Nov. 15, 1955 W. J. CLARK ET AL 2,723,717

MOVABLE GATE CARRYING ROTARY KNIVES FOR CUTTING CLOTH ON A WINDING MACHINE

Filed May 7, 1953 4 Sheets-Sheet 1

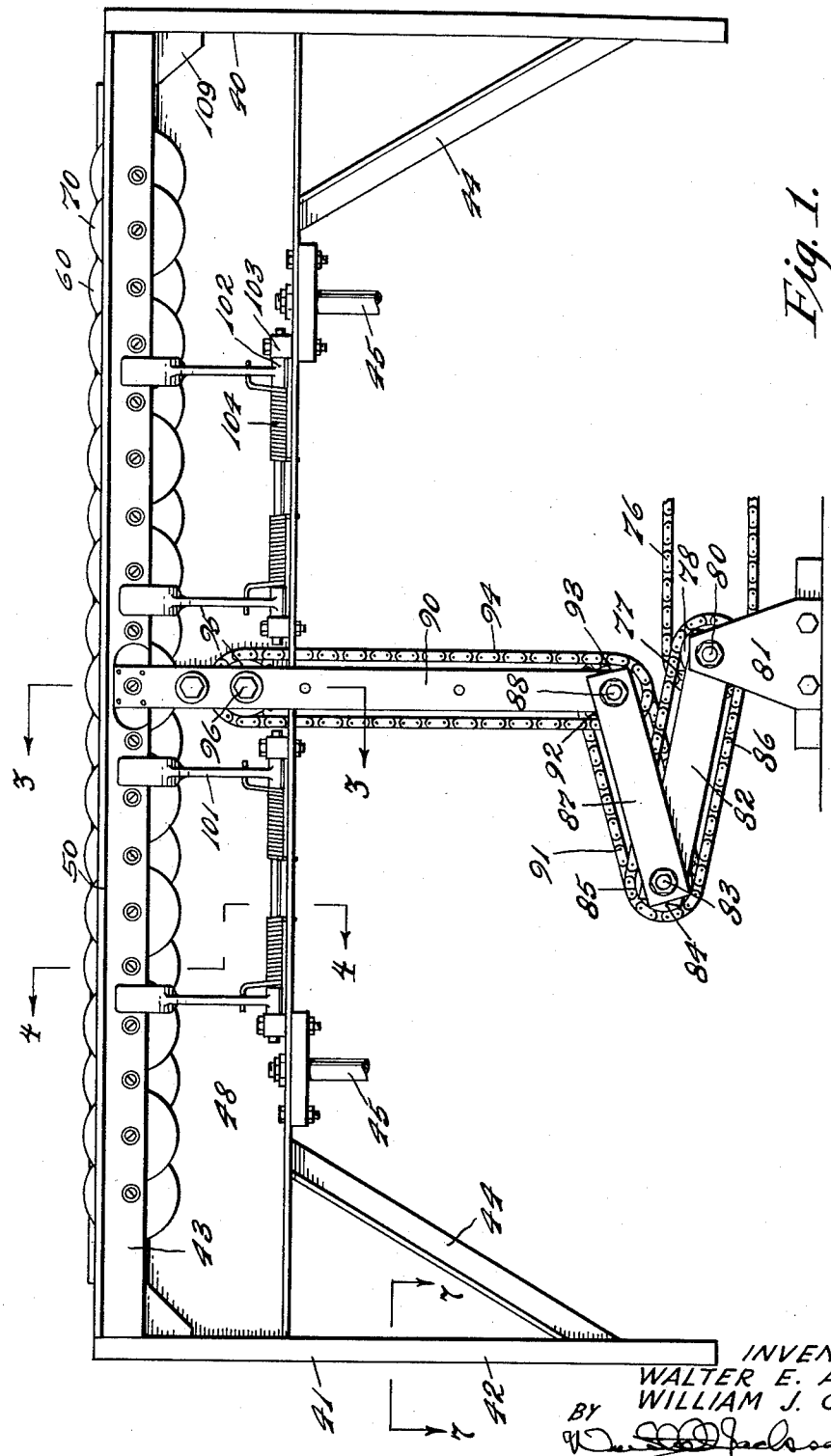


Fig. 1.

INVENTORS.
WALTER E. AULEN
WILLIAM J. CLARK
BY
ATTORNEYS.

Nov. 15, 1955 W. J. CLARK ET AL 2,723,717

MOVABLE GATE CARRYING ROTARY KNIVES FOR CUTTING CLOTH ON A WINDING MACHINE

Filed May 7, 1953 4 Sheets-Sheet 2

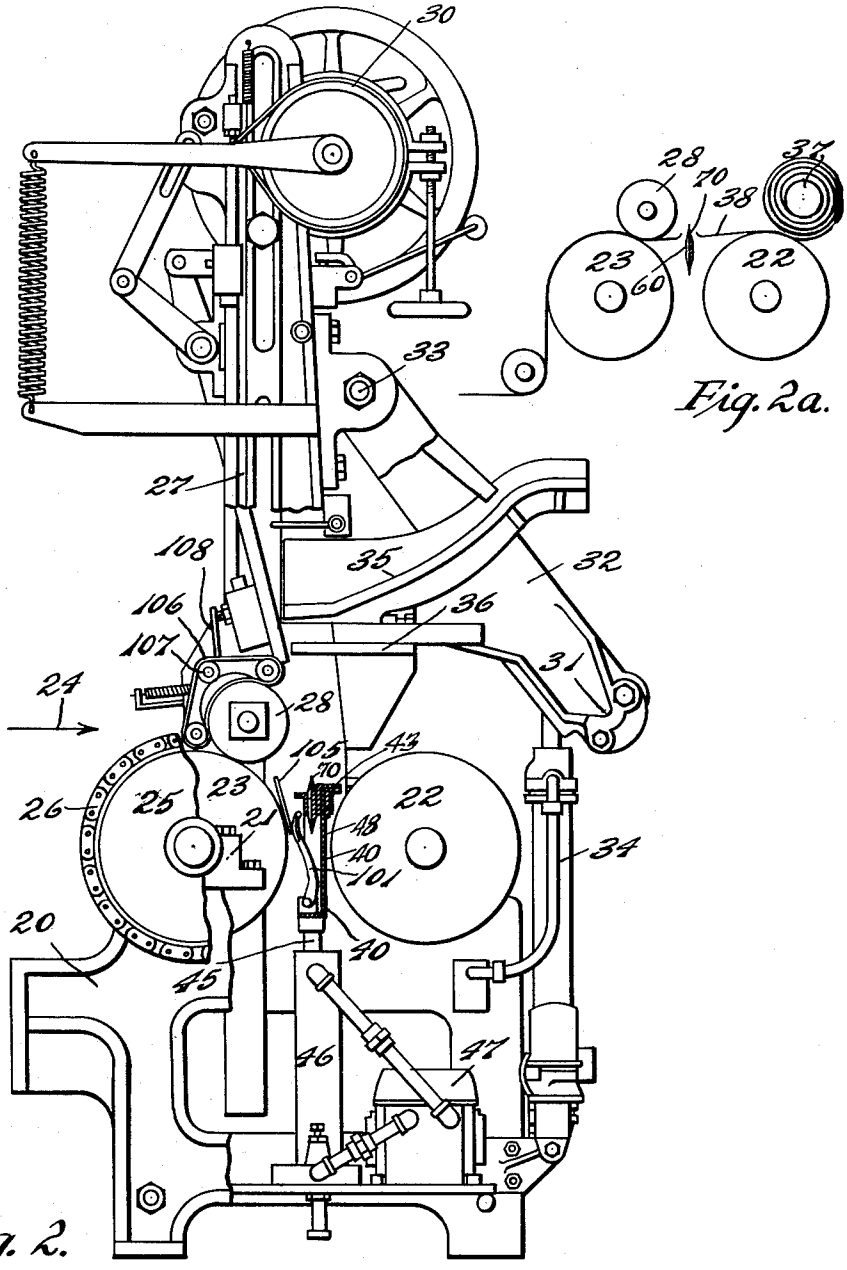


Fig. 2a.

Fig. 2.

INVENTORS.
WALTER E. AULEN
WILLIAM J. CLARK

BY

ATTORNEYS.

Nov. 15, 1955 W. J. CLARK ET AL 2,723,717

MOVABLE GATE CARRYING ROTARY KNIVES FOR CUTTING CLOTH ON A WINDING MACHINE

Filed May 7, 1953 4 Sheets-Sheet 3

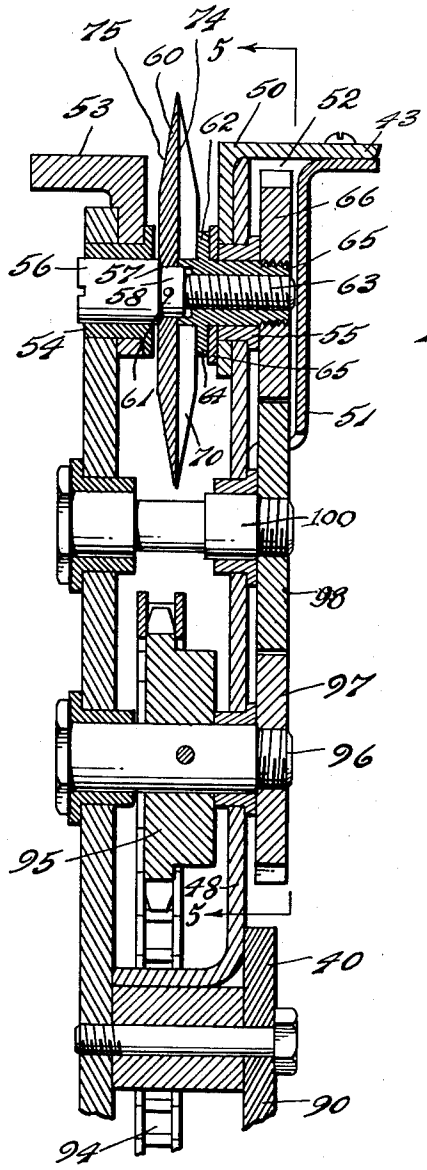


Fig. 3.

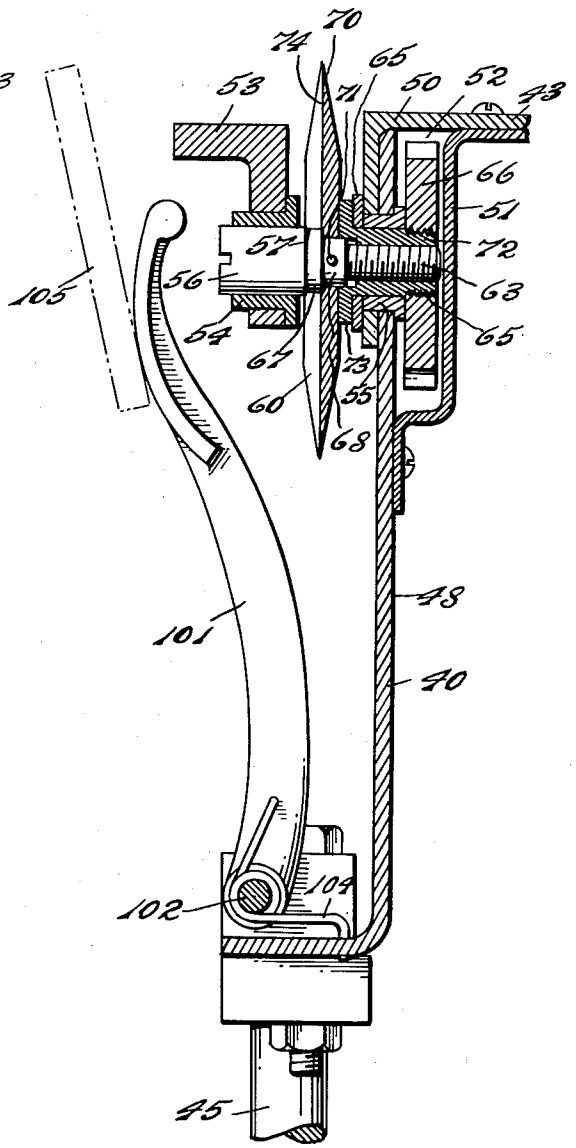


Fig. 4.

INVENTORS.
WALTER E. AULEN
WILLIAM J. CLARK
BY
ATTORNEYS.

Nov. 15, 1955 W. J. CLARK ET AL 2,723,717

MOVABLE GATE CARRYING ROTARY KNIVES FOR CUTTING CLOTH ON A WINDING MACHINE

Filed May 7, 1953 4 Sheets-Sheet 4

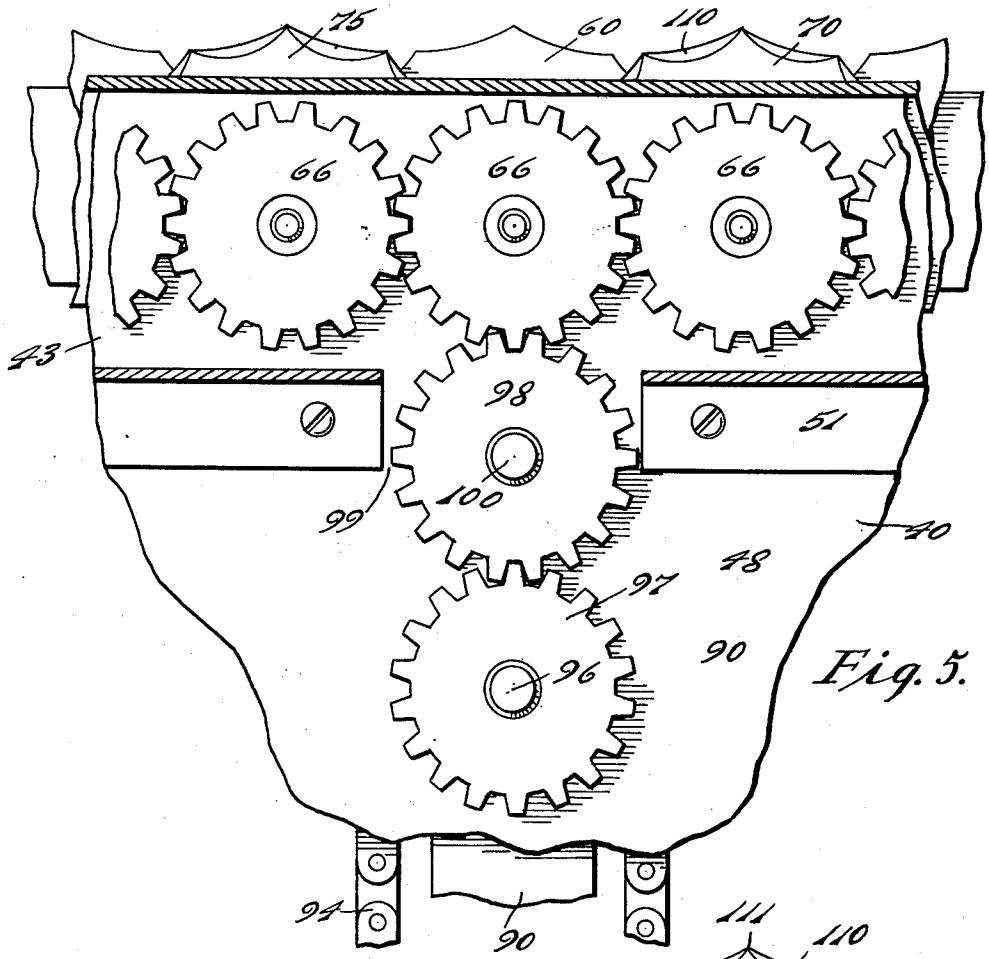


Fig. 5.

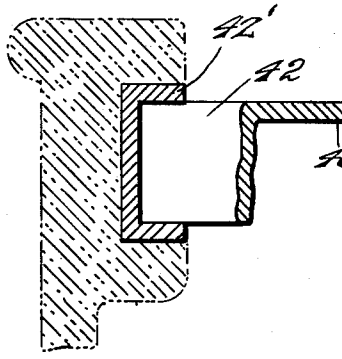


Fig. 7.

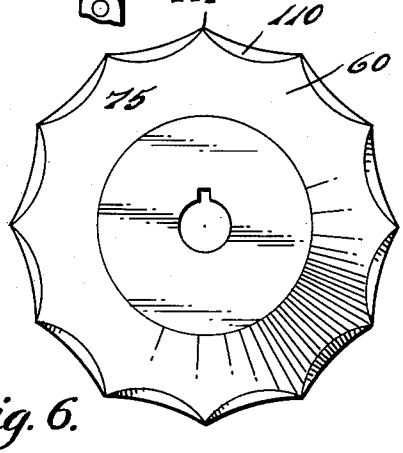


Fig. 6.

INVENTORS.
WALTER E. AULEN
WILLIAM J. CLARK
BY
ATTORNEYS.

United States Patent Office 2,723,717
Patented Nov. 15, 1955

2,723,717

MOVABLE GATE CARRYING ROTARY KNIVES FOR CUTTING CLOTH ON A WINDING MACHINE

William J. Clark, Jenkintown, Pa., and Walter E. Aulen, Woodstown, N. J., assignors to Eddystone Machinery Company, Chester, Pa., a corporation of Pennsylvania

Application May 7, 1953, Serial No. 353,473

2 Claims. (Cl. 164—61)

The present invention relates to winding machines and cutters therefor.

A purpose of the invention is to obtain a smoother and straighter cut on a winding machine and to reduce the amount of cloth damage by the cut.

A further purpose is to permit reliable cutting of heavier, tougher and more resistant cloths.

A further purpose is to permit cutting of cloth on a winding machine at lower speeds, at erratic speeds or during temporary stoppage of the machine, without damage to the cloth or to the machine and without interrupting the winding operation.

A further purpose is to permit cutting before a large roll has been wound.

A further purpose is to cut more rapidly and obtain less overlap of the advancing cut end on a new shell during cutting, and to obtain a tighter wind of the first few turns of the cloth on the new shell.

A further purpose is to avoid a tendency to feed the cloth to one side of the machine during cutting.

A further purpose is to make the rotary cutter self-sharpening and to remove any burrs which may form.

Further purposes appear in the specification and in the claims.

In the drawings we have chosen to illustrate one only of the numerous embodiments in which our invention may appear, with a minor variation, the forms shown being selected from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figure 1 is a front view, partly broken away, showing the gate of the winding machine in acordance with the invention.

Figure 2 is a fragmentary partially diagrammatic end elevation of a winding machine to which the invention has been applied.

Figure 2*a* is a fragmentary diagrammatic end elevation, showing the cutting of the cloth in accordance with the invention.

Figure 3 is an enlarged section of Figure 1 on the line 3—3.

Figure 4 is an enlarged section of Figure 1 on the line 4—4.

Figure 5 is a fragmentary section of Figure 3 on the line 5—5.

Figure 6 is a front elevation of a modified form of rotary cutter.

Figure 7 is a fragmentary sectional plan showing the gate.

Describing in illustration but not in limitation and referring to the drawings:

Winding machines of the Simpson type (Simpson U. S. Patent No. 542,034, dated July 2, 1895, for Cloth Winding Machine) are extensively used for winding cloth. In such machines two spaced parallel drums turn in the same direction, and shells placed on their upper surfaces and pivotally mounted at the ends turn with the drums. The end of the cloth is first wound around a shell turning with

the rear drum, and after a substantial roll has formed on the rear drum the roll is transferred to the front drum so that the cloth is carried across between the drums. When the roll has been wound to the desired size and a new shell is placed on the cloth above the rear drum, a cutter carried by a gate is raised between the drums, cutting the cloth and letting the newly formed cut end be wound around the new shell to start a new roll.

In the prior art a cutter has been used having cutting teeth extending out diagonally from the gate in the direction from which the cloth is coming, and having diverging cutting edges at the side of the teeth extending generally in the direction of the motion of the cloth. Except that the cutter moves up and down with the gate, it is stationary and relies upon the motion of the cloth to provide the force necessary to cut. The serrated blade of this character is generally known as a doffin cutter.

The prior art doffin cutters when used on winding machines of the character under discussion have caused difficulty in certain types of service. When the speed of progression of the cloth has been reduced to a very low value or has been erratic, in some cases the doffin cutter has hooked into the cloth without cutting it, either stopping forward motion of the cloth or breaking some part of the machine.

In recent years certain cloths have been used which are difficult or impossible to cut by a doffin cutter. One example of such material is heavy plastic sheets. Another example is leno cloth made out of cotton, hemp or paper, and commonly used for bags to hold fruit or canned goods, the cloth sometimes having a draw string woven longitudinally in the fabric. Another example is "double-double" cloth which consists of four plies of sheeting. Other examples are very heavy ducks, canvases and paulins.

Another difficulty encountered with the doffin cutter is that the pull from the cutter is so great that it is necessary to have a substantial number of turns wound around the shell before cutting a roll, as otherwise the cutter may just cause the cloth to rotate with respect to the shell on which it is wound.

In some cloths of high value the loss of material due to the zigzag cut produced by the doffin cutter and the unattractive appearance of the zigzag cut have been objectionable.

In accordance with the present invention, it is possible to cut cloths regardless of the speed of progression even though the speed is erratic or the cloth has temporarily stopped advancing.

The cutter of the present invention also is desirable for cutting very heavy cloths such as leno cloth, "double-double" cloth, heavy plastics, and heavy weight ducks, canvases and paulins.

There is no tendency to stop the forward progression, or break the machine, and the invention is applicable at any stage of winding of the roll, so that it is not necessary to wind an unnecessarily large roll in order to cut.

The time of cutting is reduced, so that the amount of cloth wound on the new shell during the cutting is reduced, and there will be no tendency to form several turns of loosely wound cloth on the new shell, as was the practice in the prior art.

The cut obtained is no longer zigzag, but is straight, so that material is not wasted by the cut and the cut obtained is not unattractive.

Unlike notary cutters which have been applied in other arts, the rotary cutter of the present invention has no tendency to feed the cloth to one side and thus spoil the smooth edges of the roll or necessitate stopping the machine.

The cutter of the present invention is especially suited to cutting heavy materials in which the drying time is

long and the speed of progression from the dryer to the winder is slow, but it is also useful for cutting ordinary or light cloth.

In accordance with the invention rotary cutters are mounted on the top of the gate and they overlap so that the cutter length extends continuous across the machine. The adjoining cutters are desirably staggered, and preferably have flat faces in juxtaposition so that the cutters are self-sharpening and self-deburring.

The machine as shown in Figure 2 and as illustrated more fully in the Simpson patent above referred to, and in Husson U. S. Patent No. 2,537,588, granted January 9, 1951, for Web Winder, comprises a frame **20** having sets of bearings **21** at the opposite ends which rotatably mount a forward drum **22** and a rearward drum **23** on spaced parallel axes. The two drums have their axes transverse to the direction **24** of progression of the cloth to be wound and the axes are suitably horizontal and at the same level as well known.

The machine as in usual practice has sprockets **25** on the respective drums which are interconnected by a chain **26** which assures that the two drums turn in the same direction and at the same speed. One of the drums is driven in any suitable manner.

Above the drums at the two sides of the machine are uprights **27** as well known, which support pivot jaws which pivotally mount the opposite ends of a rear or new shell **28** which turns on top the cloth with the surface of the rear drum. The new shell as it winds rises in the pivot jaws, and the pressure of the pivot jaws on the new shell is controlled by brake mechanism **30**, which forms no part of the present invention.

After the roll has been wound to the desired size on the rear drum, it is transferred to the front drum, the pivots of the shell being supported in pivot jaws **31** of jaw arms **32** pivoted at **33**, and manipulated by hydraulic cylinders **34** to open the jaws **31** and apply pressure to the jaw arms if desired.

A track **35** is provided at each side of the machine to introduce the new shell and a track **36** is provided at each side of the machine to transfer the pivots of the roll wound on the rear drum to the front drum.

When the roll on the rear drum has been wound to the desired size, it is transferred to the front drum and becomes a front roll **37** as shown in Figure 2*a*. When the roll has been wound to the desired size, the cloth **38** is cut transversely of the direction **24** of motion and between the two drums. This is done by raising gate **40** which is placed between the drums and normally lies below the cloth. The gate as well known in the art has a gate frame **41** which carries at the two sides vertical guiding members **42** which ride in a vertical track **42'** at the two sides of the machine. The frame also has an upper transversely extending head **43** and diagonal braces **44**.

Rams **45** operated by fluid cylinders **46** connect to the gate head at the two sides of the machine and are suitably controlled by a valve **47**. The cylinders are double acting so that the gate can be raised at a predetermined time and lowered at a predetermined time. Ordinarily in the present invention the gate remains raised only for a few seconds.

The gate head **43** desirably comprises an angle **48** extending transversely of the gate, and secured at the top to an angle **50** also running transversely, the angle **50** being connected at the top and the bottom to a housing **51** which forms a transversely extending gear box **52**.

Also running transversely of the machine in parallel spaced relation to the angle **50** is an angle **53**.

The angle **53** on one side and the angles **40** and **50** on the other side carry aligned bearings **54** and **55** which journal stub shafts **56** in a set extending horizontally side by side in a row with the axes of the shafts extending in the direction of cloth motion. The stub shafts have shoulders **57** at their rear ends, and at each alternate position shown at the top in Figure 3 they carry hubs **58** which mount rotary cutters **60** connected to the shafts by keys **61**. At this position the cutter is held by a bushing **62** which is internally threaded to engage a threaded end **63** on the shaft, carries a flange **64** which engages a spacer washer **65**, and is externally threaded at the end remote from the cutter to receive a gear **66**.

At the alternate positions as shown in Figure 4 the stub shafts have spacer shanks **67** in line with the cutters **60** and then hubs **68** which receive opposite counterpart cutters **70** in staggered relation to the cutters **60**, and held by keys **71**. A bushing **72** is flanged at **73** to engage the outside of spacer washer **65**, is internally threaded on the portion **63** of the stub shaft and is externally threaded at **65** to engage gear **66** which cooperates with the adjoining gear **66** of Figure 3.

Each cutter **60** or **70** has a flat surface **74** which is in juxtaposition to and actually in wiping engagement with a flat surface **74** on the opposite counterpart rotary cutter and also has a convex or wedge outer surface **75** remote from the opposite counterpart cutter.

As seen in Figures 1 and 5 the respective cutters **70** and **60** overlap to an extent that their cutting edges form a continuous exposed cutting surface across the width of the cloth.

As the gears turn the opposite counterpart cutters in opposite directions, it will be evident that any tendency of one cutter to push the cloth laterally in one direction is compensated by the tendency of the next cutter to push the cloth laterally in the opposite direction and the cutters in cutting pull against one another in the cloth. Thus the cutting is very rapid. Furthermore the effective cutting edges are very narrow and a substantially straight transverse cut is obtained instead of a zigzag.

The line of gears **66** as shown in Figure 5 is driven suitably at the center by a chain **76** (Figure 1) which drives a suitable sprocket **77** which in turn drives a sprocket **78** on the same shaft **80** mounted in bearings **81**, stationarily positioned at the bottom of the machine. Pivoted on the shaft **80** free from the sprocket **78** is a lever **82** which journals at its opposite end a shaft **83** which has sprockets **84** and **85** mounted thereon. Sprocket **84** is driven by chain **86** on sprocket **78**. Also pivoted on shaft **83** but free from sprockets **84** and **85** are levers **87**, the other ends of which swing on shaft **88** mounted on vertical frame member **90**. Sprocket **85** which turns with sprocket **84** on shaft **83** intermeshes with chain **91** which meshes with sprocket **92** on shaft **88**. Also carried on shaft **88** and turning with sprocket **92** is sprocket **93** which cooperates with chain **94** which drives sprocket **95** on shaft **96** journaling in the frame member **90**. Also supported on shaft **96** and turning with sprocket **95** is gear **97** which is intergeared with gear **98** on shaft **100** journaling in frame member **90**, and intergeared with one of the gears **66**. The gear case **52** is cut out at **99** to allow the gear **100** to enter.

As well known in the art, the gate carries on the side from which the cloth comes suitable tucking fingers **101** mounted on a transverse shaft **102** journalled in bearings **103**, on the gate angle **48** urged away from the cutters by tortion springs **104** and held close to the cutters by a bar **105** when the gate is down. The tucking fingers engage the newly cut forward end of the cloth and tend to deflect it around the new shell **28**, this function also being aided by threading belts **106** supported on suitable rollers **107** from a frame **108** as shown in Figure 2, and forming no part of the present invention.

Gussets **109** at the ends brace the gate frame.

In operation the gate remains down until the wound roll is placed on the forward drum and the time has come to cut the cloth. The gate is then raised by the fluid cylinders **46**, and the cutters respectively rotate in opposite directions seizing and cutting the cloth. The newly cut end is carried by the tucking fingers around the new shell and starts the new roll while the trailing end

wraps around the old roll. The gate can then be retracted allowing normal winding to proceed.

While it is not essential to use any particular type of circular cutter, it is desired to have cutters which have fluted blades at **110** on the convex side, and form protruding cutting teeth **111**, the flat sides being entirely smooth and rubbing against one another, thus keeping the cutters sharp and removing burrs.

Cutters can be of any suitable material, preferably high speed steel, or cemented carbide.

It will be evident that in the present invention, unlike the doffin cutter, the cutter is preferably carried straight up, rather than being inclined in the direction from which the cloth is coming.

In view of our invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of our invention without copying the structure shown, and we therefore claim all such insofar as they fall within the reasonable spirit and scope of our claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A cloth winding machine comprising spaced parallel rotatable drums, in combination with a gate mounted between the drums and vertically movable from a position below the upper level of the drums to a position above the upper level of the drums, rotary knives extending along the top of the gate, each knife having a flat side and a convex side and having teeth at the periphery, the knives being arranged in two rows staggered and overlapping with the flat sides of adjoining

knives in juxtaposition to one another, means for raising and lowering the gate, a line of gears each interconnected operatively with one of the knives and each gear being intergeared with the adjoining gear to drive adjoining gears in opposite directions, sprocket means stationarily mounted below the gate, sprocket means mounted on the gate, gearing interconnecting the sprocket means on the gate with the gears driving the individual cutters, lever means pivotally mounted on the gate, on the same axis as the sprocket means mounted on the gate, lever means pivotally mounted on the same axis as the stationarily mounted sprocket means and pivotally connected to the lever means first mentioned, sprocket means mounted on said lever means on the axis of pivotal interconnection, chain means interconnecting the sprocket means on the gate with the sprocket means on the lever means and chain means interconnecting the fixedly mounted sprocket with the sprocket means on the lever means.

2. A cloth winding machine according to claim 1, comprising spindles operatively mounted along the gate, each receiving and mounting one of the gears which intergear the knives and one of the knives, and means on the spindle for selectively receiving a knife in each of two alternate positions, in which the flat side of the knife faces in either of two opposite directions.

References Cited in the file of this patent

UNITED STATES PATENTS

611,599	Beaty et al.	Oct. 4, 1898
1,652,093	Coombes	Dec. 6, 1927
2,537,588	Husson	Jan. 9, 1951