels carried by said reel, a shaft journaled in said machine, said reel being rotatable on said shaft, the combination of an auxiliary bearing support for said mandrels comprising an annular arm supporting member, means for securing said member to the shaft, a plurality of pairs of support arms pivotally secured to said supporting member, each of said pairs being adapted to provide a journal support for one of said mandrels, gear means on said arms for swinging each of said pairs apart in unison, thereby releasing said mandrel, locking means carried by one arm of each pair and adapted to engage a portion of the other arm of the pair for locking said pair together, spring means for closing each of said pairs of arms about said mandrel and for biasing said locking means toward locked position, a lever projecting radially of the reel beyond said mandrel and connected to said locking means, and latch means supported in said machine in the path of said lever as said reel rotates, said lever having a latch engaging hook and being adapted to unlock said locking means and swing said pair of arms apart upon engagement with said latch.

10. In a paper roll winding machine of the class described having a plurality of stations, a reel intermittently rotatable on a shaft and carrying mandrels longitudinally disposed thereon for successive registration at said stations, the combination of an auxiliary bearing support for said mandrels comprising an annular plate adapted to be secured to said shaft, a pair of support arms for each of said mandrels pivotally supported on the plate and adapted to swing together and apart in unison, bearing surfaces on said arms for journalling said mandrel therebetween, locking means pivotally secured to the trailing arm of said pair and adapted to engage a portion of the other arm for locking said pair together, spring means for closing said arms around said mandrel and operative when said arms are closed for biasing said

locking means to locked position, a lever on said locking means for unlocking said pair and projecting radially from said reel, a stop for said arms at fully opened position, and lever contracting means independent of said reel adapted to arrest the outward end of said lever during rotation of said reel, whereby said ars are unlocked and opened fully at, at least one, station for removal of the rolls at said station, and said lever contacting means being resiliently supported in said machine, whereby said lever is released upon further rotation of the reel.

11. The auxiliary bearing support of claim 10, wherein said lever contacting means comprises a lever contact slide, a body adapted to slidingly support said contact arm, said body being tiltably secured in said machine, and spring means for resisting the tilting movement of said body.

12. The auxiliary bearing support of claim 11, wherein said lever is hooked at its projecting end, said lever contact slide has a cooperating hooked end for arresting said lever, spring means resisting the sliding of said contact slide toward said reel, latch means for preventing said sliding, said body being resiliently movable toward said reel when tilted, and trigger means for releasing said latch when said body is tilted.

13. The auxiliary bearing support of claim 12 having safety means for preventing removal of the rolls when said support arms are not fully opened, comprising a switch mounted on said body, and switch operating means on said lever contact slide adapted to operate said switch only when said slide contacts said lever and said mandrel support arms are fully open, said switch being normally adapted to stop the machine during removal of the rolls at said station.

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