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CASTELLANOS & CO LTDA
ABOGADOS
Calle 94 A No. 7 A-09
Bogotá, D.C. - COLOMBIA

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 05-116681- -00005-0000

Fecha: 2009-08-31 14:47:01 Dep. 2020 NUECREACION
Tra. 2 PATENTES Eve: 1 REGDEPOSITO
Act. 538 PETICION Folios: 2

Señor

Jefe de la División de Nuevas Creaciones

Superintendencia de Industria y Comercio

Ministerio de Comercio, Desarrollo, Industria y Turismo

E. S. D.

Re.: Expediente No. 05.116.681

Solicitud del examen de patentabilidad correspondiente a la Patente de Invención, para:

"ESTRUCTURA DE ENROLLAMIENTO Y ALIMENTACION DE UNA MAQUINA DE ENROLLAMIENTO DE TELA"

Solicitante: PAI LUNG MACHINERY MILL CO., LTD.

SOLICITUD EXAMEN DE PATENTABILIDAD

Yo, **MARGARITA CASTELLANOS ABONDANO**, mayor de edad, identificada y domiciliada como aparece al pie de mi firma, obrando en mi calidad de apoderada de la sociedad solicitante, atentamente me permito solicitar a Ud. que se realice el examen de patentabilidad de la invención arriba citada, para lo cual anexo el comprobante de pago No. 09- 63.713 de **Agosto 28 de 2009**, correspondiente a la tasa establecida para dicha solicitud.

En consecuencia, atentamente solicito a Ud. se anexe este memorial junto con el comprobante de pago al expediente correspondiente a esta solicitud de Patente de Invención, y se continúe con su tramitación.

Señor Jefe,


Margarita Castellanos Abondano
C.C. No. 39.779.654 de Usaquén
T.P.A. No. 70.819 del C. S. J.
Calle 94 A No. 7 A-09 - Bogotá, D.C.
Teléfono (PBX): 610 7420

Bogotá,
MCA/gcb/P1262

31 ABO. 2009

57

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 900176089-2

RECIBO OFICIAL DE CAJA : 09 - 63,913
FECHA : AGOSTO 28 DE 2009

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 05-116681- -00005-0000

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***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
ALVARO CASTELLANOS	CONSIGNACION	BANCO DE BOGOTA	062754387	112277911	28/08/2009	3,928,000.00

***** C O N C E P T O *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01 SOLICITUDES	85 EXAMEN DE PATENTABILIDAD DE INVEN	452,000.00
		TOTAL :	\$ 452,000.00

SON: CUATROCIENTOS CINCUENTA Y DOS MIL PESOS

RESPONSABLE : _____

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

DIVISIÓN DE NUEVAS CREACIONES

RADICACIÓN EXPEDIENTE No. 05-116681

EL EXTRACTO DE LA PRESENTE SOLICITUD DE **PATENTE DE INVENCION**

FUE PUBLICADO EN LA GACETA DE PROPIEDAD INDUSTRIAL No **602** DE

FECHA **31 DE MARZO DE 2009** EL TÉRMINO HÁBIL SEÑALADO POR LA LEY

EXPIRA EL **02 DE JULIO DE 2009**

NOTA: Dentro del plazo de los seis (6) meses siguientes a partir de la fecha de publicación en la gaceta de Propiedad Industrial, deberá solicitar y cancelar el examen de patentabilidad so pena de que la solicitud caiga en abandono, de acuerdo con lo establecido en el Artículo 44 de la Decisión 486/2000.

SE PRESENTARON OPOSICIONES POR PARTE DE TERCEROS.

SI _____

NO X

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIRECCIÓN DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Abogada
Margarita Castellanos A.
(Apoderada)

ASUNTO Radicación 05 – 116 -681
 Trámite 002
 Evento 001
 Actuación 430
 Oficio 025
 Folios 050

Patente de Invención ☒ Patente de Modelo de Utilidad ☐
Vía Nacional ☐
Vía PCT (fase nacional) ☐ Cap. I ☐ Cap. II ☐
Solicitud Internacional n.º _____
Fecha de Presentación Intrnl. _____

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

1. Documentos estudiados

Descripción: Folios 4 a 13 como se radicó inicialmente
 Folios 24 a 31 versión en inglés (¿?)

Reivindicaciones: Folios 14 a 16 como se radicó inicialmente
 Folios 32 y 33 versión en inglés (¿?)

Dibujos: Folios 18 a 23 como se radicó inicialmente

2. Objeto de la invención

Título de la solicitud: *Estructura de enrollamiento y alimentación de una máquina de enrollamiento de tela*, folio 1.

El objeto de la presente solicitud de patente de invención consiste en suministrar una estructura que comprende un bastidor dispuesto sobre la máquina de enrollamiento de tela, un eje de transmisión acoplado pivotablemente a una pared del bastidor, dos postes o muñones con sus correspondientes cierres que están

asegurados pivotablemente por un extremo a una pared lateral del bastidor y un espacio de desplazamiento que está definido entre cada cierre y el correspondiente poste o muñón para instalar un rodillo impulsado por el eje de transmisión dentro del espacio de desplazamiento; y dos dos miembros limitadores que tienen una relación fija con el cierre y, que tienen una primera posición fija con el cierre y una segunda posición con un ángulo abierto dispuesto entre el miembro limitador y el poste o muñón para liberar la relación fija. El ángulo abierto facilita el movimiento de alimentación del rodillo enrollado con la tela. Ya no es necesario levantar todo el rodillo, con lo cual se mejora la eficiencia de la operación y el rendimiento del enrollamiento de tela. (Tomado del resumen en inglés, versión libre traducida por el examinador)

El problema planteado en esta solicitud es satisfacer la necesidad de evitar que el operario tenga que desplazar manualmente los rodillos de tela enrollada.

Para solucionar este problema técnico la solicitud en estudio proporciona una estructura que comprende un bastidor dispuesto, sobre la máquina de enrollamiento de tela, un eje de transmisión acoplado pivotablemente a una pared del bastidor, dos postes o muñones con sus correspondientes cierres que están asegurados pivotablemente por un extremo a una pared lateral del bastidor y un espacio de desplazamiento que está definido entre cada cierre y el correspondiente poste o muñón para instalar un rodillo impulsado por el eje de transmisión dentro del espacio de desplazamiento; y dos dos miembros limitadores que tienen una relación fija con el cierre y que tienen una primera posición fija con el cierre y una segunda posición con un ángulo abierto dispuesto entre el miembro limitador y el poste o muñón para liberar la relación fija.

Clasificación Internacional de Patentes (IPC): D04B 15/88, 35/10, B65H 75/18

3. De la solicitud de Patente

Antes de entrar en detalles específicos, se le dan al solicitante ciertas indicaciones generales, algunas de las cuales son aplicables a este caso y todas deberán ser tenidas en cuenta en las eventuales modificaciones:

El título o nombre de la invención debe concordar con lo que se reclama en el capítulo reivindicatorio. Esto es, si en las reivindicaciones se reclama un producto, tal producto debe ser mencionado en el título, y si en las reivindicaciones se reclama un procedimiento o un sistema o un método, también debe ser mencionado allí. Normalmente, el título debe contener máximo diez palabras aunque eventualmente pueden ser más. El título no debe contener palabras cuyo significado no esté reconocido dentro del sector de la técnica de que se trate. Preferiblemente, deben ser palabras cuyo significado se encuentre en el Diccionario de la Real Academia Española (DRAE).

En Colombia, la máxima autoridad en cuestiones del lenguaje es la Academia Colombiana de la Lengua. En caso de duda sobre el significado de las palabras, se debe acoger la definición que trae el Diccionario de la Real Academia Española (DRAE).

En Colombia, es de uso obligatorio el Sistema Internacional de unidades. Esto implica, también, que la coma decimal es de uso obligatorio. Cuando aparezca algún valor con unidades diferentes a las exigidas, deberá incluirse su correspondiente conversión al Sistema Internacional.

La parte técnica de la solicitud se divide en tres secciones, debidamente separadas, preferiblemente en este orden: El capítulo descriptivo, el capítulo reivindicatorio y el juego de dibujos o figuras. Ninguna de estas secciones podrá llevar membretes (encabezamientos o pies de página) ajenos al contenido técnico de la solicitud.

Por lo menos el capítulo descriptivo debe estar debidamente paginado y estar escrito a doble espacio, con el fin de facilitar la referencia a los apartados del texto.

La terminología empleada en la descripción y en las reivindicaciones debe ser igual para designar las diferentes partes, piezas, elementos, detalles o aspectos de lo que se mencione en ellas; los cuales, a su vez, deben estar designados con números o signos de referencia.

Dentro del texto de la descripción y las reivindicaciones se aconseja encerrar entre paréntesis el número o signo de referencia cada vez que se mencione el detalle correspondiente, con el fin de distinguirlo de otros tipos de números o signos que eventualmente aparezcan allí. Estos números o signos de referencia deben aparecer dentro del juego de dibujos (preferiblemente, sin paréntesis, aunque pueden estar encerrados dentro de un círculo) siempre acompañados de líneas o flechas que señalen o indiquen a qué parte, pieza, elemento o aspecto se encuentran asociados.

Las reivindicaciones deben estar numeradas individual y consecutivamente (1, 2, ... 5, 6, etc.) El capítulo reivindicatorio no debe tener subtítulos.

Normalmente se pueden encontrar dos categorías de reivindicaciones: una, la de producto y la otra, de procedimiento.

En las reivindicaciones se deben definir los alcances de la protección que desea el solicitante. En consecuencia, las reivindicaciones forman un cuerpo aparte de la descripción y como tal debe ser redactado: la primera vez que se mencione un nombre dentro de las reivindicaciones debería estar acompañado de un artículo indeterminado; y, la inclusión -entre paréntesis- de un número de referencia no sustituye la definición del elemento o aspecto al que se refiere, simplemente sirve de información complementaria. Se debe entender que la descripción sirve para interpretar las reivindicaciones y, en consecuencia, si en una reivindicación se reclama un aparato, por ejemplo, no se deberían mencionar aspectos del funcionamiento del aparato dentro de la reivindicación, limitándose a definir únicamente los elementos que constituyen el aparato.

Cada una de las figuras debe estar debidamente identificada, preferiblemente con un número consecutivo: Figura 1, figura 2, ...

Las figuras deben ser realizadas siguiendo las reglas del dibujo técnico.

Se prefiere que dentro de las figuras no se incluya ningún texto. Cada uno de los detalles ilustrados en las figuras deberá estar señalado con un número o signo de referencia, el cual será el mismo en todas las figuras en donde se encuentre el detalle en cuestión. Si en alguna figura no se encuentran números de referencia, se entiende que no se va a decir nada sobre ella dentro del texto de la descripción y, entonces, es preferible que se omita tal figura. Análogamente, si en una figura no se encuentra señalado algún detalle con el respectivo número de referencia, es preferible que se omita tal detalle.

La patente de **modelo de utilidad** no puede incluir los procedimientos, por definición. Si alguna de las reivindicaciones de una solicitud de patente de modelo de utilidad reclama un procedimiento, debe ser suprimida.

Descripción (artículo 28 D. 486)

Durante el análisis del texto de la descripción y de las ilustraciones anexadas, se observaron los siguientes defectos:

- 1) En la página 1, folio 4, aparece por primera vez la expresión *una pieza de tela cruda* que, correspondería a una mala traducción del término en inglés *lump*. El solicitante deberá hacer la correspondiente sustitución, ya que el significado de la expresión objetada no concuerda con el contexto. Esta expresión, modificada como *una pieza larga de tela cruda* aparece adelante, dentro de la descripción.
- 2) En la misma página 1 aparece por primera vez la expresión *R.O.C.* Que carece de significado. Como aparentemente se refiere a Taiwán, debería sustituirse por *TW*, que es la sigla que le corresponde, según el estándar internacional.
- 3) En la misma página 1 aparece la expresión *"Fabric collecting roll bracket assembly"* que debe ser traducida al español.
- 4) En la misma página 1 aparece por primera vez la expresión *flanco lateral* que es redundante, porque todos los flancos son laterales. En aras de la concisión se debe omitir el calificativo *lateral*.
- 5) En la página 2, folio 5, aparece la expresión *sobre el mismo lado de un flanco lateral* que requiere una aclaración, porque abunda en redundancias.
- 6) En la misma página 2 aparece la expresión *de aproximadamente 35 a 45 kilogramos* que debe ser sustituida por *de aproximadamente 35 kg a 45 kg* porque, según las reglas de uso del Sistema Internacional de unidades, todas las cifras deben estar acompañadas por los símbolos respectivos.
- 7) En la página 4, folio 7, aparece la expresión *"Improved structure of a cloth cutting machine"* que debe ser traducida al español.
- 8) En la misma página 4, aparece el término *contactar* que debe ser sustituido porque según el Diccionario de la Real Academia Española (DRAE), *contactar* significa *1. intr. Establecer contacto o comunicación con alguien* lo que no concuerda con el contexto.
- 9) En la página 5, folio 8, aparecen las expresiones *tapones*, *elemento de frenado* que deben ser corregidas, en primer lugar, porque se hace la transición de una a otra sin ninguna justificación; en segundo lugar, porque aparentemente corresponden a una mala traducción del término *stopper* y, en tercer lugar, porque el significado de las expresiones objetadas no concuerda con el contexto. Una de estas expresiones o ambas vuelven a aparecer adelante, dentro de la descripción y las reivindicaciones.
- 10) Se le sugiere al solicitante que encierre entre paréntesis los números de referencia que aparecen a partir de la página 7, folio 10, con el fin de distinguirlos claramente de otros tipos de números que eventualmente aparecen dentro de la solicitud.
- 11) En la página 9, folio 12, aparece la expresión *El elemento de frenado liberado (40) es abierto de manera esparcida* que carece de significado.

La descripción no cumple con los requisitos de claridad y divulgación completa, lo que dificulta o impide su comprensión y ejecución de acuerdo al Art. 28 de la Decisión 486

Reivindicaciones (artículo 30 D 486)

Durante el análisis del texto de las reivindicaciones se observaron los siguientes defectos:

- 1) En la reivindicación 1, folio 14, aparecen las expresiones *piezas de tela cruda*, *elemento de frenado* que fueron objetadas arriba, con relación a la descripción. La segunda expresión objetada vuelve a aparecer en las reivindicaciones 5 a 7, folios 15 y 16.

2) En la misma reivindicación 1 se está hablando de *dos piezas de tela cruda* y después se dice *la pieza de tela cruda* por lo que no hay concordancia en el número. Otro tanto sucede con *dos elementos de límite* respecto a *el elemento de límite*.

Debe entenderse que las reivindicaciones dependientes de las reivindicaciones objetadas son, asimismo, objetadas, por razones análogas.

Las reivindicaciones no cumplen con los requisitos de definición y claridad de acuerdo al Art. 30 de la Decisión 486.

Se deben presentar, entonces, nuevos capítulos descriptivo y reivindicatorio, ambos completos, donde se hayan corregido todas las objeciones que se han hecho arriba. Esto con el fin de evitar -cuando solo se presentan algunas páginas sueltas corregidas- que el lector tenga que desplazarse desde un sitio a otro de la solicitud y luego regresar a donde estaba antes sin perder la ilación de la lectura, porque esto produce confusión y afecta negativamente la claridad de dichos capítulos.

Se le advierte al interesado que las modificaciones sugeridas arriba podrían resultar inconducentes si se mantienen las objeciones a la patentabilidad que se insinúan adelante.

4. Determinación del Estado de la Técnica

La fecha que se ha tenido en cuenta para determinar el Estado de la Técnica es la

Fecha de presentación de la solicitud nacional 2005-11-17

Se realizó la búsqueda en el estado de la técnica de documentos relacionados con la solicitud teniendo en cuenta la fecha indicada; y durante la búsqueda de anterioridades se encontraron los siguientes documentos, que forman parte de la familia de patentes de la presente solicitud: Publicación US 2007/0102558 A1 del 2007-05-10; Patente US 7 441 723 B2 del 2008-10-28; publicación EP 1 788 133 A1 del 2007-05-23; Patente TW I259855 del 2006-08-11; Patent Abstract KR 100675310 B1 del 2007-01-22. Se anexa la copia de las primeras páginas de estos documentos; junto con: la copia del Informe de Búsqueda Europeo; la copia del capítulo reivindicatorio admitido por la USPTO; la copia de los datos bibliográficos del documento TW y la copia del mosaico del mismo documento, suministrados por esp@cenet. También se encontraron los siguientes documentos que forman parte del estado de la técnica más cercano al objeto de la solicitud:

n.º	Documento	Título	Fecha de publicación
D1	Patente US 1 635 024, cuyo inventor es William H. Baker	«Cloth roll mounting for looms»(Montaje para rollos de tela en telares)	1927-07-05
D2	Patente GB 454 219, cuyos titulares son Wildt and Company y Leslie Herbert Leedham	«Improvements in or relating to fabric draw-off mechanism for knitting machines»(Mejoras en, o relativas a, un mecanismo de liberación para máquinas de tricotado)	1936-01-23

n.º	Documento	Título	Fecha de publicación
D3	Patente US 2 429 674, cuyo inventor es Alexander Dickno, quien le cedió sus derechos a la Blossom Products Corporation	«Releasable roll take-up device for knitting machines»(Un dispositivo de rodillo desmontable para máquinas de tejer)	1947-10-28
D4	Publicación EP 0 534 352 A2, cuyo inventor es Kozo Taniguchi, quien le cedió sus derechos a la Precision Fukuhara Works	«Rolling and discharging device of knitted fabric on circular knitting machine and its controlling method»(Un dispositivo de enrollado y descarga de tejido tricotado sobre una máquina de tricotado circular y su método de control)	1993-03-31
D5	Patente US 5 317 885, cuyo inventor es Cesare Vignoni, quien le cedió sus derechos a la Vignoni S.r.l.	«Winding device for split knitted fabric»(Un dispositivo para enrollado de un tejido tricotado dividido)	1994-06-07
D6	Patente US 5 560 566, cuyo inventor es Louis J. Bagnato, quien le cedió sus derechos a la Beloit Technologies, Inc.	«Winder with elevated spool support rail»(Un enrollador con un riel de soporte elevado de carrete)	1996-10-01

Se anexa la copia de las páginas pertinentes de estos documentos

5. Solicitud de suministro de información

Como resultado del examen de búsqueda de anterioridades y con fundamento en el artículo 46 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

Se determinó que existe el siguiente documento, que eventualmente afectaría los requisitos de patentabilidad de esta solicitud: Número de patente TW 259855. Se cita porque la primera página (en chino), anexada, menciona el número 94 136 052 (que sería el número de solicitud) y la fecha 94-10-14 (que sería la fecha de presentación).

El solicitante deberá presentar una traducción oficial de dicha primera página, junto con una certificación de la Oficina Taiwanesa de Propiedad Industrial en donde conste la fecha de la primera publicación de la solicitud correspondiente.

Puesto que la publicación citada hace parte del resultado del examen de búsqueda realizado para la solicitud equivalente a la solicitud colombiana aquí estudiada, y dado que el examinador a cargo no ha podido consultar este documento a pesar de sus esfuerzos razonables en ese sentido, se requiere que el solicitante -en virtud de lo establecido en el artículo 46 de la Decisión 486 de la Comisión de la Comunidad Andina- proporcione la copia de los documentos donde consten los datos solicitados, para permitir la evaluación concienzuda de los requisitos de patentabilidad del objeto de la solicitud en estudio.

Se le fija un plazo máximo de tres meses para complementar esta información.

6. Análisis preliminar de patentabilidad (artículo 14 D486)

A pesar de las objeciones respecto a la claridad y la definición de las reivindicaciones, con base en las enseñanzas de los documentos encontrados hasta ahora, se prevén objeciones respecto a la novedad y respecto al nivel inventivo del objeto de la solicitud.

Las objeciones mencionadas aquí se fundamentan en el Informe de Búsqueda Europeo cuya copia se adjunta, en el cual se objetó la novedad de lo reclamado en las reivindicaciones 1 y 5 a 8, con base en el documento D3 citado arriba; y, el nivel inventivo de lo reclamado en las reivindicaciones 2 a 4, con base en las enseñanzas de D3 en combinación de las enseñanzas de D4. También se fundamentan las objeciones en la versión en inglés de la solicitud, de manera que se obvian ciertos defectos de la traducción al español.

A continuación, los números de referencia que se mencionan son los de cada documento en análisis.

En el documento D3 se revelan, entre otras cosas, unos medios de agarre liberable asociados a un transportador elevador de rodillos. En una tricotadora, medida que una tela se enrolla alrededor del eje de un rodillo, va aumentando el diámetro exterior de la tela enrollada. Los medios de agarre evitan que se desplace el rodillo fuera de la tricotadora mientras no sean expresamente liberados. Los medios de agarre comprenden un bastidor (15) o (16) sobre el cual va montado un poste o muñón (37) que coopera con un elemento de cierre (38) montado pivotablemente alrededor de un eje (43), sobre el bastidor, y que, cuando está ajustado, se encuentra dispuesto en paralelo respecto al poste o muñón (37). Entre el poste o muñón (37) y el elemento de cierre (38) hay un espacio de desplazamiento (41) por donde se desliza el eje (31) del rodillo [vástago de enrollamiento] a medida que la tela (34) se va enrollando sobre él. Hay un elemento limitador (51) del desplazamiento del elemento de cierre (38) que pivota alrededor del eje (52) desde una primera posición, en la cual no se puede mover el elemento de cierre (38); hasta una segunda posición, en la cual el elemento de cierre (38) puede pivotar alrededor del eje (43) hasta llegar a una posición de ángulo abierto. El elemento limitador (52) posee una porción (59) sobre la cual se puede ejercer alguna fuerza para levantarlo [esto es, hacerlo pivotar sobre el eje (52)] y así liberar al elemento de cierre (38).

En el documento D4 se revela, entre otras cosas, un detector que vigila la operación de una máquina tricotadora.

Las reivindicaciones sobre las cuales se debería practicar el análisis son las reivindicaciones 1 a 8 -corregidas, porque en el momento de realizar este estudio son defectuosas, no definen claramente lo que se reclama. Por esta razón no se puede hacer un examen formal de patentabilidad-.

Al parecer, el problema técnico planteado en esta solicitud se habría resuelto previamente mediante el mismo tipo soluciones técnicas ya conocidas. Por esta razón se considera que las sustituciones propuestas por la solicitud serían evidentes para una persona medianamente versada en la materia.

Una persona conocedora de la materia motivada por las sugerencias que muestran los documentos D3 y D4 lograría las soluciones propuestas en esta solicitud; de manera que para una persona medianamente versada en la materia

sería obvio combinar las enseñanzas de estos dos documentos. Por lo cual carecería de nivel inventivo la solución que pretende proteger el solicitante.

7. Conclusión:

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados negativamente por la falta de claridad de la descripción y las reivindicaciones y por la falta de definición de estas últimas.

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta días contados a partir de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente. Respecto a lo exigido de acuerdo al artículo 46, se le fija un plazo máximo de tres meses para complementar esta información.

Notifíquese el presente oficio conforme a lo dispuesto en el número 5.2, letra e), del capítulo quinto del título primero de la Circular Única n.º 10 de 2001.



JESÚS FERNEL GARCÍA GARCÍA
Directora de Nuevas Creaciones (E)

El anterior requerimiento fue notificado por fijación en lista, de fecha

07 ENE. 2010

CONCEPTO TÉCNICO n.º 4409

EXAMINADOR TÉCNICO
Código n.º 202009



US 20070102558A1

(19) **United States**(12) **Patent Application Publication**
Chen(10) Pub. No.: **US 2007/0102558 A1**(43) Pub. Date: **May 10, 2007**(54) **ROLLING AND FEEDING STRUCTURE OF A
FABRIC ROLLING MACHINE**

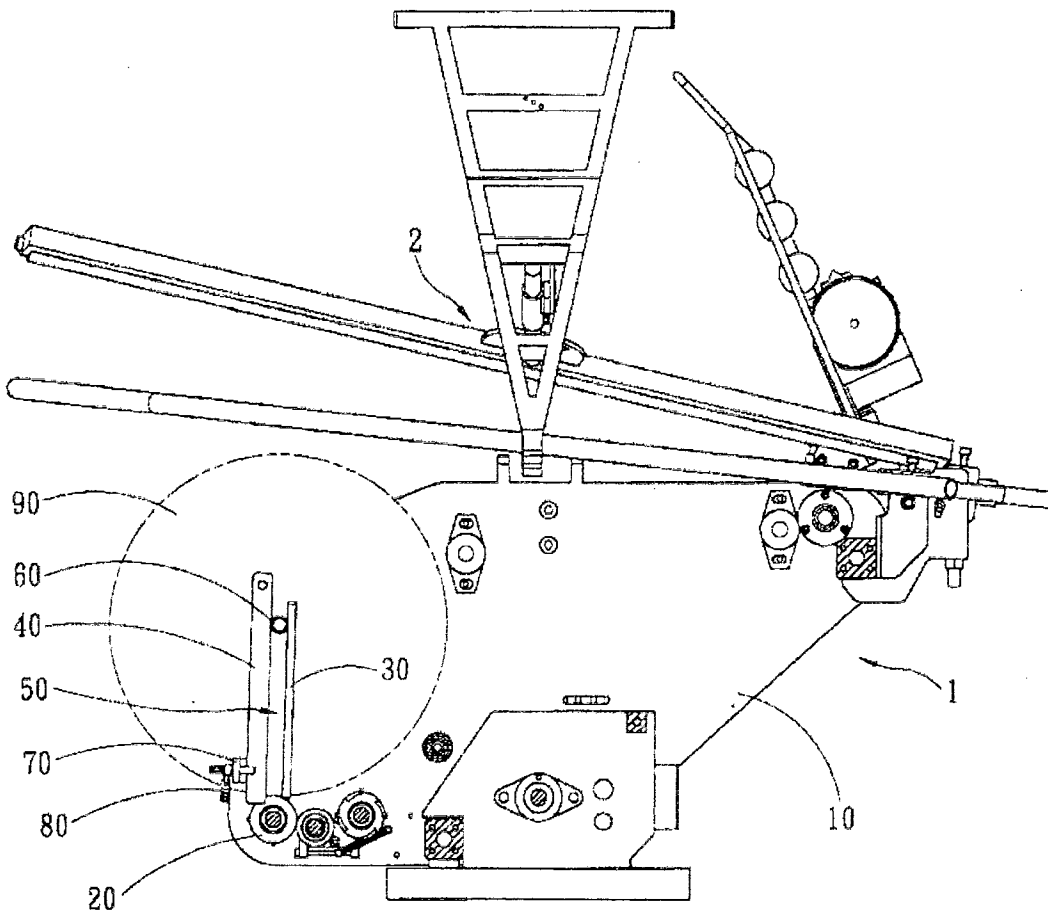
(52) U.S. CL 242/526; 242/541

(75) Inventor: **Shih-Chi Chen, Taipei Hsien (TW)**(57) **ABSTRACT**

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**BIRCH STEWART KOLASCH & BIRCH
PO BOX 747****FALLS CHURCH, VA 22040-0747 (US)**(73) Assignee: **PAI LUNG MACHINERY MILL CO.,
LTD.**(21) Appl. No.: **11/267,272**(22) Filed: **Nov. 7, 2005****Publication Classification**(51) Int. Cl.
B65H 18/16 (2006.01)

A rolling and feeding structure of a fabric rolling machine comprises a frame disposed on the fabric rolling machine, a transmission axle pivotally coupled to a sidewall of the frame, two lumps, two stoppers corresponding to the lumps and having an end pivotally coupled to the frame, a displacement gap defined between the stopper and the lump for installing a rolling rod and producing a displacement of the rolling rod from the starting point of the transmission axle in the displacement gap, two limit members for forming a fixing relation with the stoppers and including a first position of the displacement gap and having a fixing relation with the stopper, and a second position with an open angle formed between the limit member and the lump for releasing the fixing relation. The foregoing measure improves the fabric rolling quantity and features an easy operation for feeding the fabric.





US007441723B2

(12) **United States Patent**
Chen

(10) **Patent No.:** **US 7,441,723 B2**
(45) **Date of Patent:** **Oct. 28, 2008**

(54) **ROLLING AND FEEDING STRUCTURE OF A FABRIC ROLLING MACHINE**

(75) **Inventor:** Shih-Chi Chen, Taipei Hsien (TW)

(73) **Assignee:** **Pai Lung Machinery Mill Co., Ltd.,**
Jui-Fang Town, Taipei Hsien (TW)

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 368 days.

(21) **Appl. No.:** 11/267,272

(22) **Filed:** Nov. 7, 2005

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(51) **Int. Cl.**
B65H 18/16 (2006.01)

(52) **U.S. Cl.** 242/541; 242/598.2; 242/526;
242/533.2; 242/534

(58) **Field of Classification Search** 242/526,
242/533, 534, 534.2, 541, 533.2, 598.2
See application file for complete search history.

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Primary Examiner—Peter M. Cuomo

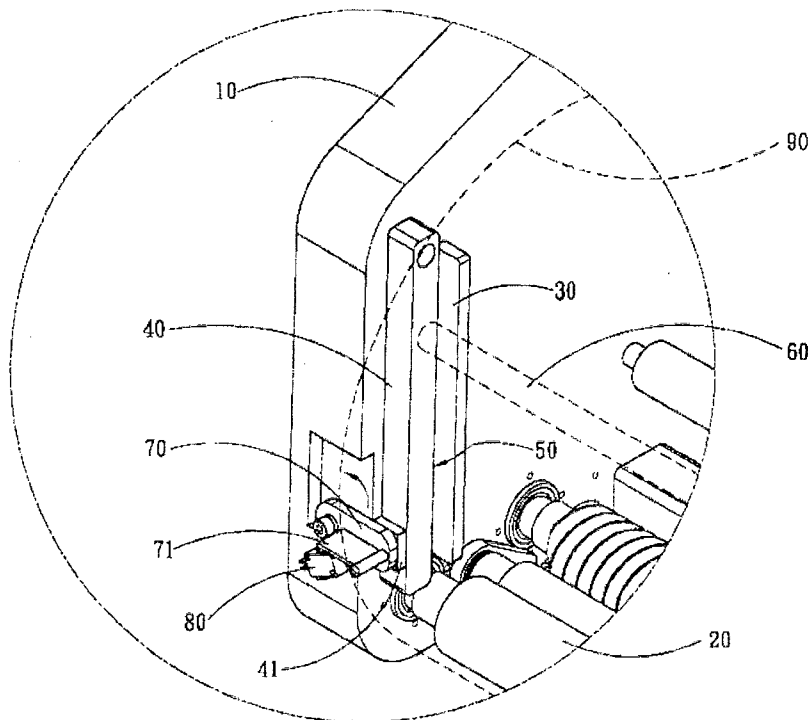
Assistant Examiner—Stefan Krueer

(74) *Attorney, Agent, or Firm*—Muncy, Geissler, Olds, & Lowe PLLC

(57) **ABSTRACT**

A rolling and feeding structure of a fabric rolling machine comprises a frame disposed on the fabric rolling machine, a transmission axle rotatably coupled to a sidewall of the frame, two lumps, two stoppers corresponding to the lumps and each having an end pivotally coupled to the frame, a displacement gap defined between the stopper and the lump for installing a rolling rod and enabling a displacement of the rolling rod from the starting point of the transmission axle in the displacement gap, two limit members for forming a fixing relation with the stoppers and including a first position of the displacement gap and having a fixing relation with the stopper, and a second position with an open angle formed between the limit member and the lump for releasing the fixing relation. The foregoing measure improves the fabric rolling quantity and features an easy operation for feeding the fabric.

14 Claims, 6 Drawing Sheets



cutting device 2 for cutting the cloth, so that the fabric rolling machine 1 has better functions and is more convenient. The rolling and feeding structure of a fabric rolling machine of the invention comprises a frame 10 disposed on the fabric rolling machine 1, a transmission axle 20 pivotally coupled to a sidewall of the frame 10, two lumps 30 corresponding and being fixed to the sidewall of the frame 10, two stoppers 40 corresponding to the lumps 30 and having an end pivotally coupled to the sidewall of the frame by a pivotal axle. The frame 10 includes a sensor 80 corresponding to the stopper 40, and the sensor 80 is electrically connected to a switch circuit of the fabric rolling machine 1. The stopper 40 and the lump 30 are installed parallel to each other, and a displacement gap 50 is defined between the stopper 40 and the lump 30. The displacement gap 50 includes a rolling rod 60 driven by the transmission axle 20 for producing a displacement of the rolling rod 60 from the starting point of the transmission axle 20 in the displacement gap 50. Two limit members 70 pivotally coupled onto the frame 10 to form a fixing relation with the stopper 40, and the limit member 70 forms a first position and a second position of a force applying section 71 for applying a force for a rotation. The stopper 40 includes a fixing section 41 corresponding to the limit member 70 and forming the fixing relation, and the limit member 70 has a first position of the displacement gap 50 for forming a fixing relation with the stopper 40 and a second position with an open angle formed between the limit member 70 and the lump 30 for releasing the fixing relation. The sensor 80 forms a fixing relation with the stopper 40 when the stopper 40 is at the first position.

In other words, the limit member 70 forms a fixing relation with the stopper 40, when the limit member 70 is situated at the first position, so that a displacement gap 50 is defined between the stopper 40 and the lump 30, and the limit member 70 and the sensor 80 form a connecting status, and thus driving the fabric rolling machine 1 to move as shown in FIG. 2A. When the fabric rolling machine 1 is operated, the rolling rod 60 is driven by the transmission axle 20 for carrying out the cloth rolling, and the rolling rod 60 is connected by the cloth 90 and the transmission axle 20, and the thickness of the cloth 90 increases as the rolling continues and thus pressing on the transmission axle 20 and producing a displacement in the displacement gap 50 by using the transmission axle 20 as the starting point (as shown in FIGS. 3A and 3B). When a sufficient quantity of the cloth 90 on the rolling rod 60 is reached, the cloth is unloaded. A user applies a force to the force applying section 71 of the limit member 70, so that the limit member 70 enters into the second position to release the fixing condition between the limit member 70 and the stopper 40. Now, the sensor 80 prevents the rolling rod 60 of the fabric rolling machine 1 from being started when the rolling rod 60 is not fixed into a position, and thus the invention is very safe (as shown in FIG. 2B). The released stopper 40 is spread open and the lump 30 forms an open angle, so that the rolling rod 60 together with the cloth 90 can be unloaded successfully (as shown in FIG. 2C). In the figure, it is not necessary to lift the rolling rod 60 together with the cloth 90 for unloading the cloth, and thus the present invention can save manpower and improve the operating efficiency. The present invention also can prevent the rolling rod 60 from touching other devices such as a cutting device 2 at the top of the cloth 90 when the rolling rod 60 is lifted to unload the cloth 90 as shown in FIG. 3B, and thus can greatly improve the cloth rolling quantity of the fabric rolling machine 1.

While the invention has been described by way of example and in terms of a preferred embodiment, it is to be understood that the invention is not limited thereto. To the contrary, it is

intended to cover various modifications and similar arrangements and procedures, and the scope of the appended claims therefore should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements and procedures.

What is claimed is:

1. A rolling and feeding structure of a fabric rolling machine, comprising:
 - a frame disposed on said fabric rolling machine and having a transmission axle rotatably coupled to said frame and two corresponding lumps fixed on a sidewall of said frame;
 - a stopper corresponding to each of said lumps and having an end pivotally coupled to a sidewall of said frame, and defining a displacement gap disposed between said stoppers and said lumps, and a rolling rod being disposed in said displacement gap and driven by said transmission axle, said rolling rod moves vertically from a starting point of said transmission axle in said displacement gap as fabric is wound thereon; and
 - two limit members pivotally coupled on said frame and forming a relation of fixing said stopper, and said limit member having a first position of said displacement gap for producing a fixing relation with said stopper, and a second position with an open angle disposed between said limit member and said lumps for releasing said fixing relation.
2. The rolling and feeding structure of a fabric rolling machine of claim 1, wherein said frame includes a sensor corresponding to said stopper.
3. The rolling and feeding structure of a fabric rolling machine of claim 1, wherein said stoppers are installed parallel to said lumps.
4. The rolling and feeding structures of a fabric rolling machine of claim 1, wherein said stopper includes a fixing section corresponding to said limit member for forming a fixing relation.
5. The rolling and feeding structure of a fabric rolling machine of claim 1, wherein said stopper has an end pivotally coupled with said frame by a pivotal axle.
6. The rolling and feeding structure of a fabric rolling machine of claim 1, wherein said limit member includes a force applying section of said first and second positions for applying a force for a rotation.
7. The rolling and feeding structure of a fabric rolling machine of claim 1, wherein the displacement gap is between the lumps and the stoppers, the displacement gap having a uniform width when the limit members are in the first position and having a varying width when the limit members are in the second position and the stoppers are pivoted away from the lumps.
8. The rolling and feeding structure of a fabric rolling machine of claim 1, wherein the stoppers are pivotable toward and away from the lumps, the stoppers being held in a fixed position when the limit members are in the first position, the stoppers each being pivotable about a first axis and the limit members being pivotable about axes which are non-parallel to the first axis.
9. The rolling and feeding structure of a fabric rolling machine of claim 1, wherein the stoppers are each pivotable about first axes and wherein the limit members are each pivotable about second axes, the first axes being perpendicular to the second axes.
10. The rolling and feeding structure of a fabric rolling machine of claim 1, wherein the lumps have a side which is

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parallel to the corresponding stopper when the limit members are in the first position and the lumps and stoppers are closed, the rolling rod being held between the stoppers and lumps when the lumps and stoppers are closed, the stoppers being pivotable away from the lumps when the limit members are moved to the second position whereby the rolling rod is removable from between the stoppers and lumps.

11. The rolling and feeding structure of a fabric rolling machine of claim 1, wherein at least one of the limit members engages a sensor when in the first position and is movable out of engagement with the sensor when in the second position, the sensor controlling operation of the transmission axle.

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12. The rolling and feeding structure of a fabric rolling machine of claim 2, wherein said sensor forms a connecting relation when said stopper is situated at said first position.

13. The rolling and feeding structure of a fabric rolling machine of claim 2, wherein said sensor is electrically connected to a switch circuit of said fabric rolling machine.

14. The rolling and feeding structure of a fabric rolling machine of claim 10, wherein the stoppers are each pivotable about first axes and wherein the limit members are each pivotable about second axes, the first axes being perpendicular to the second axes.

* * * * *



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60325 Frankfurt a.M. (DE)

Remarks:
Amended claims in accordance with Rule 86 (2) EPC.

(54) **A rolling and feeding structure of a fabric rolling machine**

(57) A rolling and feeding structure of a fabric rolling machine (1) comprises a frame (10), a transmission axle (20) rotatably coupled to a sidewall of the frame (10), two lumps (30), two stoppers (40) corresponding to the lumps (30) and having an end pivotally coupled to the frame (10), a displacement gap (50) defined between each stopper (40) and the lump (30) for installing a rolling rod (60) and allowing a displacement of the rolling rod (60)

from a starting point at the transmission axle (20), two limit members (70) for forming a fixing relation with the stoppers (40) in a first position for forming the displacement gap (50), and for releasing the fixing relation a second position allowing an open angle formed between the stopper (40) and the lump (30). The foregoing measure improves the fabric rolling quantity of the fabric rolling machine (1) greatly and features a simple and easy operation for feeding the fabric (90).

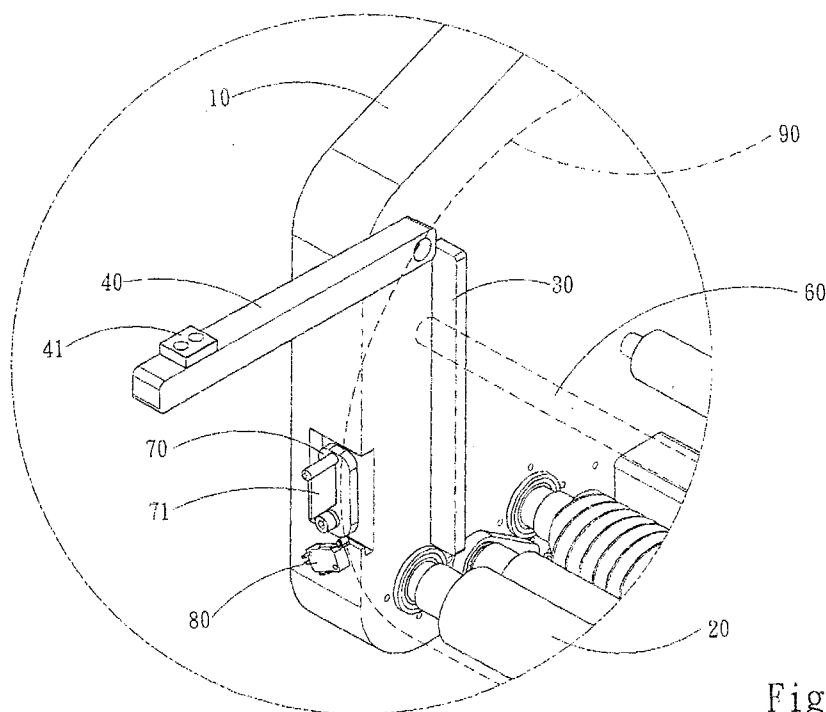


Fig. 2C



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 11 0821

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			D04B
Place of search		Date of completion of the search	Examiner
Munich		18 September 2006	Sterle, Dieter
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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ON EUROPEAN PATENT APPLICATION NO.

EP 05 11 0821

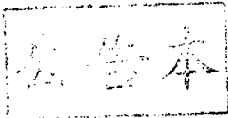
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The members are as contained in the European Patent Office EDP file on
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18-09-2006

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82



發明專利說明書

(本說明書格式、順序及粗體字，請勿任意更動，※記號部分請勿填寫)

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※申請日期：94.10.14

※IPC分類：D04B27/34

一、發明名稱：(中文/英文)

捲布機之捲布及下布架構

二、申請人：(共1人)

姓名或名稱：(中文/英文)

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代表人：王炳賜 (中文/英文)

住居所或營業所地址：(中文/英文)

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國籍：中華民國 (中文/英文)

三、發明人：(共1人)

姓名：(中文/英文)

陳世基

國籍：(中文/英文)

中華民國

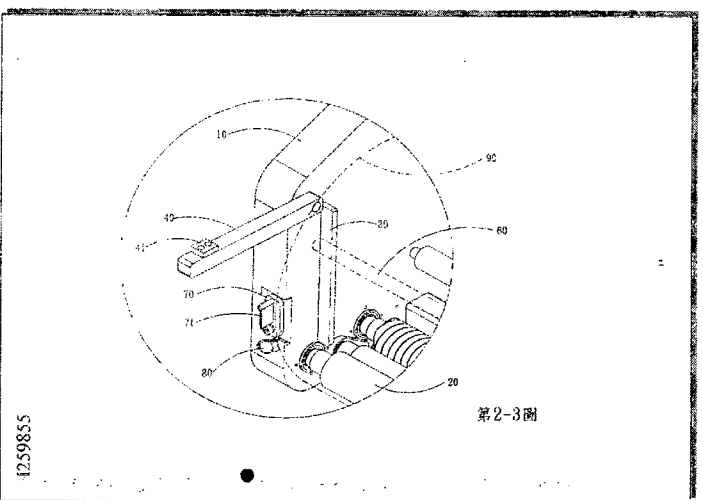
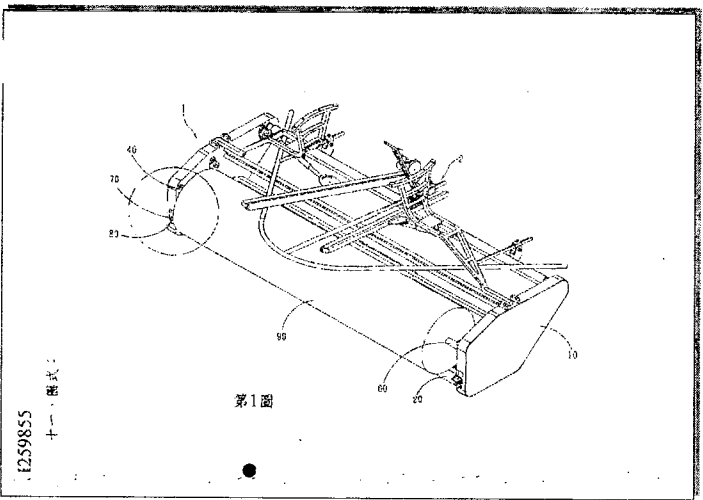
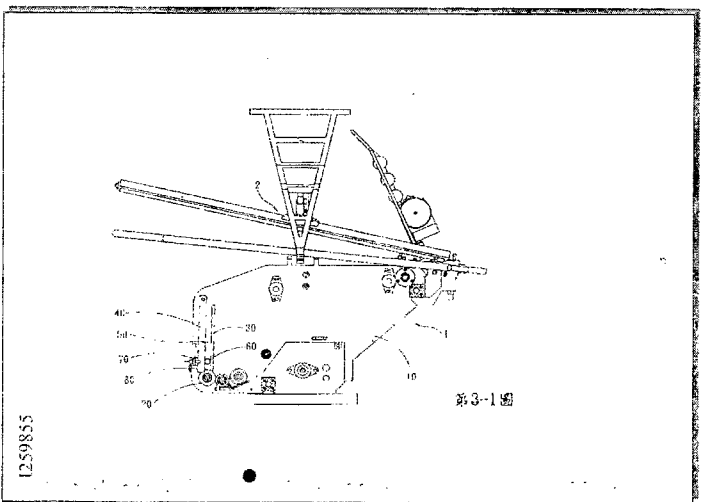
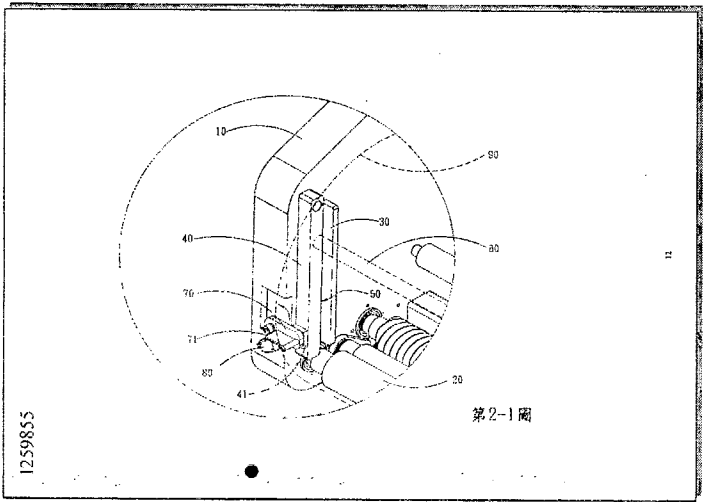
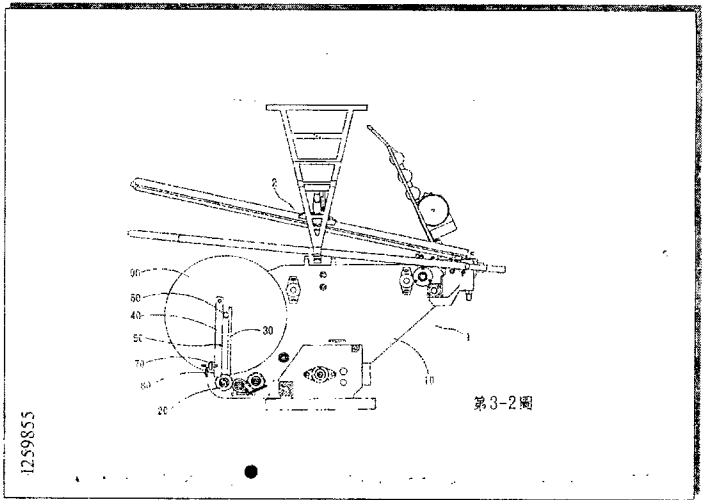
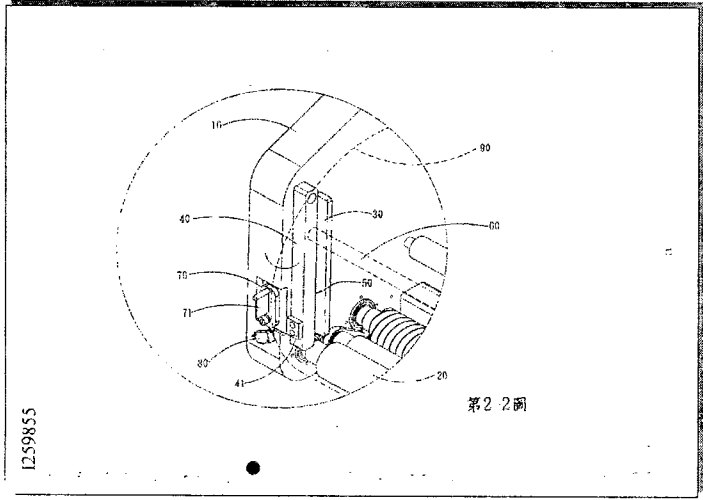
Fabric rolling-up and fabric-feed assembly for fabric rolling-up machine

Número de patente: TW259855 (B)
Fecha de publicación: 2006-08-11
Inventor(es): CHEN SHR-JI [TW]
Solicitante(s): PAI LUNG MACHINERY MILL CO LTD [TW]
Clasificación:
- internacional: D04B27/34; D04B27/00; (IPC1-7): D04B27/34
- europea:
Número de solicitud: TW20050136052 20051014
Número(s) de prioridad: TW20050136052 20051014

Resumen de TW 259855 (B)

A fabric rolling-up and fabric-feed assembly for fabric rolling-up machine, including: a frame mounted to the fabric rolling-up machine; a transmission shaft pivoted to a sidewall of the frame; two blocks; and two stopping members corresponding to the two blocks and each having an end pivoted to the sidewall of the frame; a displacement zone defined between the stopping members and the blocks, so as to allow mounting of a fabric rolling-up rod and to allow the fabric rolling-up rod to displace for a displacement path within the displacement zone in relation to the transmission shaft; two limiting parts that form specific positioning relations with respect to the stopping members, including a first position where the limiting parts assume a specific positioning relation with respect to the stopping members, and a second position where the limiting parts releasing the specific positioning relation to allow the limiting parts and the blocks to form an open angle therebetween. By adopting such measures, this invention significantly increases the quantity of fabric to be rolled-up by the fabric rolling-up machine and allows easy operation while feeding the fabric.

Datos suministrados desde la base de datos esp@cenet — Worldwide



Drawing pages of TW259855 B

(19)



KOREAN INTELLECTUAL PROPERTY OFFICE

KOREAN PATENT ABSTRACTS

(11)Publication number: **100675310 B1**(44)Date of publication of specification: **22.01.2007**(21)Application number: **1020050110083**(71)Applicant: **PAI LUNG MACHINERY MILL CO., LTD.**(22)Date of filing: **17.11.2005**(72)Inventor: **SHIH-CHI CHEN**(51)Int. Cl. **B65H 18/08 20060101AFI20051226BHKR**

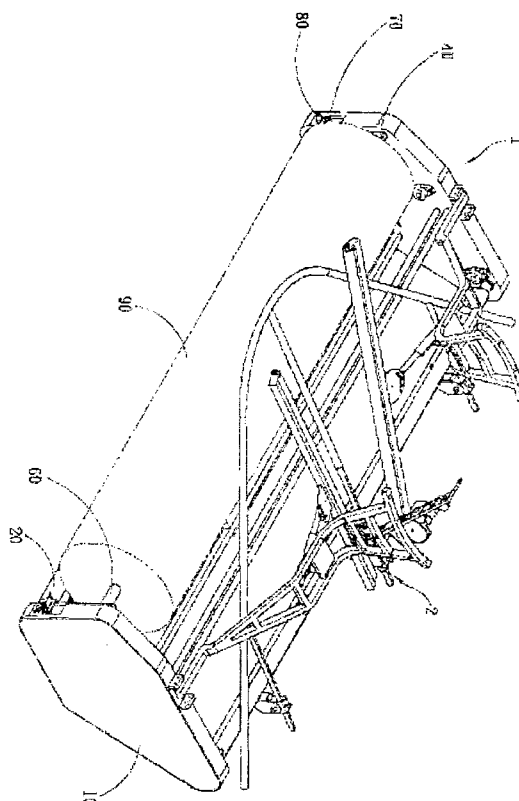
(54) **ROLLING AND FEEDING STRUCTURE OF A FABRIC ROLLING MACHINE FOR FORMING AN OPENING ANGLE BETWEEN A STOPPER AND A LUMP**

(57) Abstract:

PURPOSE: A rolling and feeding structure of a fabric rolling machine is provided to increase largely the fabric rolling quality of the fabric rolling machine.

CONSTITUTION: The fabric rolling machine(1) includes a cutting device(2) for cutting the cloth. A frame(10) is arranged at the fabric rolling machine. A transfer shaft(20) is rotatably combined with a sidewall of the frame. Two lumps are fixed to the sidewall of the frame. Two stoppers(40) corresponds to the lumps and ends of the two stoppers are combined with the sidewall of the frame by a rotation shaft. The frame includes a sensor(80) corresponding to the stopper. The sensor is electrically combined with a switch circuit of the fabric rolling machine.

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July 5, 1927.

1,635,024

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W. H. BAKER
CLOTH ROLL MOUNTING FOR LOOMS

Filed Jan. 15, 1923

2 Sheets-Sheet 1

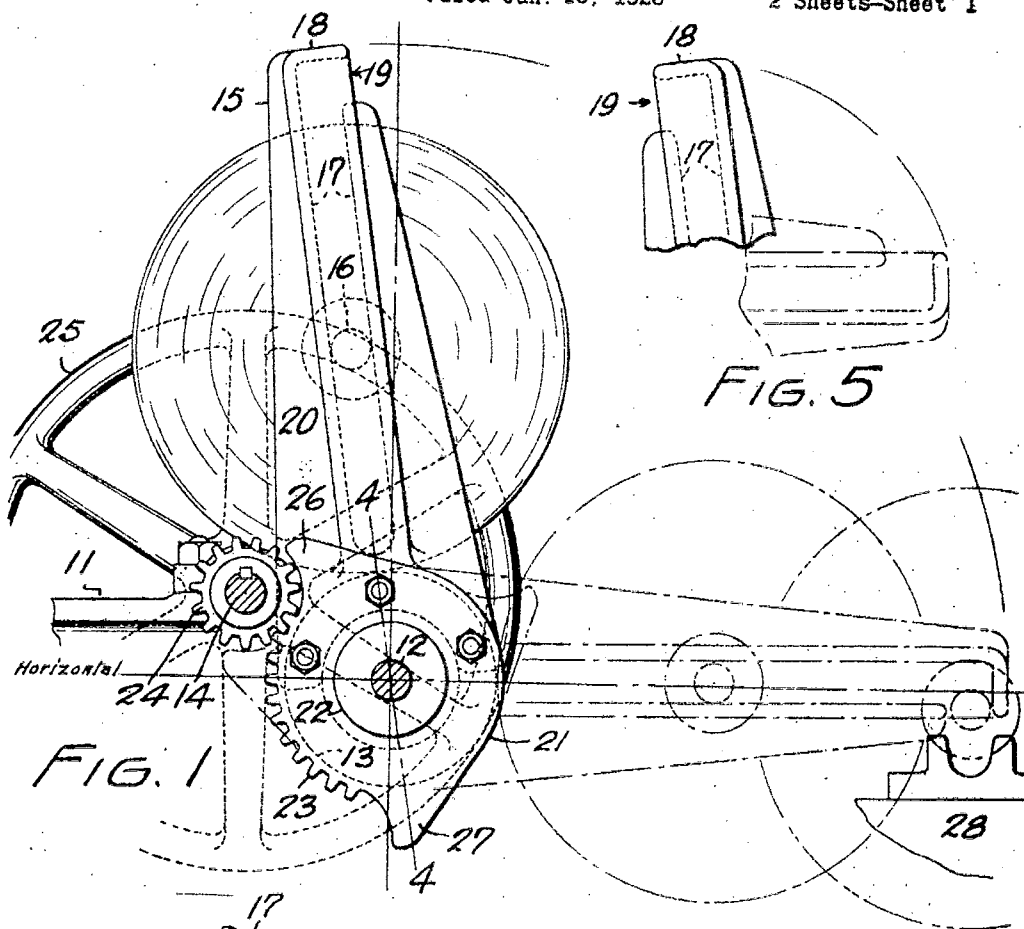


FIG. 1

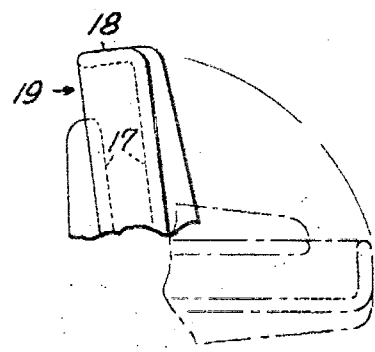


FIG. 5

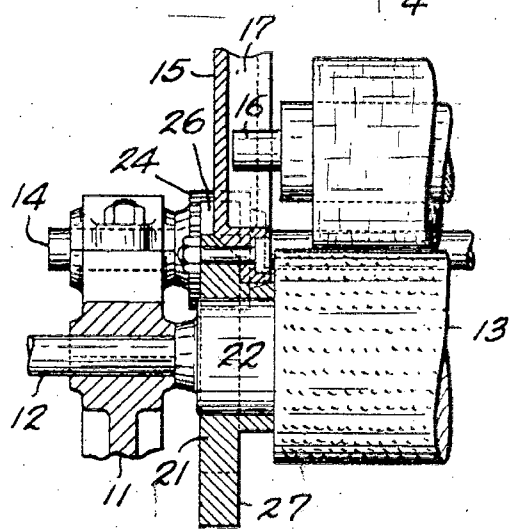


FIG. 4

Approximate limit
lateral projection
of loom

Inventor
William H. Baker
By *[Signature]*
Att.

July 5, 1927.

W. H. BAKER

1,635,024

CLOTH ROLL MOUNTING FOR LOOMS

Filed Jan. 15, 1923

2 Sheets-Sheet 2

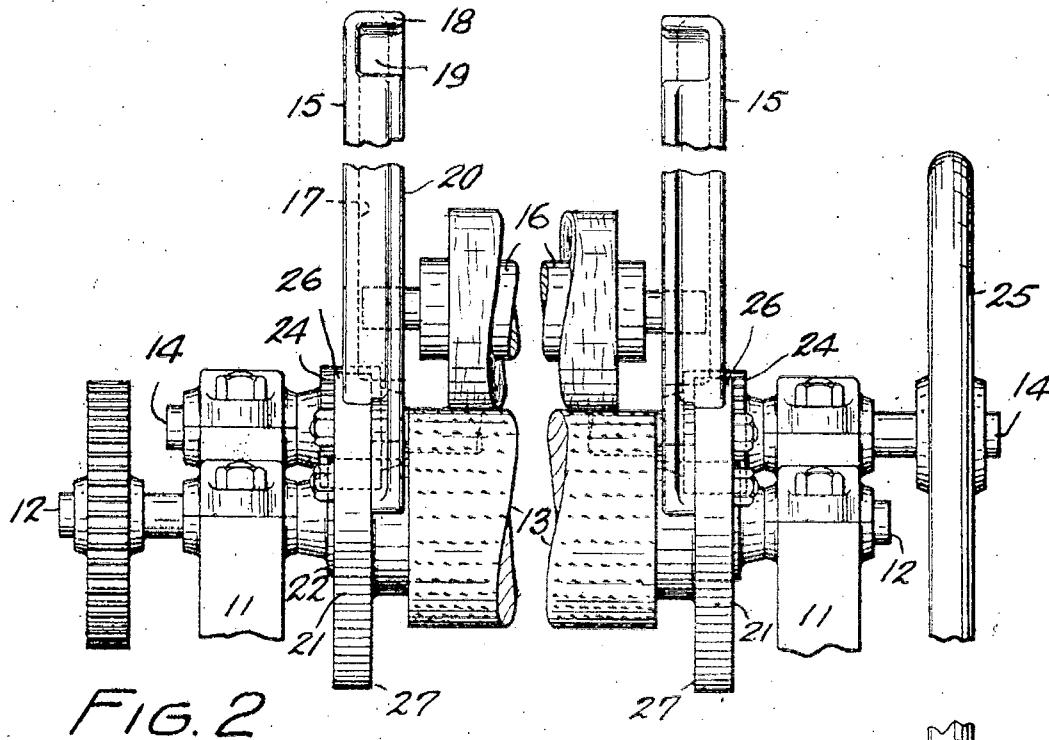


FIG. 2

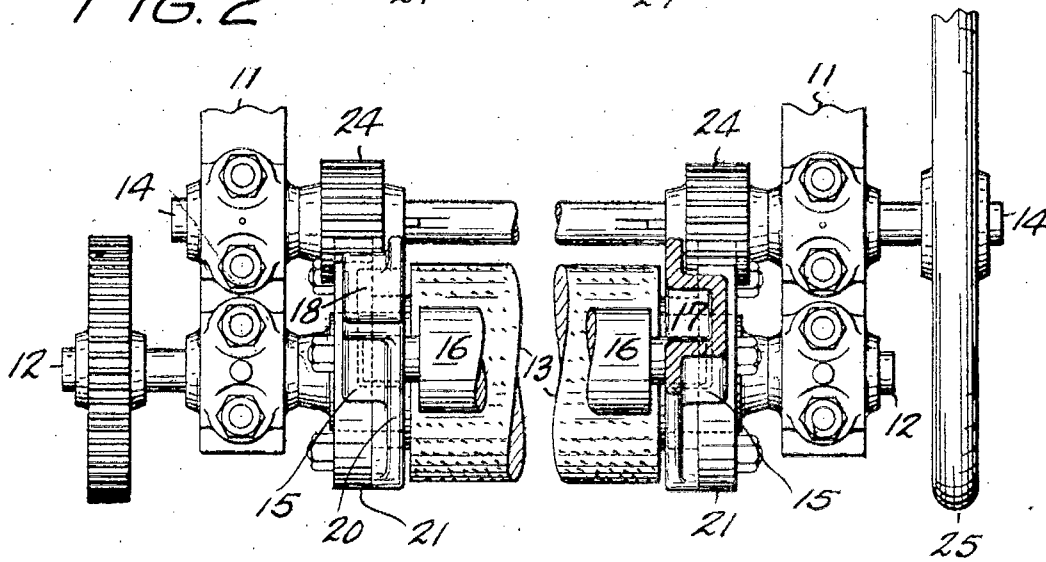


FIG. 3

Inventor
William H. BakerBy *W. H. Baker*

Atty.

Patented July 5, 1927.

1,635,024

D(

UNITED STATES PATENT OFFICE.

WILLIAM H. BAKER, OF MONTREAL, QUEBEC, CANADA.

CLOTH-ROLL MOUNTING FOR LOOMS.

Application filed January 15, 1923. Serial No. 612,809.

This invention relates to improvements in the mounting of cloth rolls in looms and is a continuation of my former application Serial No. 523140. The objects of the invention are to provide for the accommodation of a larger cloth roll than is customary and to provide for the quick and easy removal of such larger and therefore heavier roll.

10 A further object is to provide means for swinging a cloth roll clear of the loom preparatory to removal with a view to facilitating the removal and protecting the loom from damage in the event of the heavy cloth roll falling in course of removal from the loom to trucks or other transporting devices.

Various other objects and advantages may be ascertained from the following description.

20 While the subject matter of the present invention is particularly advantageous when used in connection with vertical or other looms in which the cloth roll is at the top of the loom, it must be understood that the invention is in no way thus limited but is applicable to other types of looms.

Looms in use at the present time have for the most part very limited capacity or accommodation for the cloth roll, with the result that it is usually necessary to cut the cloth and remove the roll several times during the emptying of a single warp beam. This limitation in the size of the cloth roll, which is due to the positioning of the roll in ordinary looms, limits the length of cloth that can be woven and results in the production of comparatively short pieces which for further treatment are fastened together so that the output of a number of looms may be handled as a continuous length in rope form or otherwise. The advantages to be derived from reducing the number of joints and the wastage resulting therefrom will be apparent to those skilled in the textile industry. Another factor which serves to limit the permissible size of cloth rolls is the great weight thereof, but with modern appliances this is no insurmountable difficulty if the roll is conveniently disposed. In looms where the cloth roll is placed near the ground the question of weight may be disregarded but in vertical looms or in others where the cloth roll is mounted above any of the working parts of the loom the matter of lifting the heavy cloth roll clear

of the loom is hazardous in that if the roll is dropped the loom is almost certainly broken.

According to the present invention the foregoing disadvantages are overcome and provision is made for the growth of cloth rolls to large size and for the easy handling thereof during removal from the loom without danger of a falling roll damaging the loom. These results are in part achieved by so positioning the said roll that there is ample space for a larger cloth roll. Preferably the cloth roll is placed above the loom with the result that the loom itself does not impose any limitation on the size to which the cloth roll may grow excepting the ability of the mechanism to support the weight of the roll. Positioning guides are provided for the cloth roll, which guides are movable to quickly and safely lower a cloth roll and at the same time move the roll laterally clear of the loom so that if the roll should fall in transfer from the guides to a truck or other transporting device it will fall clear of the loom. By reason of these provisions an entire warp of the maximum capacity of a loom may be woven into a single piece of cloth of great length. In a vertical loom or in a horizontal loom where the cloth roll is placed above the loom the handling of large and heavy rolls would be difficult if it was necessary to lift the roll down and over the loom and accidents would be frequent, but by reason of the instrumentalities provided according to this invention the lowering and lateral movement of the roll and the transfer to a truck or the like are accomplished mechanically and without hazard to the loom or to workmen.

In the accompanying drawings which illustrate one embodiment of the invention in its application to a vertical loom:—

Fig. 1 is an end elevation of the device with the supporting frame removed and showing the manner of unloading a cloth roll.

Fig. 2 is a front elevation of the device.

Fig. 3 is a plan view of the device.

Fig. 4 is a fragmentary sectional view on the line 4-4, Figure 1.

Fig. 5 is a fragmentary view corresponding to Figure 1 and showing a slight modification.

Referring more particularly to the drawings, 11 designates fragments of a frame-

work of any suitable sort which may be a part of loom end frames or may be brackets attached to the end frames or any other suitable parts of a loom. In the framework or supports 11 there is revolvably mounted, either directly or by means of spindles 12, a sand roll 13 of any usual or suitable construction and adapted to be operated in any usual or suitable way for the well known purpose of such device. Adjacent the roll 13 and preferably axially parallel therewith a shaft 14 is journaled either in the supports 11 or in any other suitable supports but of necessity in such a manner that the shaft and roll be maintained in their predetermined positions and relations.

A pair of guides 15 are provided to receive the ends of a cloth roll core 16, the guides being formed in any suitable manner, as for instance, by the provision of grooves 17 in which the ends of the core 16 fit loosely so that the core may rotate and also move bodily in the guides. Each guide is preferably closed at its free end as at 18 and provided with a laterally directed opening 19 giving access to the grooves. The guides may be suitably webbed as at 20 for strength. These guides are pivotally mounted each at one end, the mounting preferably being such that the guides may swing or be oscillated about the axis of the sand roll, but this relation to the sand roll is not essential. This pivotal mounting of the guides may be effected in a great variety of ways of which only one is herein illustrated. The illustrated method of mounting the guides comprises the provision for each guide of a member 21 encircling the end of the sand roll, rotatable upon the roll and seated preferably on a reduced portion 22 thereof. This member may conveniently be an ordinary tooth gear or gear segment or may have attached to it in any suitable way a circularly curved series of gear teeth designated 23. One end of a guide is rigidly connected to the member 21 by bolts or rivets as illustrated or otherwise if desired. It is obvious that exactly the same result will be produced if the guide member is formed integral with the encircling or pivoted member 21 and the teeth formed directly thereon or on the member attached thereto. Obviously, the same effect will be produced if the guides are mounted on the frame, concentrically of the sand roll axis.

The shaft 14 is operatively connected with the toothed members 21 or their equivalent, preferably by means of pinions 24 mounted on the shaft and meshing with the teeth 23. It will be understood that any suitable number of gears may be interposed between the pinions and members 21 if desirable or necessary to facilitate operation of the device. Any suitable means, such as a hand-wheel 25, may be connected to the shaft 14 to rotate

the same. If desired any usual or suitable mechanism (not shown) may be provided to releasably lock the guides against movement. The angle of movement of the guides is approximately 90° and it is advisable to limit the movement substantially to this angle. One convenient method of thus limiting the angle of movement is to provide stops 26 and 27 on the toothed member or guide in position to engage the shaft 14 or pinions 24, as illustrated. The stops 26 which limit the upward movement of the guides may be so disposed that the guides will swing slightly past the vertical, so that the weight of the cloth roll will serve to hold the stops in engagement with their abutments, as in Figure 1. By such an arrangement the weight of the roll holds the guides against accidental downward swinging. If it is thought undesirable to place entire reliance upon the weight of the roll as a holding means, a releasable locking device, previously alluded to, may be used additionally.

The operation of the device is as follows:—The guides normally extend approximately vertically upward from the sand roll or lean slightly inward from the vertical to the extent permitted by the stops 26 and the cloth roll core is supported on its ends in the guide grooves and rests by gravity on the sand roll. The cloth passes over the sand roll and around the core so that as the sand roll is rotated it rotates the cloth roll. As the cloth roll increases in diameter its core rises in the guides. Cloth may be allowed to accumulate in the roll until the core approaches the upper ends of the guides or to any less size for which there is space available in the loom. Ordinarily the length of the guides beyond the sand roll is greater than the intended radius of the cloth roll so that when the maximum size of cloth roll is formed the roll core will be still some distance below the upper ends of the guides. After the cloth in the roll is severed from the cloth in the loom the shaft 14 is rotated in an appropriate direction and by reason of the gear connection to the guides causes these guides to swing outwardly to a substantially horizontal position, the limit of movement being determined by the stops 27, as illustrated in broken lines, Figure 1. By this movement the cloth roll is lowered from a position above and at rest upon the sand roll to a position of support on the guides at one side of the sand roll. The cloth roll may now be moved out until its core is at the extremities of the guides. The end closures 18 of the guide grooves hold the core of the roll against accidental withdrawal beyond the ends of the guides, the lateral openings 19 being at the lower sides of the guides. This drawing out movement of the roll is for the purpose of disposing the same entirely clear of the loom and the length

PATENT SPECIFICATION



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454219

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D2

PROVISIONAL SPECIFICATION

Improvements in or relating to Fabric Draw-off Mechanism for Knitting Machines

We, WILDT AND COMPANY LIMITED, a British Company, and LESLIE HERBERT LEEDHAM, a British Subject, both of Adelaide Works, Leicester, do hereby declare the nature of this invention to be as follows:—

This invention consists in improvements in or relating to fabric draw-off mechanism for knitting machines, which mechanism may also include a rolling up device for the knitted fabric after it has been drawn off.

Hitherto such mechanisms have been provided a pair of draw-off rollers which in one known construction that is very largely employed are carried in a frame that is pivoted about a fulcrum. As the frame descends, the weight thereof becomes imparted to a slipping clutch through which the rollers are driven and the clutch is then caused to rotate the rollers, which latter then begin to climb the fabric until the weight is removed from the clutch to release the drive. It is found in practice that such mechanisms cause substantial variations in the fabric draw-off tension.

Moreover, in such a mechanism the fabric may be rolled up on to a rod that is racked round under the influence of a spring pawl only when sufficient fabric is available. The effort of the spring is constantly applied near the centre of the roll and as the diameter of the latter increases by the winding on of the fabric the actual pull on the latter at the periphery of the roll is greatly diminished. This variation which is felt by the upper pivoted roller frame and its clutch gives rise to constant difficulties during the growth of a roll of fabric.

An object of the invention is to obviate these drawbacks and also to reduce the somewhat considerable amount of gearing which is necessary in the previous construction above described.

According to the present invention, fabric draw-off mechanism comprises in combination a pair of rollers, a crank or equivalent device which is operatively connected to the spindle of one of them through the medium of a one-way or

slipping clutch, means to load the crank so as to tend to turn it always in one direction and automatically operating means for periodically resetting the crank or equivalent device after it has turned under its load to a predetermined angular extent.

In a preferred form of the invention the loading means comprises a falling weight or a spring; and the crank device conveniently comprises one member of the one-way or slipping clutch.

The invention may include means for adjusting the radius of the crank which means comprises a radially or substantially radially adjustable abutment mounted in the aforesaid member of the one-way clutch, the outer end of the adjustable member being connected with the loading means.

The resetting means may conveniently comprise a cam between which and a part that turns with the crank device there is relative and periodic cyclic movement; for instance, relative movement about the axis of a circular knitting machine.

In order that the invention may be more clearly understood a preferred example will now be described in connection with a circular knitting machine having a revolving cylinder.

Situated at some distance beneath the cylinder is a rotating ring similar to that customarily employed for supporting fabric draw-off mechanism hitherto. Near opposite ends of a diameter of the ring are attached two depending brackets affording bearings respectively for opposite ends of the draw-off rollers. The latter may be covered with resilient rubber or any other preferred material enabling them to grip the fabric without damaging it.

To the spindle of one of the rollers on the outside of one of the supporting frames there is secured the inner member of a circular roller clutch which constitutes a one-way or slipping clutch. As such a clutch is well known, further description will be unnecessary. Mounted in the outer member of the clutch is an adjustable abutment in the form of a rod

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Price

mounted to slide endwise in a direction parallel with the diameter of the clutch and an adjusting nut and lock nut, preferably having milled edges for easy manual adjustment, engage a screw-threaded extremity of the rod. The other extremity of the rod is connected by means of a link with a weight that is contained within a housing secured to the bracket.

It will be seen, therefore, that the leverage through which the weight acts upon the outer member of the clutch to turn the latter can be regulated by adjusting the position of the sliding rod in a direction which is radial or substantially radial with respect to the clutch. The result of such adjustment is to apply to the fabric, any desirable degree of drawing-off tension. In the example just described the adjustment is parallel with the diameter of the clutch but at a position spaced a small distance away from that diameter and normally at the commencement of operations the sliding rod will be substantially horizontal. The outer member of the clutch has a projecting arm carrying a roller which constitutes a cam follower to engage a fixed cam or cams mounted in the main frame of the machine whereby when the crank has turned the outer clutch member through a predetermined angular distance the cam will engage the cam follower to lift the weight and thereby to reset the crank device. This resetting movement is effected without rotating the roller because the clutch acts only in a direction to drive the roller under the influence of the falling weight.

The opposite end of the spindle of the same roller is also mounted in the inner member of a one-way or slipping clutch, the outer member of which is fixed in the opposite bracket. This latter clutch acts oppositely to the former, and is in operation during the very small period of time during which the outer member of the driving clutch is being reset by the cam. The fabric being under tension would, during this time, otherwise tend to rotate the winding rollers backward, but as soon as this tendency is felt, the clutch under consideration (viz. that at the opposite end to the driving clutch) engages to check any such movement. The fabric tension is thus sustained.

The companion roller to that which is connected with the clutch has its spindle ends mounted in slipper blocks housed in the brackets and through these blocks is spring urged towards the other roller, means being provided for adjustment of the spring pressure. The adjustment means may conveniently comprise screw-

threaded members which engage the outer ends of the springs and which are received in correspondingly threaded portions of the spring housings.

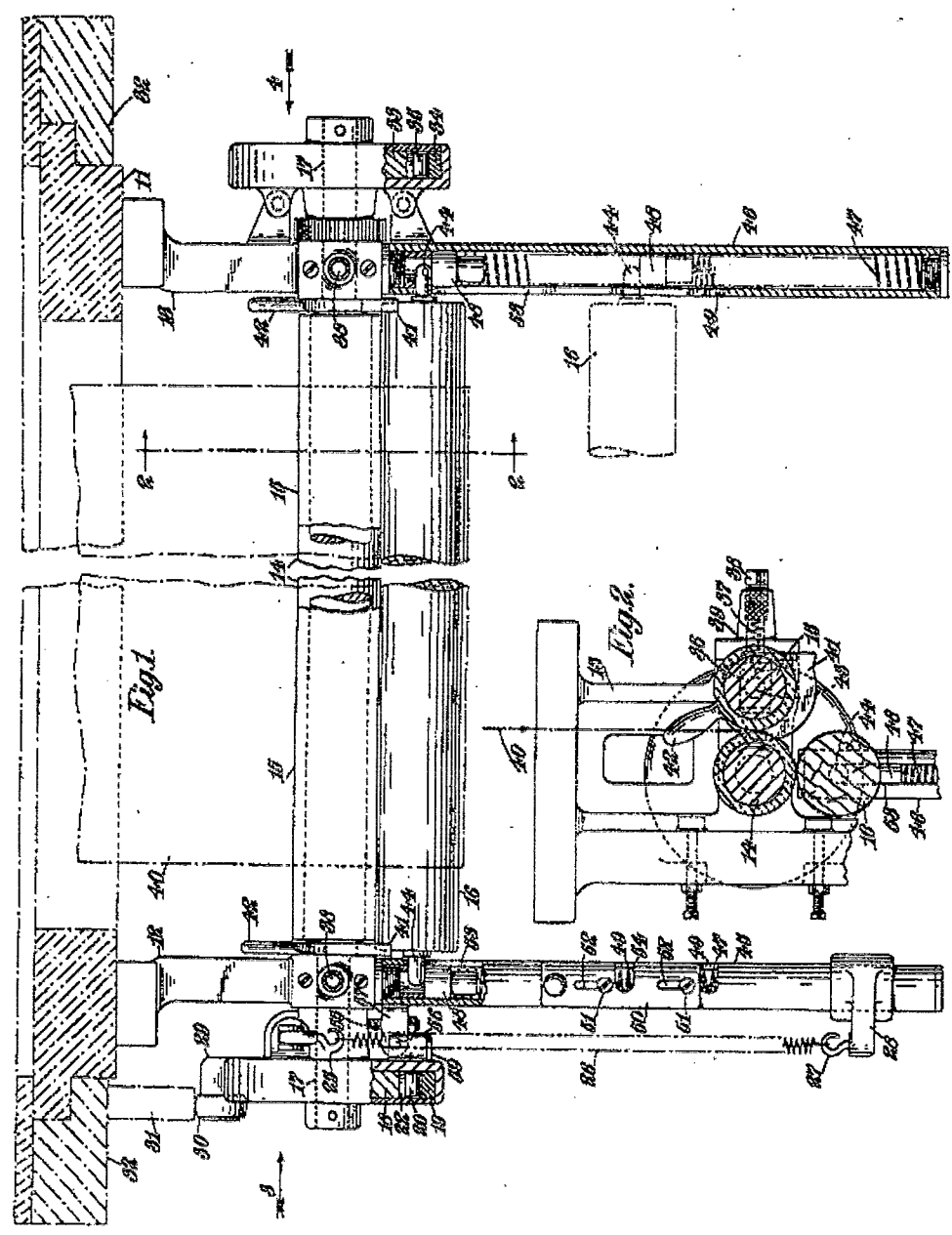
A third roller serving as a winding up or receiving roller has the ends of its spindle supported in vertical tubular members mounted on the brackets. These tubular members extend in a direction substantially at right angles to the axis of the roller and contain coiled compression springs which exert pressure on the spindle ends of the winding up roller through the medium of pressure blocks. Means may be provided for adjustment of the pressure of these two springs and at intervals in the lengths of the tubes withdrawal gates may be provided through which the spindle ends of the winding up roller can be removed. These withdrawal gates are conveniently closed by means of tubular covers sliding on the outer surface of the spring housings, with or without means to lock the covers in their closed positions. One gate may be provided in each spring housing at a position to enable a roller to be inserted prior to the commencement of winding up and another gate is conveniently situated at a position to permit a ready removal of the roller after it has received the full amount of fabric that it is desired shall be wound up on the roller prior to removal.

It is to be understood that the invention is not limited to the details of construction described and those given above in the specific example are to be understood only as showing one preferred form in which the invention may be constructed.

The falling weight may for example be replaced by a spring operating on the link that is connected with the adjustable crank so as to tend to turn the crank always in one direction. The slipping clutches need not necessarily be of the roller clutch type of conventional design. They may be replaced, if desired, by ratchet clutches or any other preferred form of one-way or slipping clutch.

Adjustable stops may be provided to limit the angular resetting movement of the crank device so that the momentum of the parts produced by engagement between the cam and cam follower during resetting shall not result in an over-resetting movement.

It will be understood that in the tubular spring housings for the springs that press on the axle ends of the winding up roller slots will be provided to allow the roller to move bodily to the extent required for winding fabric upon it. The winding up roller is rotated



[This drawing is a reproduction of the original on a reduced scale]

Oct. 28, 1947.

A. DICKNO

2,429,674

RELEASABLE ROLL TAKE-UP DEVICE FOR KNITTING MACHINES

Filed Dec. 27, 1946

D3

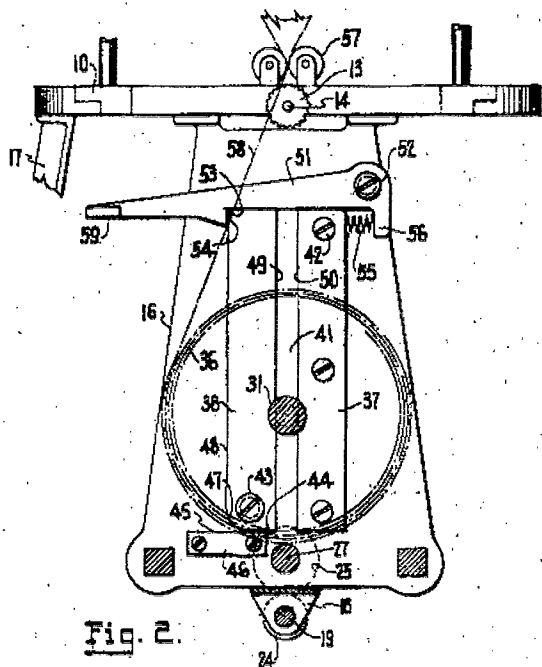


Fig. 2.

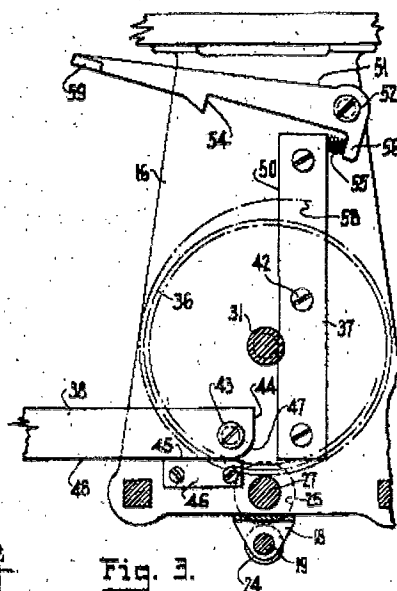


Fig. 3.

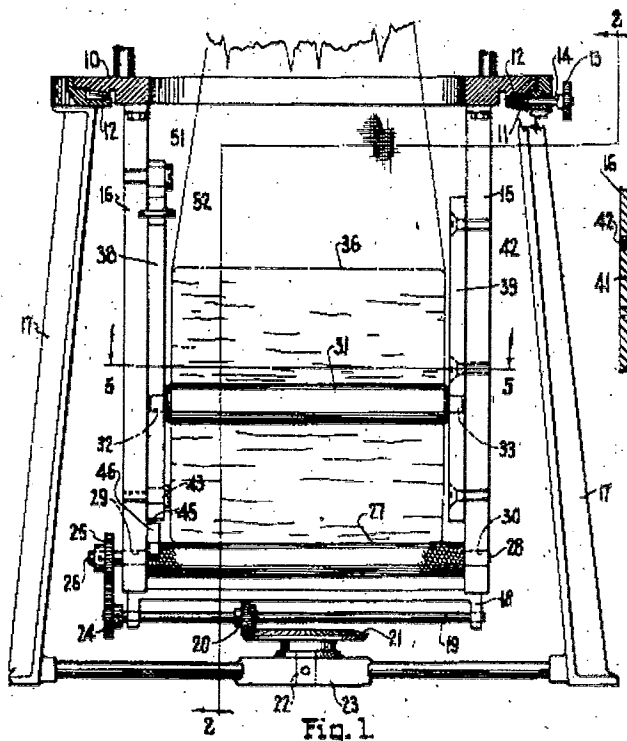


Fig. 1.

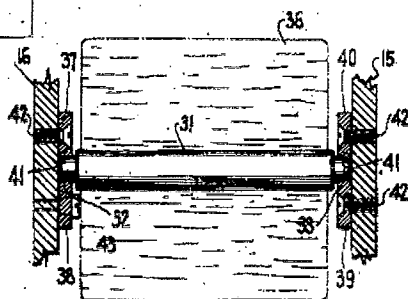


Fig. 5.

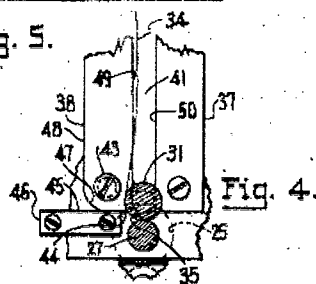


Fig. 4.

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2,429,674

RELEASABLE ROLL TAKE-UP DEVICE FOR KNITTING MACHINES

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14 Claims. (Cl. 66-151)

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This invention relates to take-up mechanisms for circular knitting machines, and more particularly to releasable holding means associated with a roll take-up carrier.

In the operation of conventional circular knitting machines, a tube of knitted fabric is directed downwardly from the knitting mechanism to two coaxing take-up rollers, the downwardly moving tube of material being received between said rollers and directed downwardly therebeyond in flattened form so as to be conveniently receivable upon a rotating spindle. As said spindle rotates, the flattened tube winds itself thereabout until the diameter of the wound fabric reaches a predetermined magnitude, whereupon the spindle with the material wound thereon is removed from the machine.

Many circular knitting machines are of a structure wherein the entire knitting cylinder revolves; and since the take-up mechanism must receive the fabric from the cylinder, the spindle and wound fabric must rotate together with the cylinder. Such arrangements have been found to be inherently dangerous due to the centrifugal force of the heavy rotating mass of wound or taken-up material. Where the speeds and masses are sufficiently great, there is the ever present danger that breaking stresses would be induced in the supporting structure, or that the rotating take-up roll would be inadvertently dislodged from its position. It has accordingly been found necessary to provide such devices with firm and rigid supports; and to obviate the dangers from this source, the rigidity of the mechanism frequently made it difficult to remove the roll from the machine.

It is primarily within the contemplation of this invention to provide a take-up mechanism wherein the above-mentioned disadvantages will not be present. And more specifically, it is an object of my invention to provide a firm and safe roll carrier structure provided with readily manipulable releasing means for enabling a full spindle to be removed from the machine. And in this aspect of my invention it is a further object to enable the said objectives to be attained in both revolving and stationary cylinder knitting machines.

It is also within the contemplation of my invention to provide a simple and inexpensive device capable of performing the aforesaid objects, and of providing a positive lock for rotating rolls of fabric during the operative rotation of the knitting machine.

Other objects, features and advantages will ap-

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pear from the drawings and the description hereinafter given.

Referring to the drawings,

Figure 1 is a front elevation, partially in section, showing the take-up mechanism of my invention with a roll of material operatively supported by the roll carrier, this view showing the lower portion of a circular knitting machine of the revolving cylinder type;

Figure 2 is a section of Figure 1 taken along line 2-2, showing the locking mechanism in its operative or holding position;

Figure 3 is a fragmentary view, substantially like Figure 2, but showing the locking means in its released position, and the roll of material ready for removal;

Figure 4 is a fragmentary section, like that of the lower portion of Figure 2, but showing the roll carrying spindle in its lowermost position; and

Figure 5 is a sectional plan of Figure 1 taken substantially along line 5-5.

As aforesaid, the drawings illustrate the lower portion of a conventional circular knitting machine with a rotating cylinder, although the invention is equally adaptable for use with a knitting machine where the cylinder is stationary. The rotating cylinder is not illustrated in the drawing inasmuch as its construction is well known to those skilled in the art, the cylinder ring 10 serving to support the cylinder in well known manner. The rotation of cylinder ring 10, together with the cylinder, may be effected in well known manner, one method being by the use of the spindle 11 engaging gear teeth 12 at the underside of the ring, the spindle being connected to gear 13 by shaft 14, the gear 13 being driven by means not shown. Depending from ring 10 are the two carrier frame members 15 and 16, these being disposed within the space defined by the supporting legs 17 of the knitting machine. Supported by the lower part of said members 15 and 16 is the channel member 18 rotatively supporting the shaft 19 which has fixably attached thereto the pinion 20. This pinion is in operative engagement with the bevel gear 21 mounted on shaft 22 fixedly attached to crosspiece 23. At least one outer terminal of shaft 19 has fixedly mounted thereon a gear 24 which is in engagement with gear 25 fixedly mounted on shaft extension 26 integral with knurled actuator rod 27. Shafts 28 and 29 extending from opposite sides of rod 27, are rotatably mounted within apertures 29 and 30, respectively, of frames 15 and 16, respectively.

From the above it is apparent that upon an operative rotation of cylinder ring 10, the entire

roll carrier assembly (supported from members 15 and 16) will rotate. And with this rotation, the pinion 20 will travel around the toothed periphery of gear 21, whereby pinion 20 and shaft 19 will be caused to rotate, thereby rotatably actuating the rod 27 through gears 24 and 25.

The roll carrier is the spindle 31 containing two oppositely disposed shaft extensions 32 and 33 which are slidably movable along substantially vertical tracks, to be hereinafter described. The arrangement is such that spindle 31 can move upwardly from its lowermost position shown in Figure 4 to a predetermined uppermost position where it is ready to be removed, in a manner to be hereinafter explained. In its said lowermost position fabric 34 (Figure 4) extending downwardly from the machine is wound around the spindle so that the knurled surface of rod 28 engages the fabric at the line of contact 35. As the actuator rod 27 rotates, in the manner aforesaid, it will rotatably actuate the spindle 31 due to the frictional engagement of its knurled surface with the fabric 34 wound thereover. As this operation continues, it is apparent that knitted material 34 will continue to be progressively wound about the spindle to form a roll of gradually increasing diameter. During the entire operation, the rod 27 is in engagement with the outer periphery of this roll; and as the diameter increases, it is apparent that the spindle 31 will rise upwardly guided by the two extensions 32 and 33 thereof slidably moving within their tracks. As will be observed in Figure 1, the roll 36 has reached such a diameter that the spindle 31 has moved upwardly a considerable distance from its original position shown in Figure 4.

The aforementioned two tracks are formed, in the preferred manner illustrated, by two pairs of spaced plates, one pair being attached to frame 15 and the other to frame 16. One set of guide plates, consisting of parallel members 37 and 38 are attached to the frame member 16, and the other set, consisting of members 39 and 40 are attached to frame member 15. The plates of each pair are separated to provide a space 41 adapted to slidably accommodate the spindle shaft terminals 32 and 33. The plates 39 and 40 are fixedly attached, preferably by countersunk screws 42, to frame member 15. Likewise, plate 39 is attached fixedly to frame member 16. But plate 38 is pivotally mounted at 43 to the lower portion of frame member 16, so that it may be moved from a vertical operative position to a horizontal retracted position (Figure 3). The lower terminal 44 of movable plate 38 is flat, and in its upright position is resting upon the upper flat surface 45 of stop member 46, also fixedly attached to frame member 16. The lower outer corner of plate 38 is rounded at portion 47 thereof, so as to conveniently permit a rotatable movement of plate 38 until flat surface 48 rests upon said flat surface 45, to hold the plate 38 in its retracted position. It should at this point be observed that retractable plate 38 is held in proper predetermined vertical position by virtue of the engagement of flat lower terminal 44 with surface 45 of block 46, thereby enabling surfaces 49 and 50 of plates 38 and 37, respectively, to be parallel, and in this manner permitting a proper sliding movement of the shaft extensions 32 and 33 within their respective slots.

To hold retractable plate 38 in its operative vertical position, the bell crank lever 51 is employed. This lever is rotatably mounted on the upper part of frame 16 at the pivotal point 52, 75

this point being preferably above upper outer corner 53 of plate 38. The lever has a downwardly extending lip 54 which engages the upper outer corner portion of retractable plate 38, and holds it against outward movement. The lever 51 is held in this holding position by the action of spring 55 operatively positioned between the upper outer surface of plate 37 and the short arm 56.

When it is desired to remove a completed roll of knitted fabric from the machine, it is first necessary to cut the fabric at some point below the tube-flattening take-up rollers 57. For example, the line of severance can be at point 58. Thereafter the outer terminal portion 59 of the lever is manually manipulated upwardly, thereby causing the entire lever to rotate in clockwise direction against the action of spring 55. During this upward movement of the lever, the lip 54 becomes disengaged from the upper portion of member 38, thereby releasing said member 38 for retraction to the position shown in Figure 3. At this point, the roll 36 can readily be removed from the machine, and a new spindle replaced in its lowermost position, as shown at Figure 4. Upon a return of the retractable plate 38 into its vertical position, the lever 51 is lowered to again engage said plate and hold it locked thereat. The position of pivotal point 52 above corner 53 enables a ready engaging and disengaging movement of lip 54 with the plate 38.

It is thus apparent that by the mechanism above described, a flattened tube of fabric rotatably received on a take-up roll can be firmly locked in position, while permitting the roll to gradually increase in size until a predetermined diameter is reached. And it is further evident that by means of a simple releasing operation, the holding mechanism can be retracted so as to enable the roll to be readily removed and a new spindle replaced.

In the above description, the invention has been disclosed merely by way of example and in preferred manner; but obviously many variations and modifications may be made therein which will still be comprised within its spirit. It is to be understood, therefore, that the invention is not limited to any specific form or manner of practicing same, except in so far as such limitations are specified in the appended claims.

I claim:

1. In a knitting machine take-up mechanism having a rotatable spindle for receiving from the knitting mechanism a continuous length of fabric to be wound thereupon in the form of a roll, a carrier device for releasably holding the spindle comprising two oppositely disposed track sections adapted for slidable engagement with opposite ends of the spindle, each of said sections containing two adjacent plates spaced to slidably accommodate therebetween a terminal portion of the spindle, at least one of said plates being retractable to an inoperative position out of engagement with the spindle, whereby the spindle may be removed from the carrier device.

2. In a knitting machine take-up mechanism having a rotatable spindle for receiving from the knitting mechanism a continuous length of fabric to be wound thereupon in the form of a roll, a carrier device for releasably holding the spindle comprising two oppositely disposed track sections adapted for slidable engagement with opposite ends of the spindle, each of said sections containing two adjacent plates spaced to slidably accommodate therebetween a terminal por-

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tion of the spindle, at least one of said plates being retractable to an inoperative position out of engagement with the spindle, whereby the spindle may be removed from the carrier device, and a movable locking member in releasable engagement with the said retractable plate.

3. In a knitting machine take-up mechanism, a rotatable spindle for receiving from the knitting mechanism a continuous length of fabric to be wound thereupon in the form of a roll, a carrier device for releasably holding the spindle comprising two oppositely disposed track sections adapted for slidable engagement with opposite ends of the spindle, each of said sections containing two adjacent plates spaced to slidably accommodate therebetween a terminal portion of the spindle, at least one of said plates being retractable to an inoperative position out of engagement with the spindle, whereby the spindle may be removed from the carrier device, an actuator rod with a roughened surface adapted for rotatable driving engagement with the roll on said spindle, said rod being disposed in the region of the lower terminals of said plates, and means to rotate said actuator rod.

4. In a knitting machine take-up mechanism, the combination according to claim 3, the said means for rotating the actuator rod being operatively connected to the driving means of the knitting machine.

5. In a knitting machine take-up mechanism containing a cylinder ring, a roll carrier assembly comprising two frame members depending from diametrically opposite portions of said ring, a track section attached to each of said frames, each of said sections containing two adjacent plates spaced apart to form tracks, a rotatable roll-carrier spindle disposed between said sections, the opposite ends of the spindle being slidably engageable with and movable along said tracks, at least one of said plates being retractable to an inoperative position out of engagement with the spindle, whereby the spindle may be removed from the carrier device, and a movable locking member in releasable engagement with the said retractable plate.

6. In a knitting machine take-up mechanism, the combination according to claim 5, further provided with an actuator rod having a knurled surface adapted for rotatable driving engagement with said roll-carrier spindle, said rod being rotatably carried by said frame members, and means to rotate said rod.

7. In a knitting machine take-up mechanism, the combination according to claim 5, further provided with an actuator rod having a knurled surface adapted for rotatable driving engagement with said roll-carrier spindle, said rod being rotatably carried by said frame members, the cylinder ring being rotatable whereby the entire roll carrier assembly rotates therewith, a shaft rotatably carried by said frame members, a pinion affixed to the shaft, a stationary bevel gear in engagement with said pinion, and transmission means operatively connecting said shaft with said rod, whereby upon an operative rotation of the cylinder ring the actuator rod will rotate.

8. In a knitting machine take-up mechanism, a rotatable spindle for receiving from the knitting mechanism a continuous length of fabric to be wound thereupon in the form of a roll, a carrier device for releasably holding the spindle comprising two oppositely disposed track sections adapted for slidable engagement with opposite

ends of the spindle, each of said sections containing two adjacent plates spaced to slidably accommodate therebetween a terminal portion of the spindle, at least one of said plates being pivotally movable from an upright operative position to a horizontal inoperative position out of engagement with the spindle, whereby the spindle may be removed from the carrier device, and a stop block in engagement with the said movable plate in both its said operative and inoperative positions.

9. In a knitting machine take-up mechanism, the combination according to claim 8, the outer and bottom surfaces of the plate being flat and at right angles to each other, said stop block having a flat surface engageable with said outer and bottom surfaces of the plate, for maintaining the plate in its extreme positions.

10. In a knitting machine take-up mechanism containing a cylinder ring, a roll carrier assembly comprising two frame members depending from diametrically opposite portions of said ring, a track section attached to each of said frames, each of said sections containing two adjacent plates spaced apart to form tracks, a rotatable roll-carrier spindle disposed between said sections, the opposite ends of the spindle being slidably engageable with and movable along said tracks, at least one of said plates being pivotally movable from an upright operative position out of engagement with the spindle, whereby the spindle may be removed from the carrier device, and a stop block in engagement with the said movable plate in both its said operative and inoperative positions, said block being affixed to the frame member supporting the movable plate.

11. In a take-up device of the class described, a roller spindle for rotatably receiving thereupon a continuous sheet of material to be wound thereupon, two oppositely disposed pairs of spaced plates each providing substantially vertical tracks, the terminal portions of said spindle being slidably movable within said tracks, at least one of said plates being pivotally mounted and being rotatably retractable from an operative vertical position to a retracted inoperative position, releasable holding means for said retractable plate comprising a pivotally mounted lever having a lip engageable with said retractable plate to hold it against retraction, and spring means normally urging said lever in its said holding position.

12. In a take-up device of the class described, a roller spindle for rotatably receiving thereupon a continuous sheet of material to be wound thereupon, two oppositely disposed pairs of spaced plates each providing substantially vertical parallel tracks, the terminal portions of said spindle being slidably movable within said tracks, at least one of said plates being pivotally mounted and being rotatably retractable from an operative vertical position to a retracted inoperative position, releasable holding means for said retractable plate comprising a pivotally mounted lever having a lip engageable with said retractable plate to hold it against retraction, spring means normally urging said lever in its holding position, and a manually manipulable portion on said lever for actuating it, against the action of said spring, out of engagement with the retractable plate, whereby said latter plate may be operatively retracted so as to enable the said spindle to be removed.

13. In a take-up device of the class described, the combination according to claim 12, the said lever being pivoted at a predetermined point above

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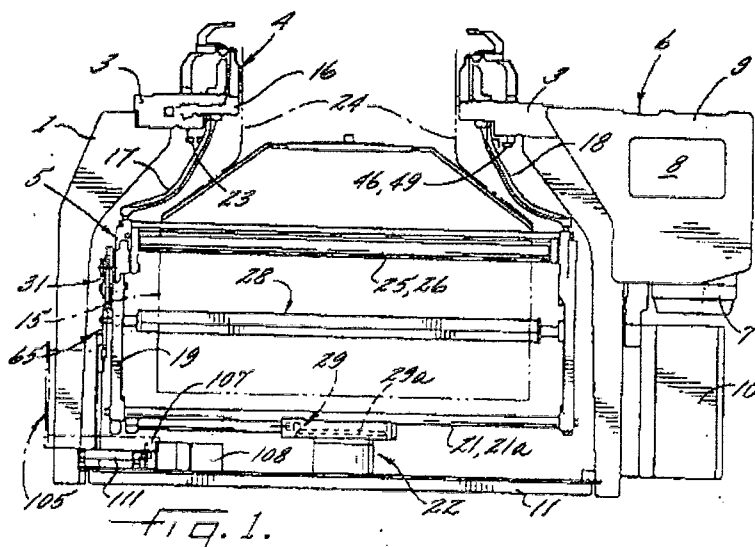
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54 Rolling and discharging device of knitted fabric on circular knitting machine and its controlling method.

57 Knitted fabric produced by a circular knitting machine passes downwardly to a fabric winding unit that rotates synchronously with the knitting unit and that includes fabric delivery rolls and a fabric winding shaft that are driven by rotation of the unit. The winding unit also includes a fabric guide that guides the fabric onto the shaft, a fabric cutter that cuts the fabric after a preselected quantity of it has been

wound upon the roll, a fabric receiving table, and a thruster that removes the wound fabric from the center shaft and discharges the fabric onto the fabric receiving table and thereafter from the machine. A central processing unit and associated sensor and switch elements monitor and/or control operation of the knitting machine and winding unit.



disposed beyond the bottom of said L-shaped supporting part so as to prevent displacement of the shaft during its return movement to the supporting frames.

The fabric thrusting device preferably both withdraws the rolled fabric from the fabric winding shaft and discharges it from the knitting machine. Preferably, a space is provided under a C-shaped opening in one of the shaft supporting frames so as to allow access of the thrusting device to the fabric.

A stationary electricity supply device at the center of rotation of the winding unit provides electricity to motor, switches and the like that rotate with the unit.

The center shaft of the winding unit is capable of deviating from the horizontal, and preferably is provided with a detecting switch for detecting whether the shaft is mounted on the supporting frames. Detecting switches are preferably also provided for detecting whether the shaft locking/unlocking device is locked.

The control means of the invention includes a detecting switch for stopping the winding unit at a preselected position after driving the knitting machine at low speed in response to control signals, and another detecting switch confirming that the winding unit has stopped in such position. A detecting switch for detecting winding of the fabric is preferably fixed to the rolled fabric receiving table.

A method of controlling the automatic fabric winding and discharging unit of the invention preferably includes the following steps:

- (a) guiding the fabric after knitting of it to the center shaft of the winding unit by fabric guiding means;
- (b) attaching the fabric to the winding shaft by use of the retractable and extendible comb means carried by the shaft;
- (c) rolling the fabric on the shaft;
- (d) detecting whether a selected quantity of the knitted fabric has been rolled upon the shaft;
- (e) stopping the shaft at a selected discharge position;
- (f) cutting the knitted fabric with cutting means;
- (g) opening and closing a gate before and after the roll of fabric is discharged, respectively;
- (h) unlatching and latching the shaft before and after the rolled fabric is discharged, respectively;
- (i) moving the fabric winding shaft and rolled fabric from the winding unit by moving the free end of the shaft downwardly relative to the shaft's opposite end when discharging the rolled fabric; and returning the shaft to its initial position after the rolled fabric is discharged;
- (j) letting the rolled fabric fall from the winding shaft to the fabric receiving table;
- (k) moving the rolled fabric from the fabric receiving table by fabric thrusting means; and

(l) discharging the rolled fabric from the knitting machine.

When the RPM of the knitting machine reaches a value one less than a first preset value, the machine is driven at medium speed. The machine is driven at a low speed when the RPM reaches a second preset value, prior to being stopped at a preselected position.

The fabric thrusting device preferably pushes against the rolled fabric, withdraws, and then again pushes so as to insure discharge of the fabric from the machine without fail.

Sensors preferably monitor the steps in the conveyance of the knitted fabric, and detect any malfunctions. Operation of the fabric cutting device is preferably confirmed by monitoring the amperes in the cutter motor and cutter shifting motor.

After the knitted fabric winding and discharging device displace the rolled fabric and winding unit center shaft from the supporting frame the fabric falls onto the receiving table. A movable arm slows its fall so as to reduce the possibility of rebound or "bounce" of the roll of fabric.

The rolled fabric preferably is received in a recess of the receiving table and is then discharged from the knitting machine via said recess by the fabric thrusting device.

Description of the Drawings

Other features of the invention will be apparent from the following description of a preferred embodiment thereof, which should be read in conjunction with the accompanying drawings, in which:

FIG. 1 is a front elevational view of a circular knitting machine having a fabric winding unit in accordance with the invention;

FIG. 2 is a top plan view of the machine and unit of Fig. 1;

FIG. 3 is a foreshortened elevational view of the winding unit, some components being shown in vertical section;

FIG. 4 is a foreshortened plan view of the winding unit of Fig. 3;

FIG. 5 is a left side elevational view of the winding unit;

FIG. 6 is a right side elevational view of the winding unit;

FIG. 7 is an enlarged fragmentary view of a position signalling switch and of a position confirming switch of the knitting machine;

FIG. 8 is a plan view of the switches of Fig. 7;

FIG. 9 is a side elevational view of a frame member, a fabric guide member and a fabric cutter of the winding unit;

FIG. 10 is an opposite side elevational view of the components of Fig. 9, and of the opposite support plate of the winding unit;

frames 19, 20 of winding unit 5. Device 85 includes a circular cutter element 89, a drive motor 88, a guard element 90 and a cutter support member 91 that is attached to and movable along a rail 93 of device 85. A transmission mechanism for moving the foregoing components along the rail includes rotatable pulleys 96, 97 adjacent opposite ends of the rail, a wire 95 entrained about pulleys 96, 97 and connected to movable member 91, and a reversible motor 94 for imparting rotation to pulley 96 and for thereby effecting translatory movement of cutter element 89 and its drive motor 88 parallel to rail 93. A sensor plate 98 secured to member 91 cooperates with a microswitch 99 adjacent one end of rail 93 to detect the initial position of member 91. Another microswitch 100 adjacent the opposite end of rail 93 detects the terminal position of movable member 91. Confirmation of the operation of the fabric cutting device is realized by monitoring the amperage in motors 88, 94.

Referring now particularly to Figs. 9 and 10, a fabric guiding device 50 guides the end of fabric 24 onto shaft 28 of winding unit 5. Device 50 is pivotally connected adjacent its upper end to arms 51, 52 that are secured to side frames 19, 20 of unit 5 by screws or other suitable fasteners 54. Springs 55 connected to upper end sections of fabric guide 50 bias the lower end portion of the guide toward shaft 28. The cut end of the fabric is guided by guide 50 to shaft 28 and is rolled upon the shaft. Switches upon respective ones of the arms 51, 52 detect the minimum dischargeable diameter of the fabric wound upon shaft 28.

Figs. 17-18 show a mechanism 65 for at times retaining the free end of shaft 28 of winding unit 5 in the C-shaped opening 19a (Fig. 5) of frame 19, and for at other times permitting passage of the shaft end from such opening. The mechanism includes a movable arm 66 and drive means for imparting movement to such arm. The drive means includes a motor 74 having a gear 75 fixed to its output shaft. Gear 75 meshes with gear teeth 69a upon a linkage member 69 that is supported for vertical movement by a guide block 73. Linkage member 69 is connected by a pin 71 to a linkage member 68 that is pivotal about a pivot member 67. The opposite (right, as viewed in Fig. 17) end of lever 68 is connected by a pin 70 to the lower end of latch arm 66, which is mounted for vertical movement by a guide block 72. When the upper section of arm 66 is in its upper position of Fig. 17, the arm retains the adjacent end portion of shaft 68 in opening 19a. Movement of arm 17 downwardly, in response to rotation in the appropriate direction of the gear 75 of motor 74, permits passage of the end of shaft 68 from the C-shaped opening. A proximity switch 77 adjacent linkage member 69 indicates when linkage member 69 occupies its

initial position. Another proximity switch 76 indicates when linkage member 69 occupies its terminal position, and a switch 78 confirms the latter position of the linkage member. A detecting lever 79 pivotable about a pivot 80 detects when shaft 28 is held in place and when it is released by arm 66. Rotation of lever 79 about a pivot 80 is limited by a stop pin 81. The forward (rightward, as viewed in Fig. 17) end of lever 79 is biased downwardly by a spring 82 when shaft 28 is not supported by frame members 19, 20. When the shaft is supported by the frame members, lever 79 is displaced upwardly in opposition to the force of spring 82, and the aforesaid upward displacement is detected by a proximity switch 83.

Figs. 21-23 show a mechanism 105 for at desired times moving the free end of winding unit shaft 28 from the opening 19a of frame member 19 and toward fabric receiving table 40. The mechanism includes a movable arm 106 and drive means for imparting pivotal movement to such arm. The drive means includes a motor 108 having an output gear 109 that turns a shaft 111 that is supported by bearings 112, 113. The lower end of arm 106 is attached to and pivotal about the central axis of shaft 111. A hook-shaped member 114 adjacent the upper end of arm 106 is secured to a triangular member 117 of arm 106. Member 114 has a section 114a of inverted L shape for moving the free end of shaft 28 from opening 19a of frame member 19, and has a cutaway section 114b connected to section 114a. A latch 115 in section 114b is pivotable about a pin 118. A spring 116 has one end secured to latch 115, and has its opposite end secured to member 117. The spring biases the latch to a closed position.

Proximity switches 121, 122 and 123 upon a holder 120 between bearings 112, 113 detect the respective initial, medial and terminal positions of arm 106.

When unit 5 stops at a fixed stop position, arm 106 pivots into engagement with the free end of center shaft 28 and then moves the free end of shaft 28 from the C-shaped opening 19a (Fig. 5) of frame 19 of unit 5. When the free end portion of center shaft 28 is subsequently again placed in C-shaped opening 19a, member 115 is raised so as to prevent inadvertent passage of roll 28 from opening 19a.

Referring now particularly to Figs. 21 and 24-26, a fabric pushing device 130 within the lower part of winding unit 5 includes a pusher unit 131 that engages and pushes an end of each roll of fabric 24 so as to discharge it from knitting machine O; an internally threaded part 132 that is fixed to pusher 131; an externally threaded shaft 133 that mates with and extends through part 132, and a motor 134 that drives shaft 133. Two guide

which the fabric is wound, a plurality of fabric delivery rolls for conducting a free end of said fabric to said shaft, and transmission means for driving said delivery rolls and said shaft in response to rotation of said unit about said axis;

a pair of spaced frame members carried by and rotatable with said unit, one end of said shaft acting as a universal joint and being connected to one of said frame members, and an opposite end of said shaft being releasably connected to the other of said frame members;

said shaft being radially expandable and contractible and having fabric engaging comb means that at times extend from, and that at other times are retracted within, said shaft;

means for stopping rotation of said unit at a fabric discharge position;

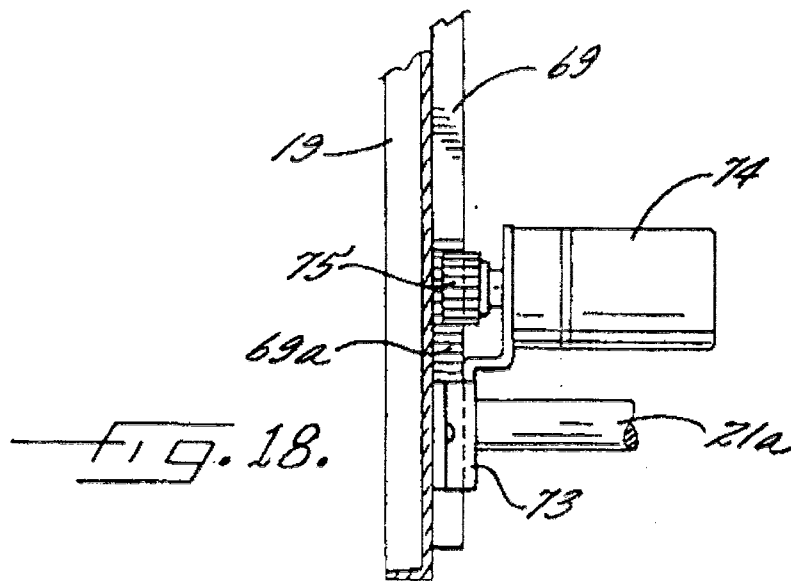
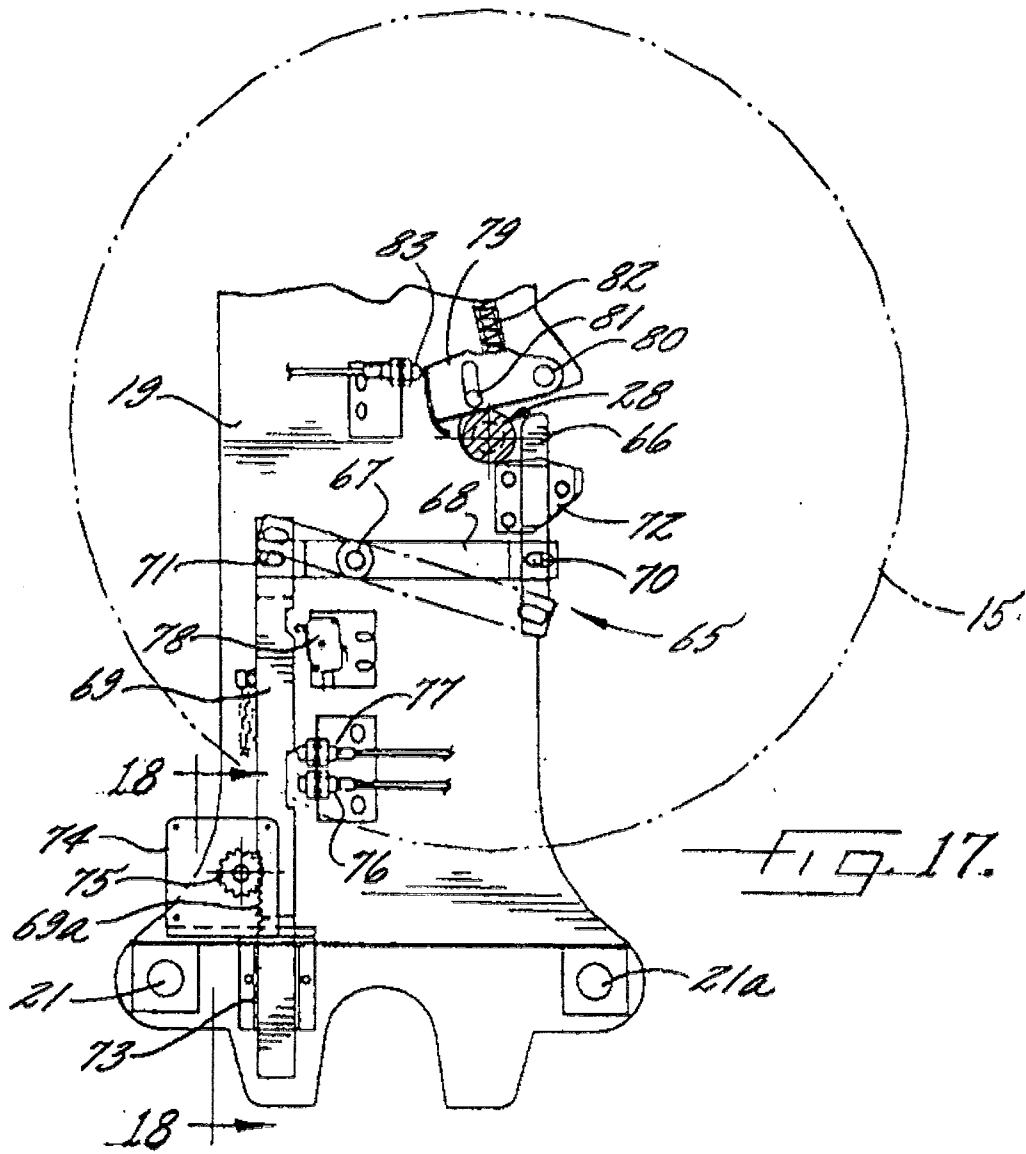
a shaft retaining/releasing device for at times securing an end of said shaft to said frame members, and for at other times moving said end of said shaft from said frame member;

a fabric receiving table carried by and rotatable with said unit, said table receiving rolls of said fabric following discharge thereof from said shaft retaining/releasing device; and

a thrusting device for pushing said rolls of fabric from said knitting machine.

2. A unit as in Claim 1, wherein said fabric receiving table has a recess therein for receiving said rolls of fabric, said recess extending approximately perpendicularly to the path of travel of said rolls of fabric during discharge thereof onto said table.
3. A unit as in Claim 1, wherein said shaft retaining/releasing device includes an L-shaped support member and a latch member associated therewith so as to prevent said shaft from sliding off of said support member as said shaft is moved toward said frame members.
4. A unit as in Claim 2, wherein said shaft retaining/releasing device includes an L-shaped support member and a latch member associated therewith so as to prevent said shaft from sliding off of said support member as said shaft is moved toward said frame members.
5. A unit as in any of Claims 1-4, wherein said fabric thrusting device withdraws each of said rolls of fabric from said shaft, and thereafter pushes the fabric outside of said knitting machine.

6. A unit as in any of Claims 1-4, and further including an electrical power supply device at the center of rotation of said unit.
7. A unit as set forth in any of Claims 1-4, wherein one of said frame members has a generally C-shaped opening adjacent the lower end thereof, said opening providing access of said thrusting device to said rolls of fabric.
8. A unit as in any of Claims 1-4, wherein said shaft of said fabric winding unit is spaced from the central axis of said knitting machine.
9. A unit as in any of Claims 1-4, and further including switch means for halting rotation of said winding unit at a preselected position after driving said knitting machine at a low speed in response to signals received from sensors upon said machine; and second switch means for confirming that said winding unit has stopped at said position.
10. A unit as set forth in any of Claims 1-4, and further including switch means upon said fabric receiving table for detecting winding of fabric upon said shaft of said winding unit.
11. A unit as in any of Claims 1-4, and further including detecting switch means for detecting whether said shaft is mounted upon said frame members of said winding unit.
12. A unit as in any of Claims 1-4, and further including detecting switches for detecting whether a shaft latching device is latched or unlatched.
13. A method of effecting winding and discharge of fabric knitted by a circular knitting machine having a rotatable fabric winding and discharging unit including a fabric winding shaft having extendible and retractable comb means, fabric cutting means, fabric guiding means, a gate through which rolls of fabric are discharged, latch means for releasably securing the shaft to the unit, a fabric receiving table, and a thrusting device for discharging a roll of fabric from the shaft onto a fabric receiving table; comprising the steps of:
 - guiding the fabric after knitting thereof to the fabric winding shaft by the fabric guiding means;
 - extending the comb means from the shaft so as to catch the fabric and thereby cause it to adhere to the shaft;
 - rolling the fabric upon the shaft;
 - detecting when a preselected quantity of





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United States Patent [19]
Vignoni

[11] **Patent Number:** **5,317,885**
[45] **Date of Patent:** **Jun. 7, 1994**

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- [54] **WINDING DEVICE FOR SPLIT KNITTED FABRIC**
- [75] **Inventor:** Cesare Vignoni, Brescia, Italy
- [73] **Assignee:** Vignoni S.r.l., Bergamo, Italy
- [21] **Appl. No.:** 949,787
- [22] **Filed:** Sep. 22, 1992
- [30] **Foreign Application Priority Data**
Sep. 23, 1991 [IT] Italy BS/91/A/000101
- [51] **Int. Cl.⁵** D04B 15/88
- [52] **U.S. Cl.** 66/151; 83/102; 83/872; 242/56.4; 66/149 R; 66/153
- [58] **Field of Search** 66/147, 150, 151, 152, 66/149 R; 242/56.4, 56.5; 83/872, 102
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- Primary Examiner*—Clifford D. Crowder
Assistant Examiner—John J. Calvert
Attorney, Agent, or Firm—McGlew and Tuttle

[57] **ABSTRACT**
The present invention pertains to a circular knitting machine with a pair of cutting devices (15) in opposite positions for longitudinally cutting, on two sides, the tubular fabric component and for forming two individual even pieces (13a, 13b) and with two winding units (11, 12) for separately winding the two pieces onto rolls, the pieces being led in opposite directions by central return rollers (16, 17).

11 Claims, 2 Drawing Sheets

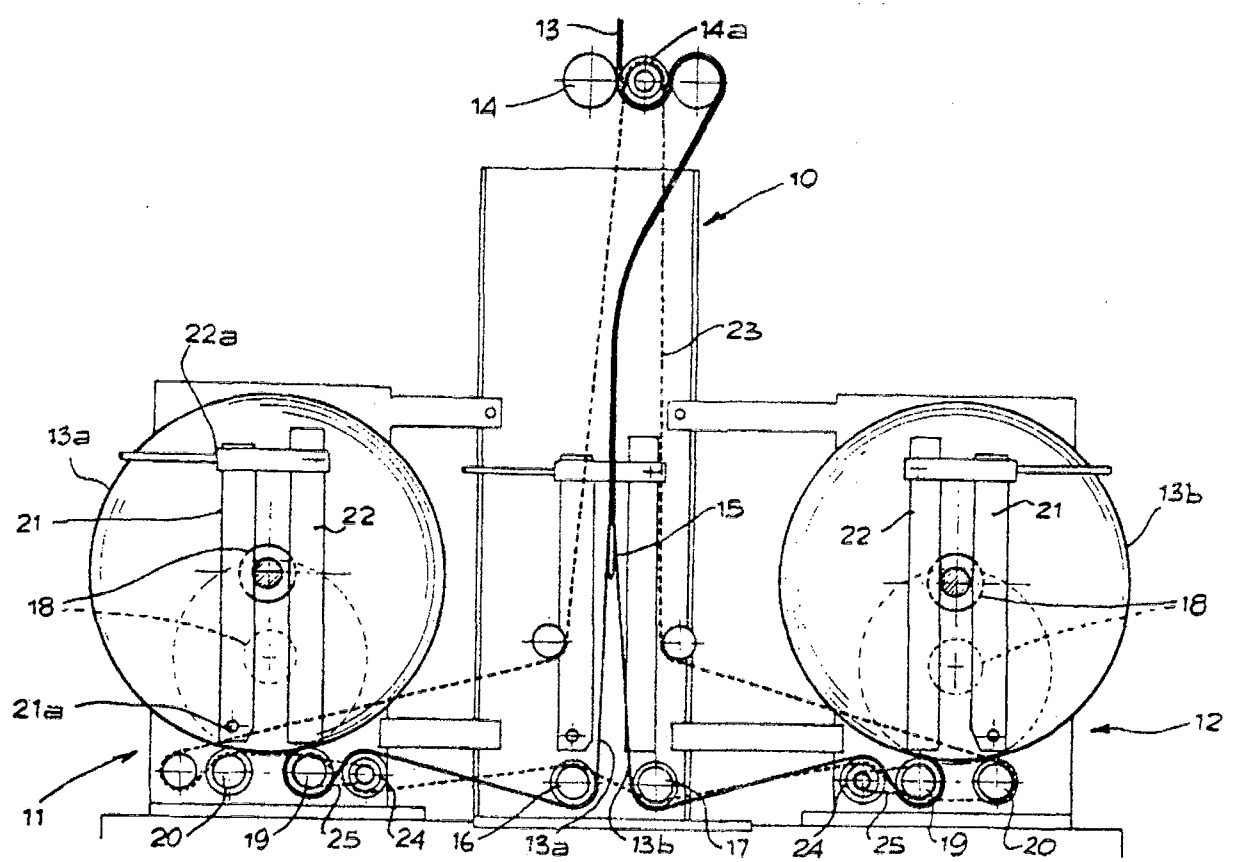


Fig. 2

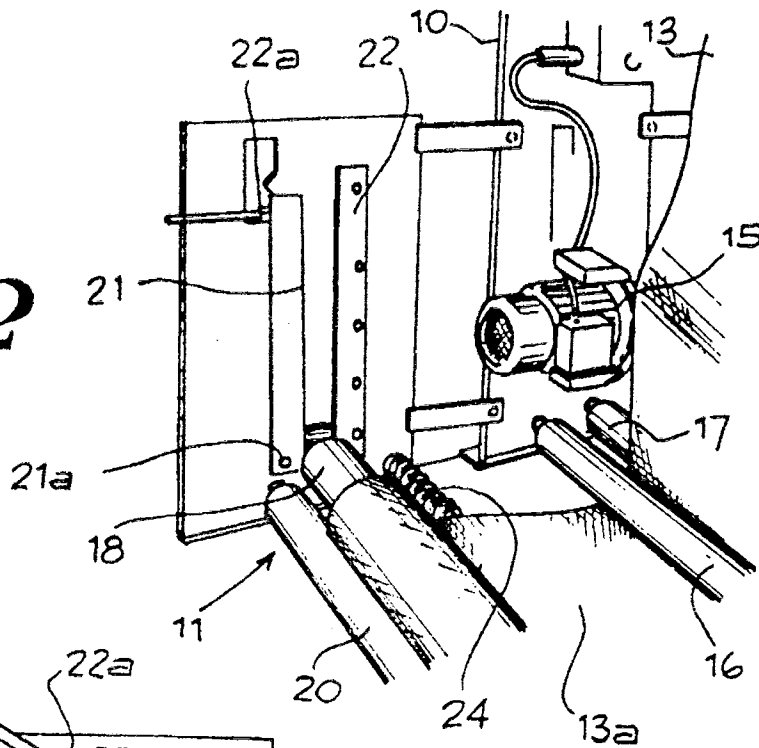
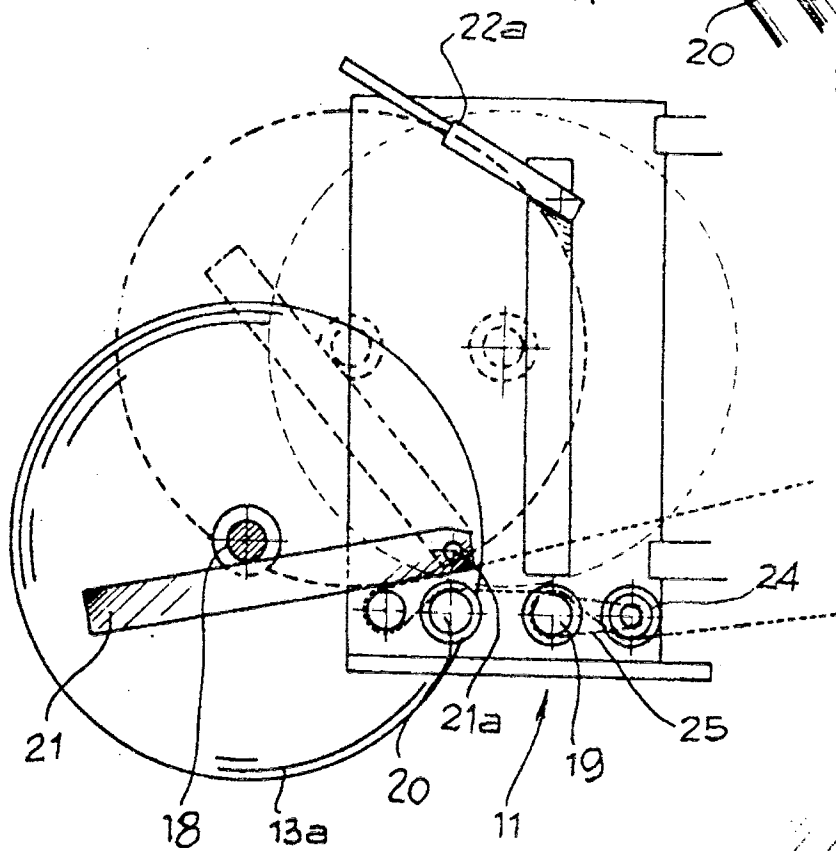


Fig. 4



F.



WINDING DEVICE FOR SPLIT KNITTED FABRIC

FIELD OF THE INVENTION

The present invention concerns the field of circular knitting machines and specifically pertains to a winding unit for the winding on a roll of the fabric produced on such machines.

BACKGROUND OF THE INVENTION

From the knitting process on circular machines there is obtained, as is known, a fabric component having a tubular shape which is led and progressively wound onto a winding roller arranged in the lower part of the machine. However, it is well known to persons skilled in the art that with the winding onto the winding roller of the tubular fabric, two folds are inevitably formed along two generators on opposite sides of the tubular component and produce an opposite effect during treatments, processing and subsequent use of the fabric. Even when the tubular fabric component is being cut along its generator, the problem is only partially resolved since, with the winding of the fabric component onto a winding roller, even if open on one side, a longitudinal fold is always formed, however, on the other side of the fabric.

SUMMARY AND OBJECTS OF THE INVENTION

On the contrary, the object of the present invention is to solve such a problem in a new and original manner with the unquestionable advantage of eliminating the formation folds on the fabric due to winding in such a way as to provide even pieces or lengths of fabric capable of being used more easily and comfortably.

The solution to the problem is achieved by longitudinally cutting, on two opposite parts, the tubular fabric component as produced on a circular knitting machine, so as to form two individual even pieces, and by winding the pieces or lengths of fabric on two separate winding units.

Therefore, the circular machine is provided, not with only one winding unit as usual, but with two piece-winding units which are arranged in parallel and with two cutting devices in opposite positions. The two piece-winding units are operated contemporaneously by a single control drive for rotating in opposite directions and winding the two pieces, the one in the opposite direction of the other. Thus, the surface of the knitted fabric which is facing the inside of the starting component is turned towards the center of the roll which is formed on each winding unit.

Since the edges of each piece produced from the longitudinal cuts of the tubular component have the tendency to be rolled up or curled up, each winding unit also comprises a stretching roller intended for stretching out or drawing the edges and smoothing out the piece for its correct winding. The stretching roller is arranged in parallel to the corresponding winding roller and is operated by a control drive derived from that which operates the winding roller.

It must be noted that the adoption of two piece-winding units on a circular knitting machine does not change in any way, however, the structure and the operation of the machine. In other words, the machine can be equipped either in the traditional manner with only one

winding unit or with two winding units in accordance with the present invention.

Each piece wound on the winding rollers shall have a width equal to half the circumference of the starting tubular component. In order to obtain pieces of suitable width, at least equal to that of a piece produced by the opening of a cut tubular component, as usual, along only one generator, it is possible to start with a machine having a greater diameter, that is, double. This is not a disadvantage since from such a machine are produced two pieces having a width equal to the generation of a tubular component produced on a very small machine, especially already cut and advantageously without folds.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference is made to the accompanying drawings and descriptive matter in which preferred embodiments of the invention are illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 shows schematically the two winding units and pertinent controls;

FIG. 2 shows in perspective view part of one of the winding units with guides for the winding roller;

FIG. 3 shows a lateral view of the units applied to the base of a circular machine; and

FIG. 4 shows schematically the arrangement for the unloading of a roll of fabric from the machine.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawings, part of the base of a circular knitting machine is indicated as 10, and the two winding units, which are arranged symmetrically and applied on opposite sides of the base, are indicated as 11 and 12.

The knitted tubular component 13 produced on the circular machine or knitting means is set into motion by means of guide or transport rollers 14, one of which 14a is operated by a drive (not shown) derived from that which operates the cylinder of the machine. The tubular component 13 is cut longitudinally on opposite sides by means of cutters 15, provided with a sharpener. The cutters 15 are located at the base of the machine under the guide rollers 14 and in a position centered between the two winding units. After cutting, the tubular component 13 is divided into two pieces or lengths of fabric 13a, 13b which are guided and directed in opposite directions, by means of central return rollers 16, 17, to the winding units 11, 12, respectively.

Each winding unit 11, 12 comprises a winding roller 18 controlled in rotation, with friction, by a pair of guiding rollers 19, 20. As shown in FIG. 1, the winding roller 18 rests, due to gravity, on the complanate guiding rollers 19, 20 across the wound-up piece. Moreover, the winding roller 18 has end necks—cf. FIGS. 2 and 4—each arranged between two vertical outer and inner guide gibs 21, 22 which make it possible to raise the roller for increasing the diameter of the piece roll which is being wound up.

The guiding rollers 19, 20 of both winding units 11, 12, as well as the central return rollers 16, 17, are operated simultaneously by a control drive 23, for example, a chain drive, which leads to the movement of the

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above-mentioned roller 14a. The drive 23 is such that it rotates the winding rollers 18 in opposite directions so as to wind the pieces or lengths of fabric 13a, 13b in opposite directions and with the inside surface of the pieces, or lengths of fabric, coming from the machine being turned towards, or wound on, the center of the roll.

On the inlet side in each winding unit of pieces 13a and 13b, a stretching roller 24, of the type with two opposite screws or screw surfaces, is coupled in parallel to the winding roller 18 for stretching out and drawing the edges of the piece which tend to be rolled up immediately before the piece 13a or 13b is wound onto the roller 18. The stretching roller 24 is operated in rotation by a drive 25, for example, a chain drive, controlled by the adjacent guiding roller 19 with an appropriate ratio. Basically therefore, the knitting tubular component 13 is longitudinally cut on two sides so as to form two pieces 13a, 13b. The two pieces are led separately and wound progressively onto two winding rollers 18 after being passed onto the stretching roller 24.

The vertical guide gib 21, at the neck of each winding roller is arranged towards the outside of the machine. This gib 21 is pivoted toward the bottom at 21a and blocked in the vertical position by means of a releasable means 22a. Because of this, the gibs 21 can be released and folded on one side—cf. FIG. 4—to form an inclined plane which aids the unloading of the fabric roll once completed.

If, as usually occurs, the unloading of the fabric on the roll is provided on only one side of the machine, the winding units can be mounted on a rotating platform 26—cf. FIG. 3. This allows the machine to be able to support one roll after the other in correspondence to the only unloading outlet and emptying the machine by making use of the inclined planes which are produced by folding the guide gibs 21.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

I claim:

1. A circular knitting and winding apparatus comprising:
 - knitting means for producing a tubular fabric;
 - transport roller means for transporting said tubular fabric away from said knitting means;
 - cutting means positioned downstream of said transport roller means and for cutting said tubular fabric into first and second separate fabric pieces;
 - first central roller means for leading said first fabric piece in a first direction;
 - second central roller means for leading said second fabric piece in a second direction, said second direction being substantially opposite said first direction;
 - first winding means for winding said first fabric piece after said first fabric has passed said first central roller means;
 - second winding means for winding said second fabric piece after said second fabric has passed said second central roller means;
 - a single unloading outlet positioned adjacent one of said first and second winding means; and
 - a rotating platform means supporting said first and second winding means and for rotating said first

and second winding means into a position adjacent said unloading outlet.

2. An apparatus in accordance with claim 1, wherein: said cutting means includes two cutters cutting said tubular fabric in a cutting plane substantially parallel to said transporting of said tubular fabric; and said first and second winding means being positioned on opposite sides of said cutting plane.
3. An apparatus in accordance with claim 1, wherein: each of said first and second winding means includes inner and outer gib means for guiding said winding roller as said winding roller increase an external diameter due to said winding of a respective fabric piece on a respective winding roller, said each of said first and second winding means also including pivot means for pivoting said outer gib at one end for forming an inclined plane for unloading of said winding roller from said inner and outer gib.
4. An apparatus in accordance with claim 1, wherein said first and second central roller means and said guiding rollers of said first and second winding means guide said first and second fabric pieces to cause an inside surface of said tubular fabric to be directed radially inward during said winding of said first and second fabric pieces on respective winding rollers.
5. An apparatus in accordance with claim 1, wherein: said cutting means cuts said tubular fabric into substantially equal sized first and second fabric pieces.
6. An apparatus in accordance with claim 1, wherein: said transport roller means is positioned downstream of said knitting means and includes rollers contacting said tubular fabric.
7. An apparatus in accordance with claim 1, further comprising:
 - a base supporting said first and second winding means, said first and second winding means being positioned on opposite sides of said base, said cutting means being positioned between said first and second winding means, said transport roller means being positioned above said base.
8. A circular knitting and winding apparatus comprising:
 - knitting means for producing a tubular fabric;
 - transport roller means for transporting said tubular fabric away from said knitting means;
 - cutting means positioned downstream of said transport roller means and for cutting said tubular fabric into first and second separate fabric pieces;
 - first central roller means for leading said first fabric piece in a first direction;
 - second central roller means for leading said second fabric piece in a second direction, said second direction being substantially opposite said first direction;
 - first winding means for winding said first fabric piece after said first fabric has passed said first central roller means, said first winding means includes a winding roller and inner and outer gib means for guiding said winding roller as said winding roller increases an external diameter due to said winding of a respective fabric piece on a respective winding roller, said first winding means also including pivot means for pivoting said outer gib means at one end for forming an inclined plane for unloading of said winding roller from said inner and outer gib means; and

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United States Patent [19]
Bagnato

[11] **Patent Number:** **5,560,566**
[45] **Date of Patent:** **Oct. 1, 1996**

26

- [54] **WINDER WITH ELEVATED SPOOL SUPPORT RAIL**
- [75] **Inventor:** Louis J. Bagnato, New Port Richey, Fla.
- [73] **Assignee:** Beloit Technologies, Inc., Wilmington, Del.
- [21] **Appl. No.:** 339,046
- [22] **Filed:** Nov. 14, 1994
- [51] **Int. Cl.⁶** **B65H 18/16**
- [52] **U.S. Cl.** **242/541.1; 242/541.7; 242/542.3**
- [58] **Field of Search** 242/534, 541.1, 242/541.4, 541.5, 541.6, 541.7, 542.3, 547

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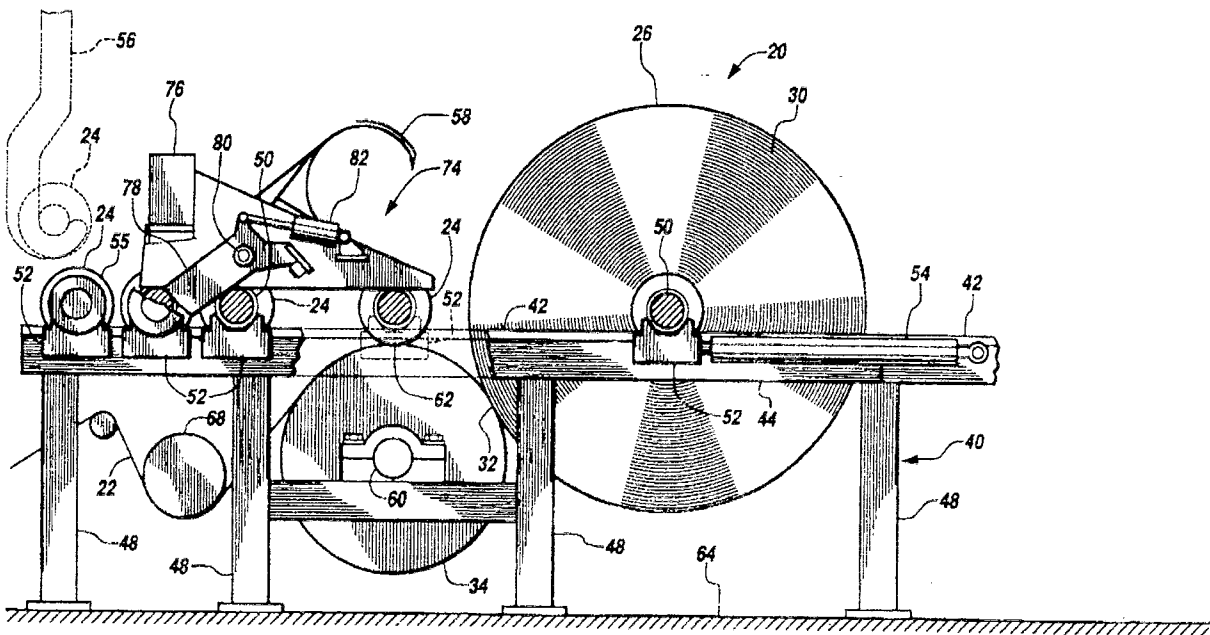
Primary Examiner—John M. Jillions
Attorney, Agent, or Firm—Dirk J. Veneman; Raymond W. Campbell; Gerald A. Mathews

[57] **ABSTRACT**

A winder in a papermaking machine has a frame with horizontal rails which are positioned above a rotatable reel support drum, which is fixedly mounted. As a relatively large diameter wound paper web reel, or jumbo, is formed on a spool riding on the rails, the surface of the jumbo remains tangent to the top of the support drum as the spool moves from an initial position vertically over the reel drum to a position laterally displaced horizontally along the rail. Centerwind drive(s) control spool torque. As the jumbo increases in size, it is moved linearly away from the initial position, while maintaining the paper web reel rotatively supported and in a nipping engagement with the support drum. Nip pressure between the support drum and the jumbo is controlled by the force of gravity and the horizontal positioning of the jumbo along the rails. The positioning of the jumbo along the rail may be controlled by a conventional pneumatic or hydraulic cylinder, or a screw mechanism. An alternative embodiment winder utilizes primary and secondary arms to position the jumbo and its spool along the reel rails.

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8 Claims, 12 Drawing Sheets



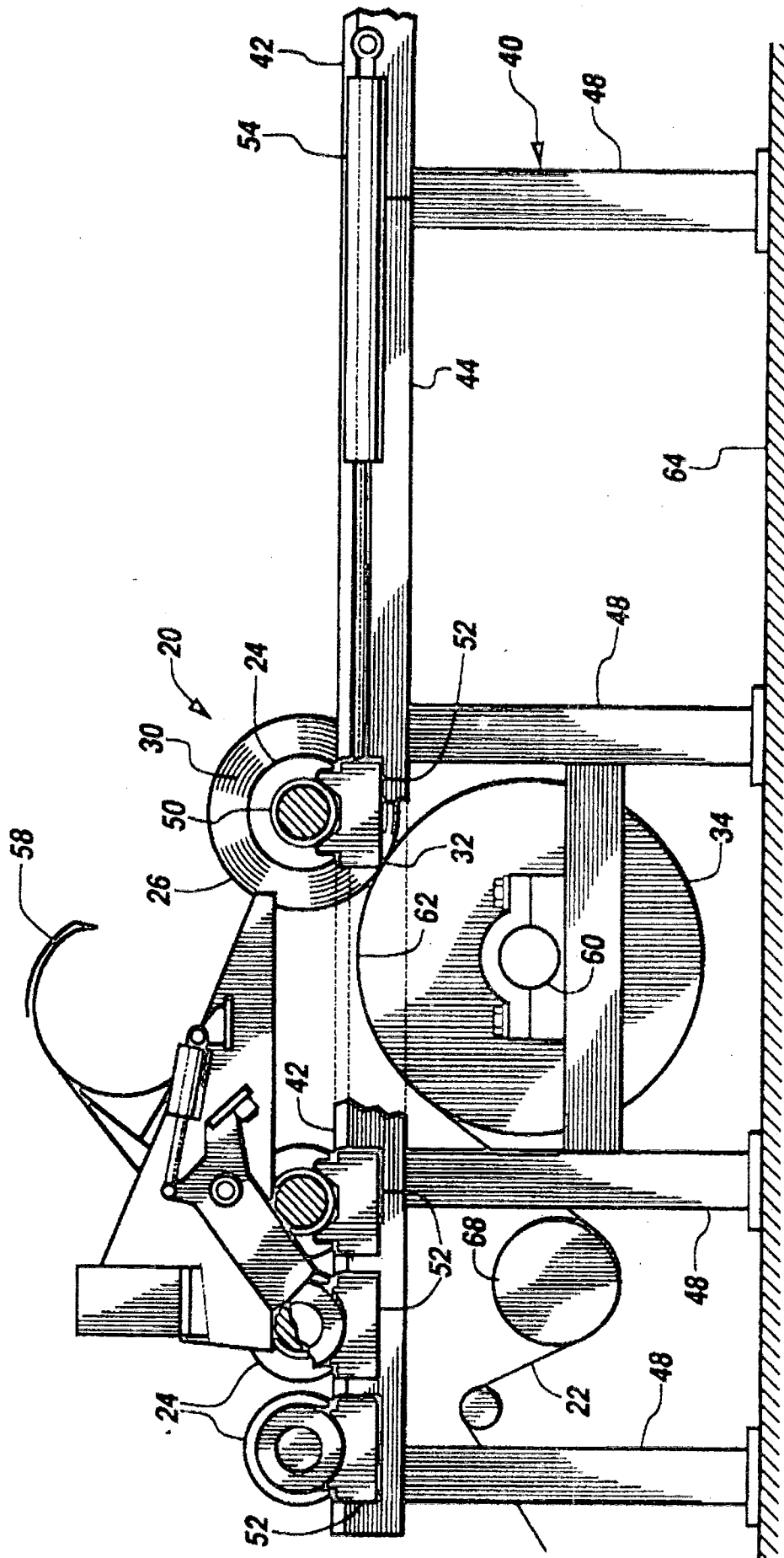


Fig. 3

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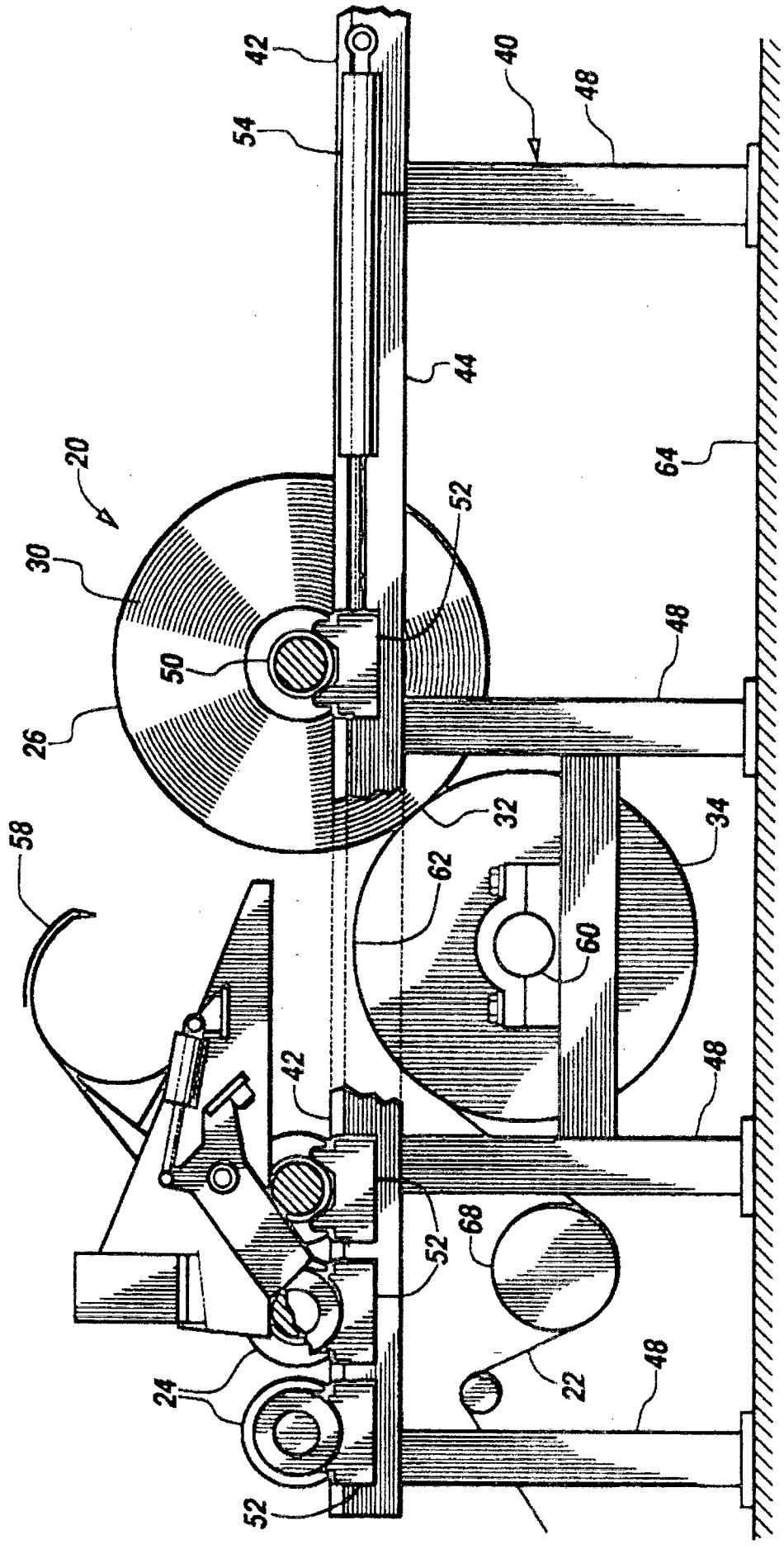


Fig. 4

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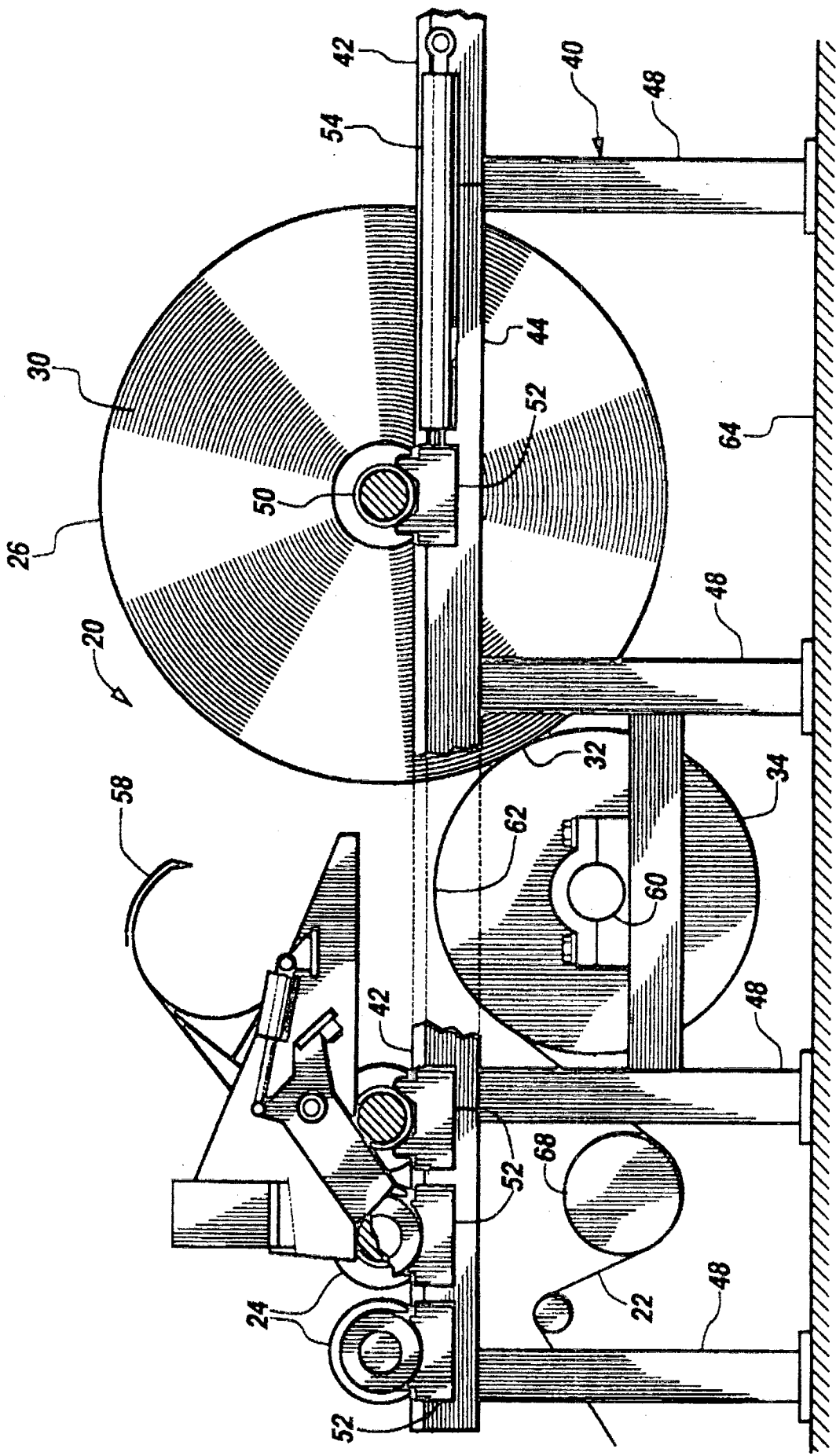


Fig. 5

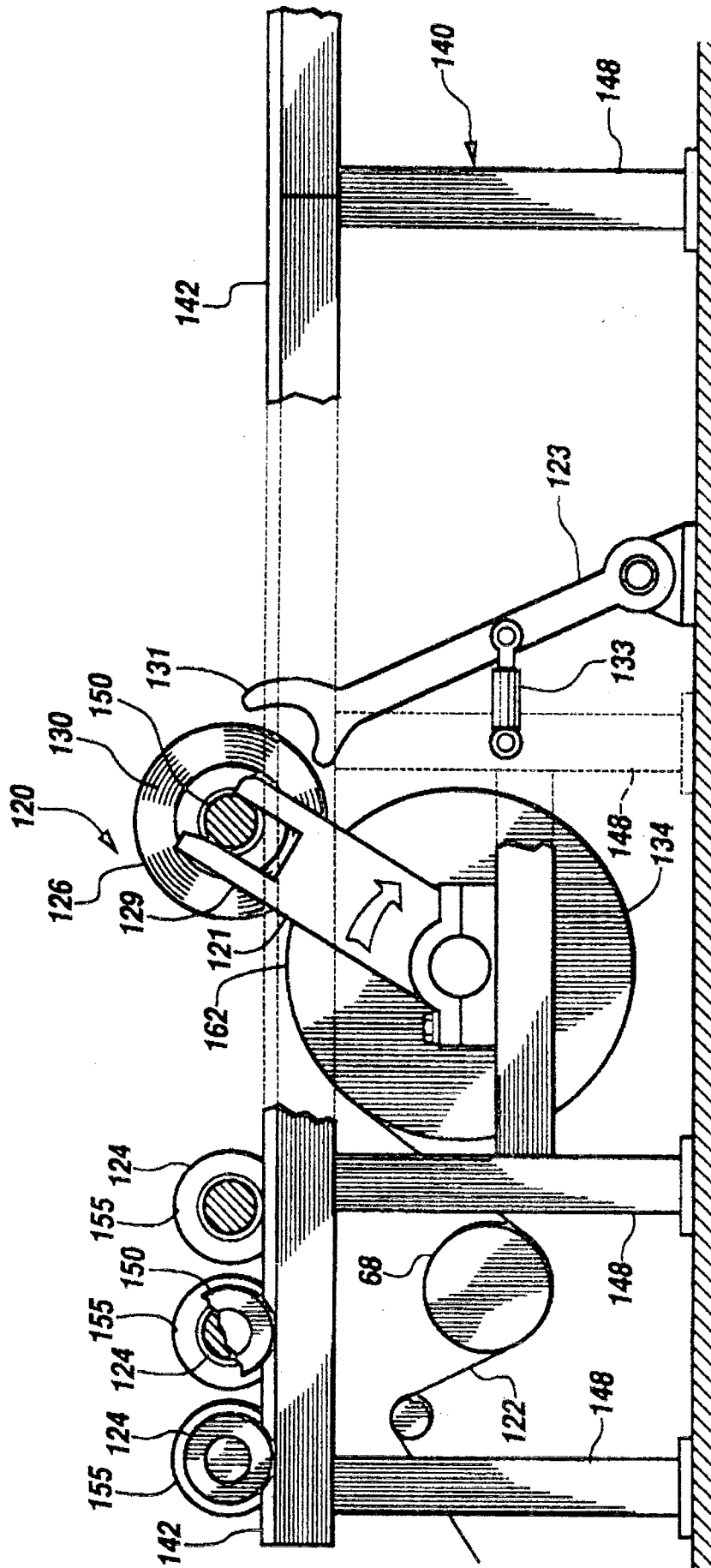


Fig. 10

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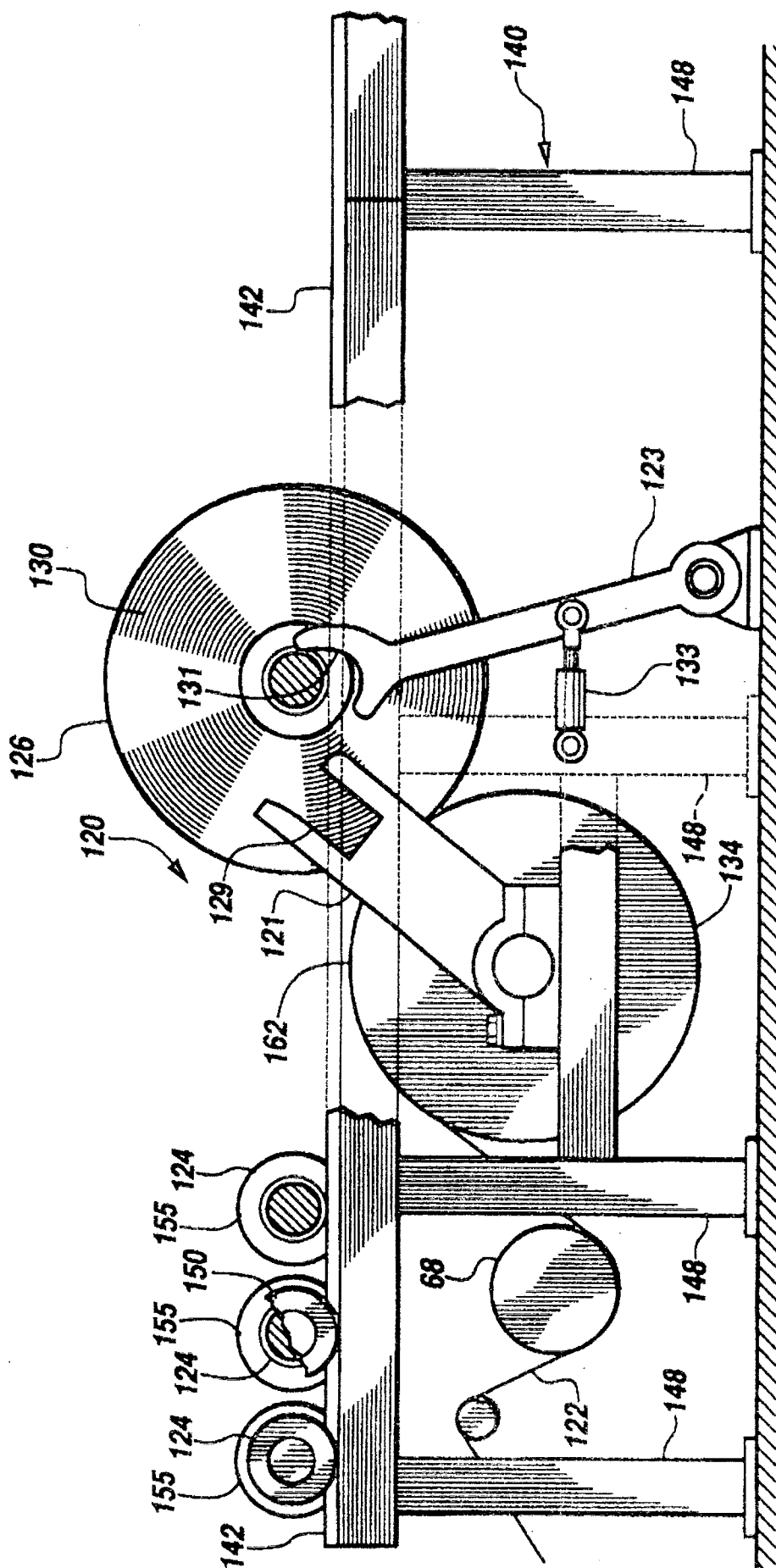


Fig. 11

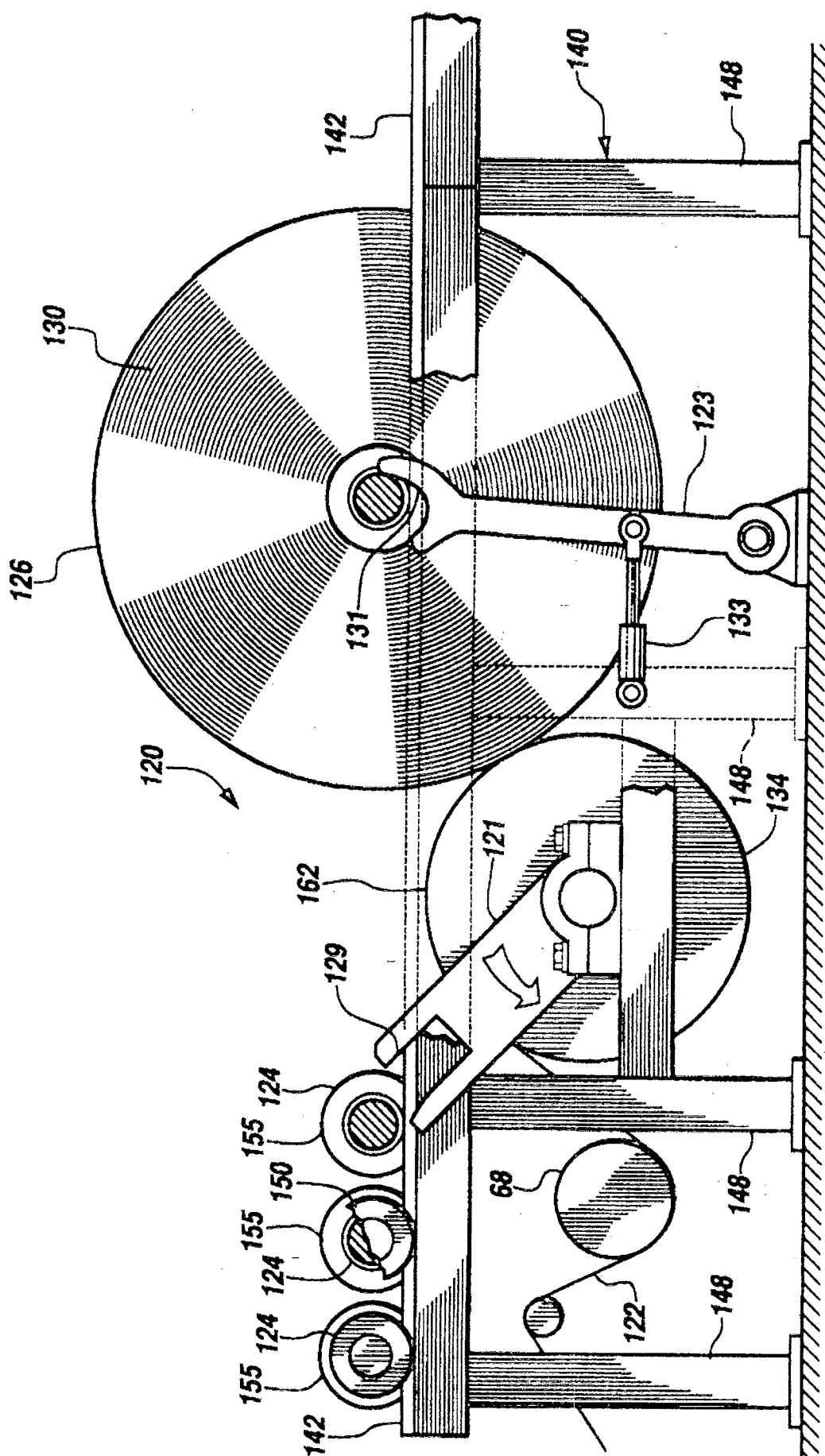


Fig. 12

Fig. 12

the reel drum. Nip pressure between the reel drum and machine reel is controlled by the force of gravity and the horizontal positioning of the machine reel along the rail. The positioning of the machine reel along the rail may be controlled by conventional pneumatic or hydraulic cylinders. The start-up centerwind drive remains engaged with a new spool up to a point where the jumbo has reached a predetermined jumbo reel diameter. As the jumbo reel grows in diameter, a secondary centerwind drive takes over at the opposite end of the reel spool and remains engaged to completion of the jumbo reel. The start-up centerwind drive is disengaged upon engagement of the secondary centerwind drive and returned to the initial position to bring the next reel spool to line speed. The centerwind drives are of the differential torque type so that the torque on the machine reel may be controlled with respect to the tension produced by the reel drum. An alternative embodiment winder utilizes primary and secondary arms to position the machine reel and its core along the reel rails. In prior art designs where primary and secondary arms controlled the reel, and the rail was located on the level with the reel drum, a discontinuity arose in the winding of the machine reel which is overcome in this invention by placing the machine reel above the reel drum and by continuously progressing the machine reel along the reel rail.

It is a feature of the present invention to provide a winder and method for reeling a web onto a wound web reel.

Another feature of the present invention is to provide an improved winder and method for producing a wound jumbo reel having few defects.

Another feature of the present invention is to provide an improved winder and method wherein the torque, nip pressure, and web tension can be applied and controlled in a paper web being wound through the entire reeling process without transfers or interruptions so producing a machine reel of improved uniformity.

Another feature of the present invention is to provide an improved winder and method wherein the geometry of the winder minimizes reel spool and jumbo reel deflection due to gravity by providing drum support of the initial reel spool and partial drum support of the winding jumbo reel throughout the winding cycle.

Yet another feature of the present invention is to provide a winder of greater simplicity employing fewer parts.

A still further feature of the present invention is provide a winder for retrofit to existing paper machines in a cost-effective manner.

A still further feature of the present invention is to provide an apparatus and method for producing machine reels of large diameter and length with a reduced number of winder induced paper defects.

Other objects, features, and advantages of this invention will become readily apparent to those skilled in the art upon reading the description of the preferred embodiment in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side-elevational view of the winder of this invention showing reel spool storage and positioning apparatus.

FIGS. 2-5 are schematic side-elevational views showing the progression of the machine reel as it is wound.

FIG. 6 is a top plan view of the winder of FIG. 1 showing the start-up and main centerwind drives.

FIG. 7 is a cross-machine view of the winder of FIG. 1 showing the start-up and main centerwind drives.

FIG. 8 is a graphical view comparing prior art nip loads with the uniform nip loads of the winder of FIG. 1.

FIGS. 9-12 are schematic side-elevational views showing the progression of the machine reel as it is wound on an alternative embodiment of the winder of FIG. 1 wherein arms are employed to control the position of the machine reel on the reel rails.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to FIGS. 1-12 wherein like numbers refer to similar parts, a winder 20 is shown in FIGS. 1-7. The winder 20 receives a paper web 22 from a papermaking machine (not shown) and winds the web 22 onto a reel spool 24 to form a jumbo or machine roll 26. The winder 20 is typically the last component of the papermaking machine and is the final step in the basic process of paper manufacture. Once the manufactured paper web 22 is formed into the large jumbo reels 26, the paper is severed from the papermaking machine and the wound reels of paper are removed for further processing or sale.

A typical jumbo reel may be as wide as four hundred inches and have a diameter of one hundred twenty inches or more. The large jumbo reel is typically sliced into smaller reels or sets of significantly smaller diameter and width. The paper may also be processed through a coater and/or supercalender to satisfy a particular user's requirements. As capacities for manufacturing paper webs of greater width and at higher speeds have increased, the jumbo reels have gotten commensurately larger. These larger reels are more subject to paper defects which are caused by the way the jumbo reel is wound.

The spool 24 on which the paper web 22 is wound is a long beam which can only be supported on its ends while paper is being wrapped thereon. Beam flexure loads on the spool are caused by the force of gravity acting on the paper 30 which is built up on the spool 24. Flexure of the beam formed by the spool 24 can result in defects in the paper web 22 when wound on the spool 24. These defects are typically concentrated in the paper immediately adjacent to the spool 24. Thus it has been observed that as much as seventy to 80 percent of the paper defects which cause such problems as paper web breaks during processing or printing on the paper, occur in the last set off the reel.

By uniformly winding the web 22 onto the spool 24, the paper web co-acts with the spool to form a beam of greater thickness and stiffness which then in turn supports additional paper wound thereon. Thus, one aspect to avoiding defects in the jumbo reel 26 is to assure a uniform wrap, of gradual decreasing tension as the reel 26 diameter increases. A graphical plot 28 of the ideal nip loading for a jumbo reel 26 is illustrated in FIG. 8. The nip loading plot 28 shown in FIG. 8 shows a uniform nip loading which very gradually decreases as the reel diameter increases.

The winder 20, as shown in FIGS. 1-7, will produce a jumbo reel 26 with reduced defects and improved reel structure by controlling the tension in the web 22, the pressure at the nip 32 between the spool 24 and the support drum 34, and the torque, which is controlled by driving the jumbo reel 26 with a center line assist drives 36,38, as shown in FIGS. 6 and 7.

Referring to FIG. 1, the winder 20 has a frame 40 with two rail support beams 44 which support horizontal rails 42. The

rail support beams 44 are mounted to the floor or foundation 64 by post members 48. A supply of spool reels 24 are supported on the rails 42 on bearing housings 50. The bearing housings 50 roll on the rails 42 to permit horizontal translation movement of the reel spools 24 over the rails. When the bearing housings 50 are stationary, the spool reel 24 can rotate while supported in its bearing housings 50.

Carriages 52 engage the bearing housings 50 and allow the spools 24 to be urged along the rail by an actuator 54. Alternatively a pneumatic or hydraulic cylinder may be employed. A crane hook 56 supplies the spool reels 24 to the rails 42. The next spool to be wound is positioned directly over the support drum 34 where a conventional web turn-up device 58 severs the web 22 from the jumbo reel 26 and wraps the web 22 onto the spool 24 positioned directly above the support drum 34. As shown in FIG. 2, the reel 24 positioned over the support drum 34 is positioned along the rails 42 by an actuator 54, such as a ball screw, or fluid-powered cylinder. The support drum 34 is fixedly mounted to post members 48 by a bearing 60 which defines an axis of rotation. The rails 42 pass over the apex 62 of the support drum 34.

As the spool 24 begins to be wrapped by the web 22 the diameter of the incipient jumbo reel immediately begins to increase. If the jumbo reel remained at the apex 62 of the support roll 34, it would be lifted off the rails and would be supported entirely on the support roll. To retain the engagement of the bearing housing 50 with the rail, the partly formed jumbo reel 26 must move laterally away from the support drum apex 62 in the down machine direction as shown in FIG. 3.

In a conventional Pope-type winder, the nip loading of a jumbo reel against a support drum as a function of roll diameter is irregular as shown in curve 66 of FIG. 8. The variation in nip load shown by curve 66 is also indicative of the variation in web tension. These variations in the web structure are a result of winding the web onto a spool in two different positions. The first one being up machine of the apex of the support roll and the second position being on rails on which pass approximately through the axis of the support roll. Uneven winding is directly responsible for the damage to the paper immediately adjacent to the spool which forms part of the last set off the jumbo reel.

The winder apparatus 20, as shown in FIGS. 2, 3, 4 and 5, winds the web 22 onto the spool 24 in a continuous and controlled manner to form the jumbo 26. The three factors which must necessarily be controlled to produce a jumbo reel 26 of uniform wrap are the tension in the web 22, the load in the nip 32 between the jumbo reel 26 and the support drum 34 and the torque supplied by the centerwind assist drives 36,38. Tension in the web 22 is controlled by movement of the paper web 22 between support roll 68 and the support drum 34. The support roll 68 and support drum 34 are typically directly driven off the paper machine drive system or by individual drive motors 71, such as shown in FIG. 7. The support roll 68 and the drive drum 34 are controlled so that the web is stretched, thus imparting a tension in the web which is a percentage of the tensile strength of the web 22 being wound.

The pressure at the nip 32 is controlled by the weight of the spool and by the force exerted by the actuator 54 as the jumbo reel 26 builds up alongside the support drum 34. It may be desirable in some circumstances to have an additional means (not shown) such as a backing roll positioned above the spool when it is positioned at the apex 62 as shown in FIG. 2. It may also be desirable to mount the support drum

on a load cell arrangement so that the loading of the jumbo reel can be monitored at all times. In some existing winders, the support roll provides the sole driving force for rotating the jumbo reel and so winding the paper web thereon. It has been found, however, that use of a differential centerwind assist drive controls the torque of the jumbo reel so as to improve the uniformity of wrap on the jumbo reel. Differential torque drives are conventional and allow a controlled amount of torque to be supplied to the jumbo reel directly as opposed to that supplied by the support drum 34.

As shown in FIG. 6, the jumbo reel 26 may be continuously driven by employing two centerwind assist drives 36 and 38. Each drive 36,38 is mounted on rails 70,72. Two drive arrangements are contemplated. In one arrangement, the centerwind drives 36 and 38 are of equal capacity and each drive is sized to maintain 100% of the torque requirement such that they can alternate between spools as they are wound into jumbo reels 26 with each centerwind drive engaging a new spool and maintaining driving engagement with the spool until the jumbo has completed being wound. Alternately, centerwind drives 36 and 38 may be differentially sized to suit specific torque requirements, with drive 36 having the lesser capability. An on-the-run shift may then be performed in which drive 38 takes over from drive 36 after the jumbo has reached a predetermined diameter, and engages the same spool, and completes the winding of the jumbo reel while the smaller drive 36 returns to the initial position to initiate the winding of a new spool 24.

As shown in FIG. 1, a spool guide apparatus 74 is mounted on the winder 20 from a cross machine support beam 76, located above the reel spools 24 in their storage position on the support rails 42, up machine from the support roll 34. The spool guide apparatus 74 utilizes a spool stop 78 which pivots about a pivot 80 by a hydraulic cylinder 82. By operation of this apparatus, in cooperation with a spool insertion device, a reel spool supported in the support carriages on either side of the apparatus is moved translationally horizontally from the storage position to an initial position.

The web turn-up device 58 is also mounted on the spool guide 74 and is used in urging the oncoming web 22 into wrapping engagement with a new spool 24 when it is time to begin winding the web 22 onto a new reel spool. The arrangement of the carriages 52 and their relation to the actuators 54 may be one of several configurations. Either a single pair of actuators, one of which is visible in FIGS. 1 through 5, may be utilized with the actuators 54 successively grabbing and pulling the carriages 52 forward. Alternatively, to assure continuous control over the carriages, and thus the spools, the carriages may be mounted on alternating tilting beams mounted on either side of the rails 42, such as shown in U.S. patent application Ser. No. 08/060,171 entitled "A Method and Apparatus for Reeling a Wound Web Roll", now U.S. Pat. No. 5,370,327, which is incorporated herein by reference. Another alternative is to have two actuators 54 in spaced parallel relation on either side of the rails and having every other pair of carriages 52 be of a design so that they can be grabbed and manipulated outward of the carriages gripped by the inner pneumatic actuators.

An alternative embodiment winder 120 is shown in FIGS. 9-12. The winder 120 employs a first arm 121 and a second arm 123 which control the position of a jumbo reel 126 with respect to the support drum 134. A supply of spools 124 is stored on rails 142. The first arm 121, as shown in FIG. 12, receives a spool 124 from the storage region of the rail and positions the spool 124 over the apex 162 of the support drum 134 where a conventional knife and turn-up device