Oct. 3, 1972 A. V. THOMAS Re. 27,500

STRIPPER FOR INTERMITTENT SPIRAL TUBE WINDER

Original Filed March 11, 1968 5 Sheets-Sheet 1

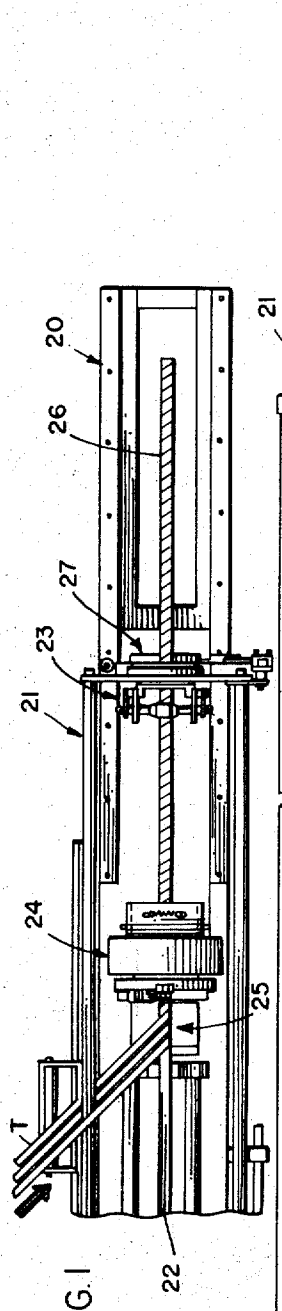


FIG. 1

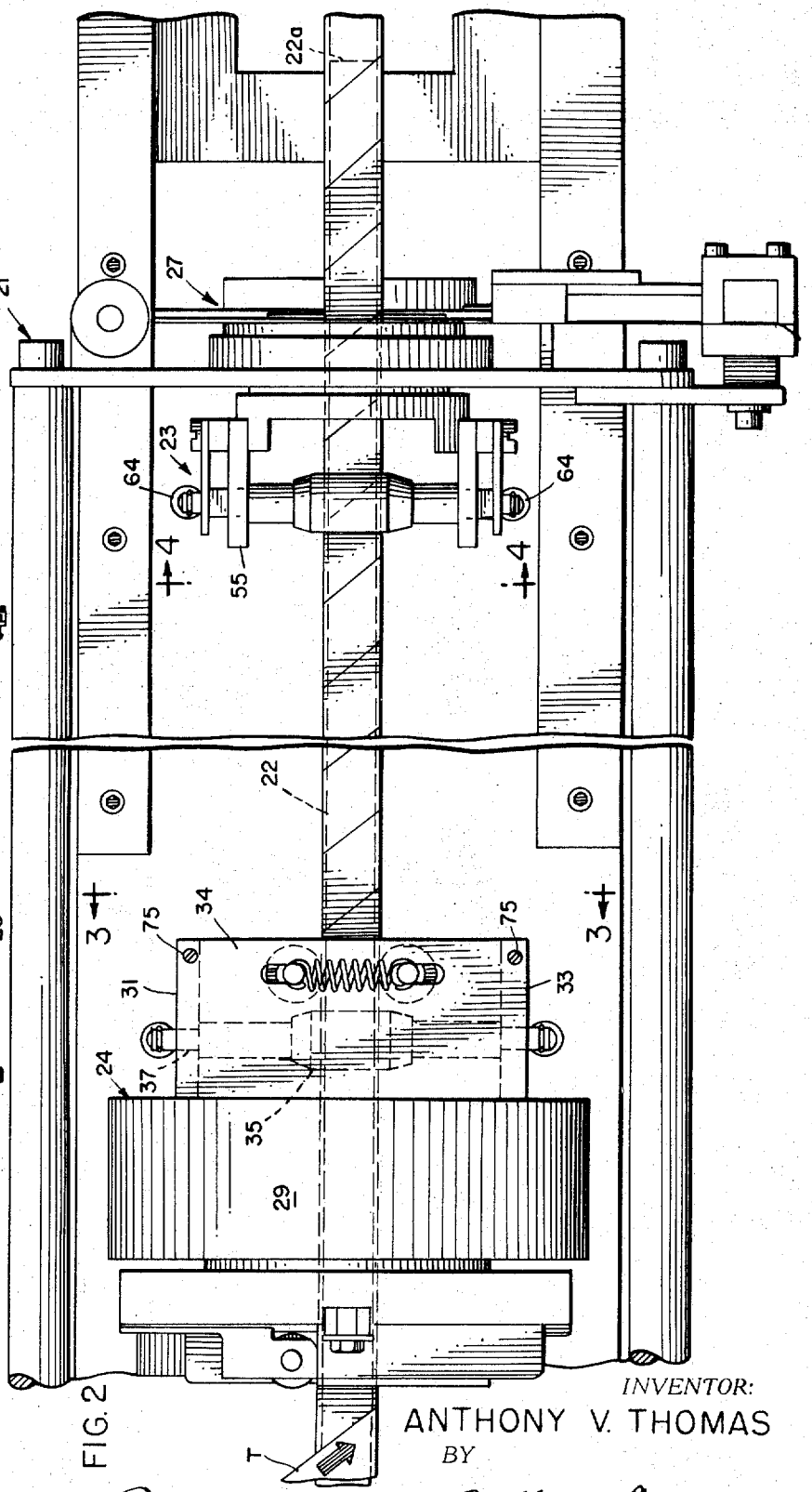


FIG. 2

INVENTOR:
ANTHONY V. THOMAS
BY
Dawson, Tilton, Fallon & Lungmus
ATT'YS

STRIPPER FOR INTERMITTENT SPIRAL TUBE WINDER

Original Filed March 11, 1968 5 Sheets-Sheet 2

FIG. 3

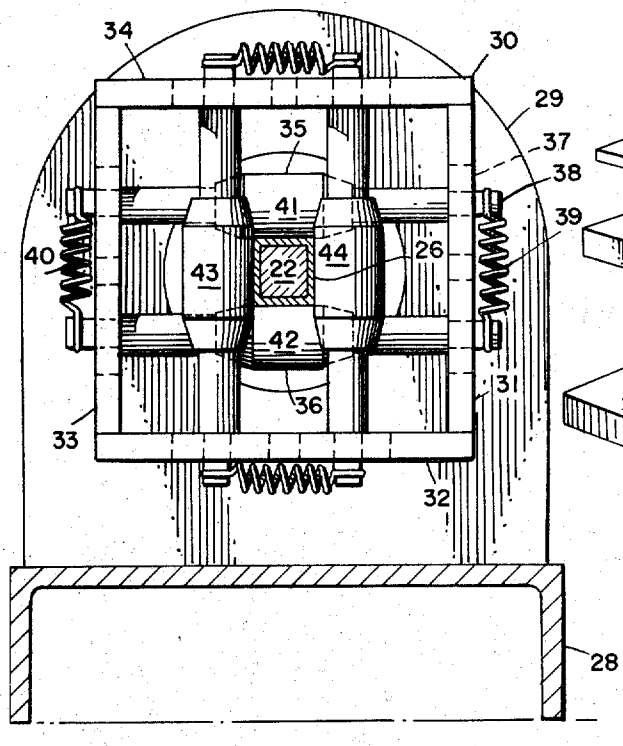


FIG. 4

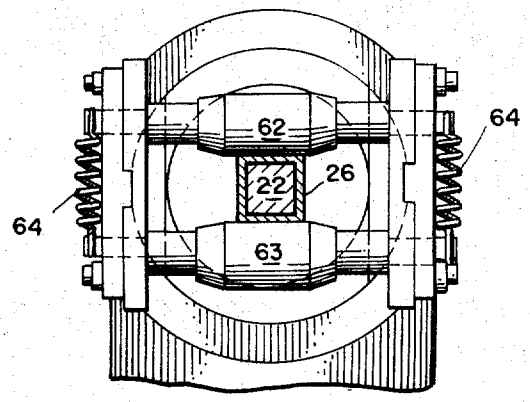
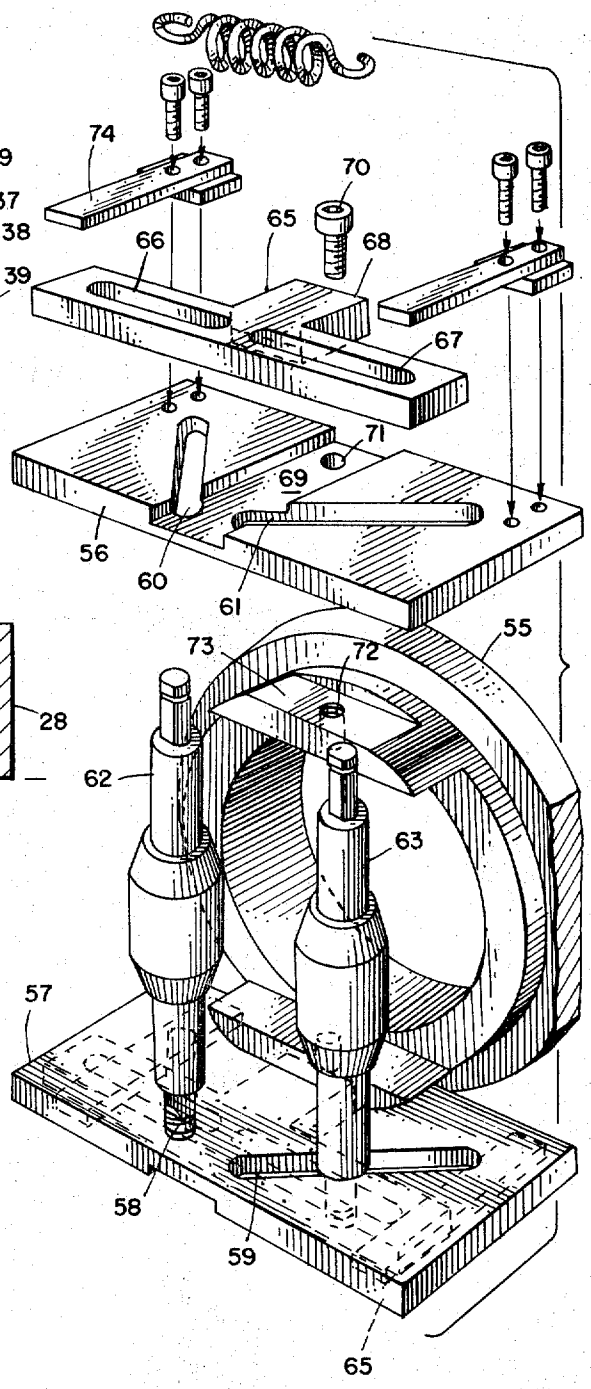


FIG. 5



INVENTOR:
ANTHONY V. THOMAS
BY
Dawson, Tilton, Fallon & Lungmus
ATT'YS

STRIPPER FOR INTERMITTENT SPIRAL TUBE WINDER

Original Filed March 11, 1968 5 Sheets-Sheet 3

FIG. 6

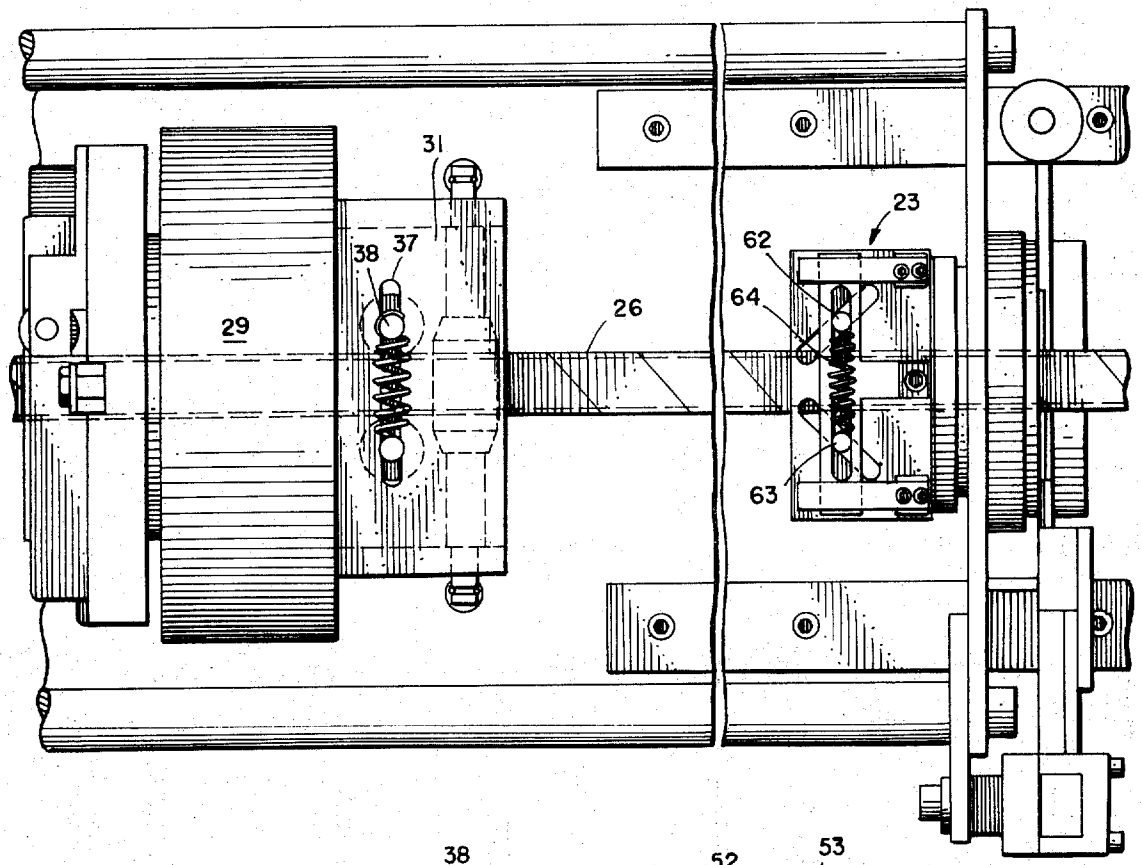


FIG. 7

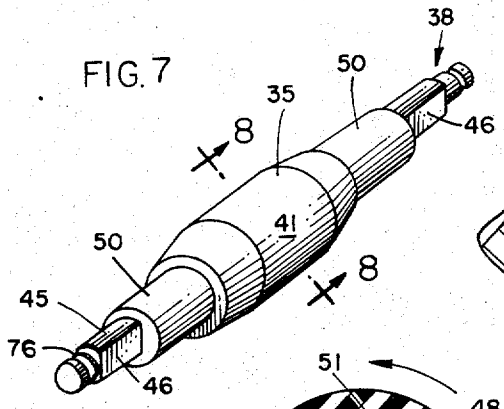


FIG. 9

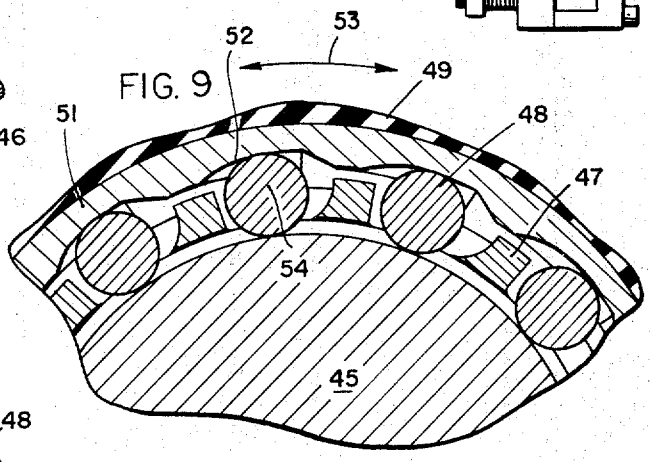
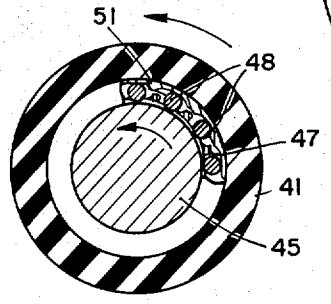


FIG. 8



INVENTOR:
ANTHONY V. THOMAS
BY
Dawson, Tilton, Fallon & Lungmus
ATT'YS

STRIPPER FOR INTERMITTENT SPIRAL TUBE WINDER

Original Filed March 11, 1968 5 Sheets-Sheet 4

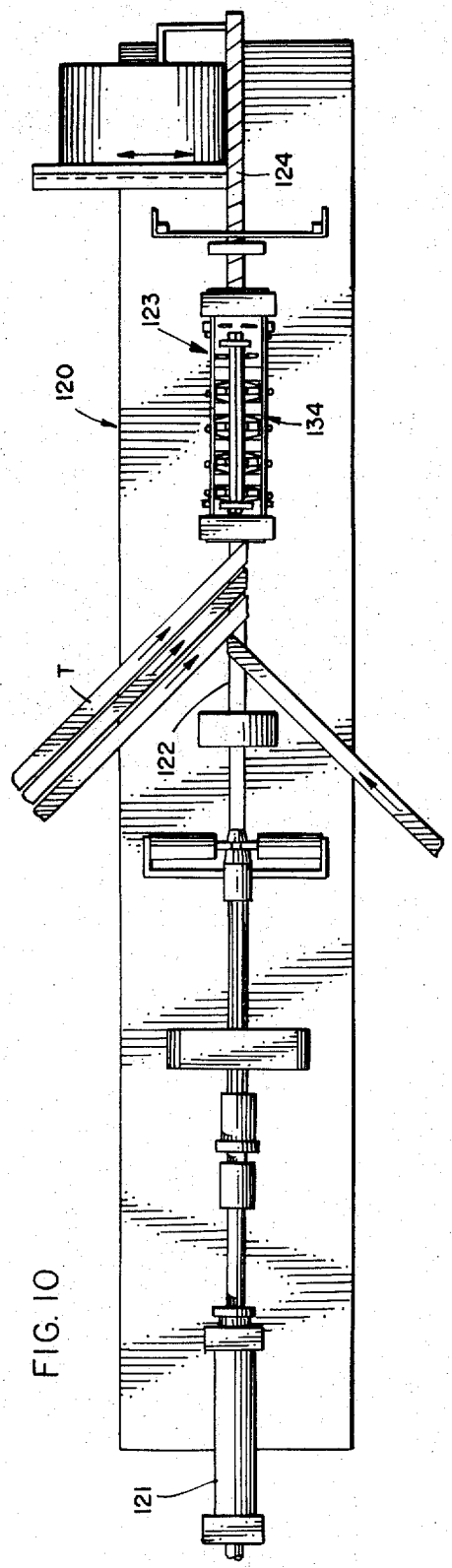


FIG. 10

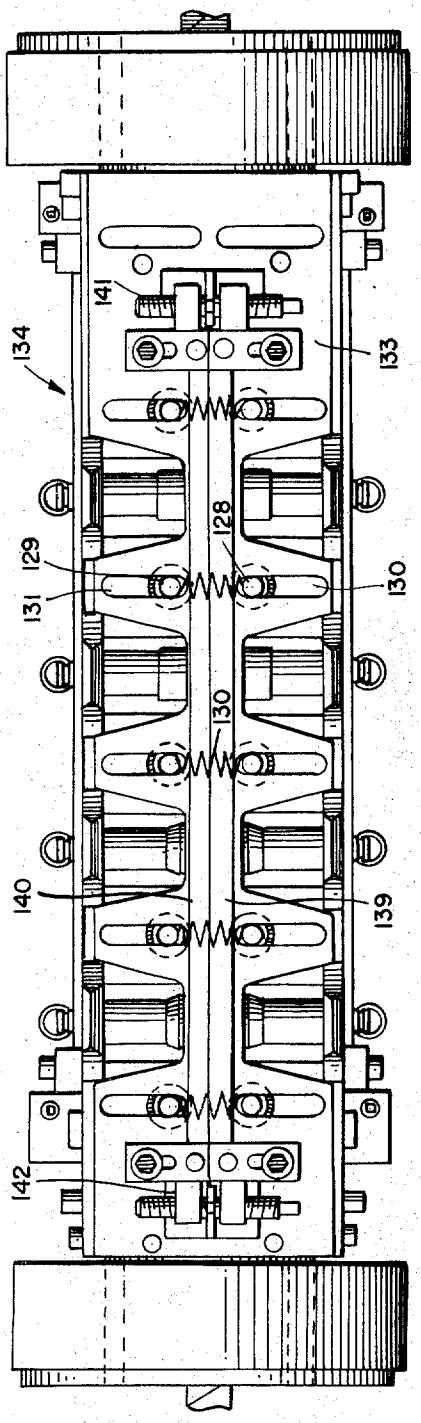


FIG. 11

INVENTOR:
ANTHONY V. THOMAS
BY
Dawson, Tilton, Fallon & Lungmus
ATT'YS

STRIPPER FOR INTERMITTENT SPIRAL TUBE WINDER

Original Filed March 11, 1968 5 Sheets-Sheet 5

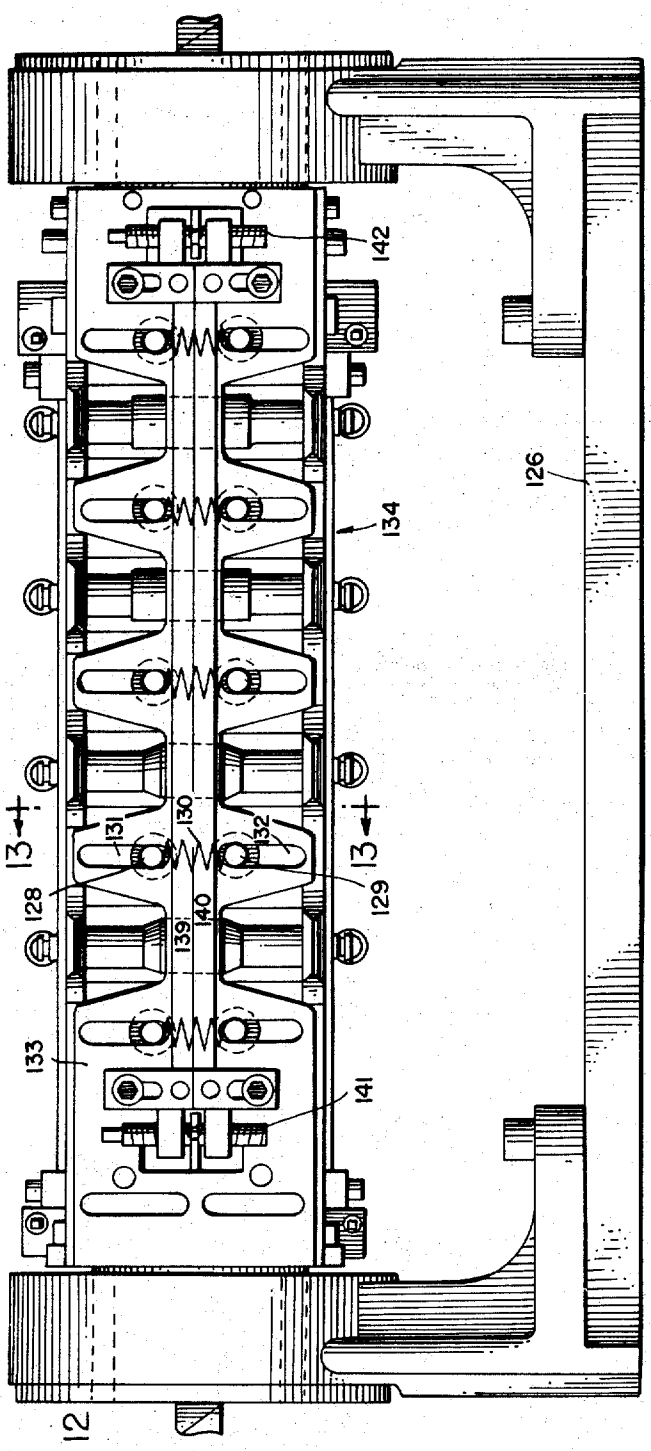


FIG. 12

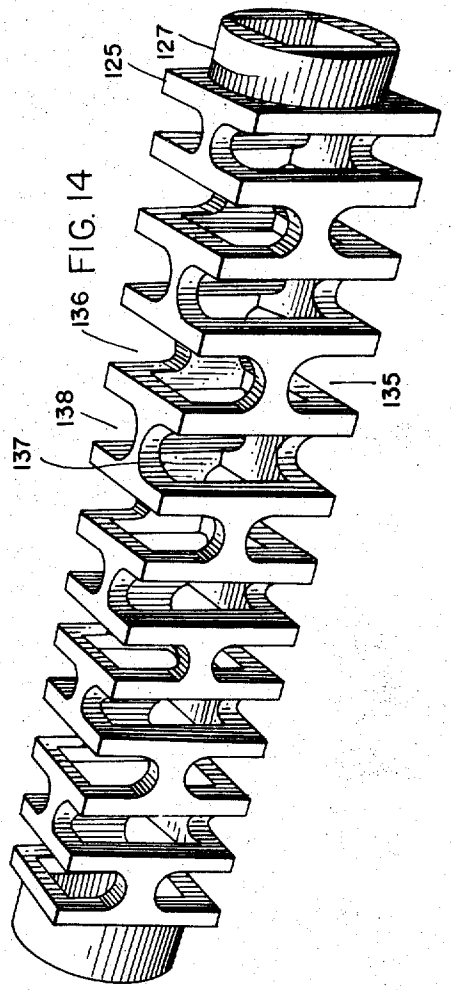


FIG. 14

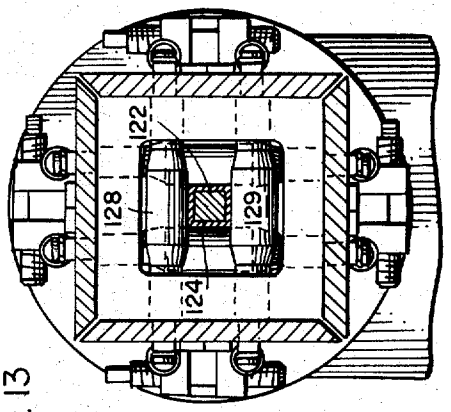


FIG. 13

INVENTOR:
ANTHONY V. THOMAS
BY
Dawson, Tilton, Fallon & Lungmus
ATT'YS

United States Patent Office

Re. 27,500
Reissued Oct. 3, 1972

27,500

STRIPPER FOR INTERMITTENT SPIRAL TUBE WINDER

Anthony V. Thomas, Prospect Heights, Ill., assignor to Precision Paper Tube Company, Wheeling, Ill.

Original No. 3,482,490, dated Dec. 9, 1969, Ser. No. 712,291, Mar. 11, 1968. Application for reissue Oct. 9, 1970, Ser. No. 79,715

Int. Cl. B31c *3/00*

U.S. Cl. 93—80 5 Claims

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

ABSTRACT OF THE DISCLOSURE

An improved stripper for an intermittent spiral tube winder wherein an arbor advances while rotating to perform a winding operation and thereafter retracts from the already wound tube so as to present an overlapping portion suitable for severing—the severed tube being useful as a coil form. The improved stripper or gripper includes one-way roller clutches arranged to bear against the sides of a rectangular tube to restrict the same from returning with the arbor.

Background of invention

The invention finds particular utility in connection with square-tube winders of the type found in Jauch Patent No. 1,625,471 and Macchione patent Reissue No. 25,820. Both of the Jauch and Macchione machines are of the intermittent type. Over the years, tube manufacturers have made use of both intermittent and continuous tube winders. Continuous tube winders are, for the most part, much more complex. The intermittent tube winders are characterized by an advancing, rotating arbor which develops a wound length (6–8 inches in the case of Jauch and 20–30 inches in the case of Macchione) after which the rotation stops, the wound tube gripped, and the arbor retracted to starting position, after which the cycle is repeated. A critical element in the operation of any intermittent winder is the stripping means that restrains the already formed tube from being retracted along with the arbor. Should simultaneous reaction occur, the winding operation may have to be stopped because of the possibility of overwinding, wrinkling of the tapes, etc. In the extreme, a jam or wadding of the tapes can occurs which requires dismantling of the machines so as to realign the tapes.

Inasmuch as the tapes are wound relatively tightly on the arbor, a substantial restraining force is necessary in the strippers to prevent a joint retraction, i.e., to provide sufficient gripping force on the tube so as to overcome the friction between the tube interior and the arbor so that the arbor may slidingly retract within the tube. In the past, the strippers have been characterized by the use of metal parts. These metal parts tend to dig into the tube (in order to exert the necessary restraining force) and in some cases develop not only unsightly but unacceptable score marks. It will be appreciated that such forms are used to develop inductors wherein a large number of turns of wire are applied and the value of the inductance is determined by the number and placement of the wire turns. A distorted or otherwise damaged coil form can develop an unacceptable variation in inductance.

With the order of magnitude of pressure that is exerted by the prior art stripping means, there results the possibility of scoring or burring the arbor itself, should

the strippers contact a naked arbor. Once this occurs, the frictional engagement between the two is increased so that the desired slidability may be lost, possibly resulting in jams and expensive and extensive down time and repair.

The principle concern, however, is that of preventing retraction of the tube with the arbor, i.e., the elimination of slack or backlash in the stripping mechanism. With mechanical arrangements of the nature taught in both Jauch and Macchione, backlash of an unacceptably high value develops relatively shortly after the machine is put into use. In the Jauch machine, which makes use of ratchets and pawls as well as sliding and rotating knurled rollers, the various metal parts develop excessive backlash. This, as will be pointed out hereinafter, may result in erratic grooving of the roller-receiving slots so as to render the machine unpredictably inoperable. In the Macchione machine, which has the advantage over Jauch in providing a longer tubular segment for each cycle of the arbor, the greater restraining force needed has resulted in a complex stripper mechanism that is difficult to set up and maintain.

According to the invention, all of the foregoing difficulties are avoided through the unique usage of one-way roller clutches as the stripping means. By virtue of this arrangement, the advantage of the Macchione machine over the Jauch machine in providing longer tube segments each cycle is preserved yet without the difficulties in set up, maintenance and operation. Here it should be appreciated that contemporary production techniques result in the tubes having length of the order of about 24 inches. Thus a Jauch-type machine requires about three cycles for such a tube. Notwithstanding the less efficient operation of a Jauch-type machine, the same is preferred by some winders because of its more compact nature—this being tolerable where a quantity production is not critical.

It is therefore an object of this invention to provide an improved stripper for both of the prior art type intermittent square tube winding machines. Additionally, the invention provides a unique secondary gripping means for a Macchione-type machine, i.e., the one associated with the "travelling cut-off."

Detailed description

The invention is described in conjunction with two embodiments in the accompanying drawing in which—

FIG. 1 is a fragmentary top-plan view of the winding end of a Macchione-type machine;

FIG. 2 is a fragmentary enlarged top-plan view of the central portion of FIG. 1;

FIG. 3 is a sectional view taken along the sight line 3—3 of FIG. 2 and showing details of the basic gripper, i.e., the one employed for stripping the tube from the arbor during retraction of the latter;

FIG. 4 is a fragmentary sectional view taken along the slight line 4—4 of FIG. 2 and showing in detail the gripping means associated with the "traveling cut-off";

FIG. 5 is an exploded perspective view of the traveling cut-off gripper of FIG. 4;

FIG. 6 is a top-plan view of the right-hand portion of FIG. 1 and thus corresponds essentially to the right-hand portion of FIG. 2 but wherein the arbor in FIG. 2 has been rotated 90° so that the gripper portion in FIG. 6 is essentially a side elevation of that seen in FIG. 2;

FIG. 7 is a perspective view of one of the one-way roller clutches employed in the grippers seen in the preceding views;

FIG. 8 is a transverse sectional view such as would be seen along the sight line 8—8 applied to the one-way roller clutch of FIG. 7;

FIG. 9 is an enlarged fragmentary detail of FIG. 8;

FIG. 10 is a top-plan view of a portion of a Jauch-type ıachine equipped with the inventive gripper;

FIG. 11 is an enlarged detail of the gripper portion of IG. 10;

FIG. 12 is a bottom-plan view of the gripper seen in IG. 11;

FIG. 13 is a sectional view such as is seen along the ght line **13**—**13** of FIG. 12; and

FIG. 14 is a perspective view of the chassis portion of ıe gripper seen in FIGS. 10–13.

In the illustration given and with particular reference) FIG. 1, the numeral **20** designates generally the frame f a horizontally elongated machine. Further details of ıis machine may be seen in the above-mentioned Mac-ıione patent Reissue No. 25,820. The various prime ıover details at the extreme left end of the machine have ɜen eliminated from FIG. 1 for ease of description. The ɒerational parts of the machine relevant to the instant ıvention include a traveling carriage generally designated **l** which provides a means for advancing an arbor **22**. he extreme end of the arbor **22** is designated **22a** in IG. 2. The carriage **21** at its extreme left-hand end (not ıown) may be coupled to a hydraulic cylinder for the urpose of advancing the carriage and arbor together (as ı FIG. 10 to be described hereinafter). Stabilizing the ·bor adjacent its unsupported end **22a** is a traveling ripper mechanism generally designated **23**—this being arried by the carriage **21**.

The arbor **22** is caused to rotate during its forward ıovement, i.e., during its travel to the right as shown. otation of the arbor is achieved by means of the sta-onary gripper generally designated **24**. The stationary ripper or, more precisely, the tube "stripper" is positioned long the machine length just forward of the tape appli-ıtor position generally designated **25**. As can be best ɜen in FIG. 1, three tapes are provided in angled rela-on to the axial direction of the arbor and as the arbor ɒtates and is advanced, these tapes are wound in over-ıpping relation to form a "square" tube. It will be ap-reciated that most of the tubes produced on intermittent ıachines of this type for usage as coil forms have a cross-ɜction but it will be appreciated that plural-sided tubes f other configurations may be equally advantageously eveloped. For that purpose, the term "rectangular" is sed herein to designate plural-sided tubes whether they e triangular, rectangular, square, polygonal, etc.

In the operation of the apparatus thus far described, ıe carriage **21** advances in a winding cycle toward the ight, meanwhile, the stationary stripper mechanism **24** ɒtating the arbor **22** which is advancing with the carriage **1**. This causes the tapes T to be wound as at **25** and a ıbe continuously developed. As the carriage **21** reaches ıe right-hand end of its stroke, rotation of the arbor **22** eases, the carriage **21** retracts (i.e., moves to the left) nd the arbor **22** is withdrawn from the tube **26** leaving he same in cantilevered relation to the arbor. At that ime, a cut-off mechanism generally designated **27** and ssociated with the right-hand end of the carriage **21** ıperates to transversely sever the tube—in a fashion de-cribed in greater detail in the above-mentioned Reissue 'atent No. 25,820. Thereafter the cycle is repeated and he severed tube segments are collected in a bin or other torage (not shown).

Stripper mechanism

The stripper mechanism associated with the stationary ripper **24** can be best appreciated from a consideration ɒf FIGS. 2, 3 and 6. Referring first to FIG. 3, the nu-neral **28** designates a fragment of a pedestal provided ıs a stationary part of the frame **20**, i.e., the pedestal **28** s rigidly integrated with the frame **20**. Extending up-vardly from the pedestal **28** is a housing **29** which con-ains gearing (not shown) employed to rotate a chassis **0**. As will be appreciated from what has gone before, he chassis **30** is rotated intermittently, i.e., only during

the advancement portion of the arbor reciprocating cycle. From a comparison of FIGS. 2 and 3, it is seen that the chassis **30** is essentially of an open-box construction, having four sides as at **31**, **32**, **33** and **34**. The sides are arranged in opposing pairs with the sides **31** and **33** supporting a first pair of one-way roller clutches **35** and **36**. For this purpose, the sides **31** and **33** are equipped with vertically-extending grooves as at **37**. Received within the groove **37** are the journals generally designated **38** (see FIG. 7) of a typical one-way roller clutch **35**. The journals of the first pair of roller clutches **35** and **36** are resiliently tied together by means of springs **39** and **40**. Thus, the central portions **41** and **42** are urged together in clamping relation to the tube **26**. A similar arrangement is employed for the one-way roller clutches **43** and **44** (see FIG. 3) extending between the opposed sides **32** and **34**.

The operation of the roller clutches as exemplified by the element **35** in FIG. 7 can be best appreciated from a consideration of FIGS. 7–9. The journal **38** extends from one end of the element to the other providing a through shaft **45**. This shaft is equipped with flats as at **46** (see FIG. 7) so as to be non-rotatably received within the slots **37**. Rotatably mounted about the shaft **45** is a needle-bearing cage **47** equipped with axially elongated needle bearings **48**. Clamped around the exterior of the cage **47** is a rubber sleeve **49** which provides the roller portion **41**. The rubber sleeve **49** extends beyond the axial length of the cage **47** and is supported on spacers **50**. The cage **47** consists of inner and outer parts with the outer part **51** being equipped with camming surfaces **52**. Thus, as the outer rubber sleeve **49** is attempted to be rotated in the direction of the arrow **53**, the needle-bearing elements **48** are forced clockwise, i.e., in the direction of the arrow **53** (see FIG. 9) so as to "clutch" the shaft **45** and thereby substantially immobilize the roller **41**. In contrast, when the sleeve **48** is subjected to a rotational force tending to rotate the same in a counterclockwise direction (in the form pictured in FIG. 9), there is free rotation. The one-way roller clutches are arranged so that only 2–3 minutes of backlash rotation are required before the sleeve **49** is immobilized so as to restrict any tendency of the tube **26** to move in company with the arbor **22**.

Traveling gripper

Because of the length of tubing produced each cycle, it is desirable in a Macchione-type machine to provide a gripper to insure that the tube **26** does remain immobile relative to the arbor as the arbor **22** is advanced during a winding cycle. The traveling gripper **23** is seen in FIGS. 2 and 4–6 and utilizes the same type of one-way roller clutches that were previously described in conjunction with the stripper mechanism **24**. Optimum results have been obtained in the practice of the invention utilizing roller clutches designated RC–061008 of the Torrington Company of Torrington, Conn., these clutches also being shown in U.S. Patents Nos. 3,184,020 and 3,194,368.

For the traveling gripper which grips the tube **26** on the forward stroke of the arbor but releases any clamping pressure thereon during retraction of the arbor, I provide a subframe **55** (see FIGS. 2 and 5). The subframe **55** includes a pair of opposed plates **56** and **57** (see FIG. 5) each of which is equipped with a pair of angled, i.e., convergent slots as at **58** and **59** in the plates **57** and **60** and **61** in the plate **56**. Slidably mounted within opposing slots, i.e., **58** and **60**, and **59** and **61** is a pair of roller clutches **62** and **63**. As can be appreciated from FIG. 6, the journal ends of the clutches **62** and **63** are interconnected by means of a spring **64**, a similar spring being provided to couple the other journal ends. The cooperating slots permit the parallel arranged roller clutches **62** and **63** to move into clamping relation with a tube **26** on the arbor **22** (see FIG. 4).

To achieve centering of the two clutches **62** and **63**, I provide a pair of supplemental bars as at **65** in FIG. 5. The bars **65** are slotted as at **66** and **67** to receive the journals on the ends of the clutches **62** and **63**. The bars **65** are maintained in a predetermined position by means of a block portion **68** slidably received within a slot **69** in the corresponding plate **56** or **57**, as the case may be. By virtue of the cooperation of the block **68** and the slot **69**, the bar **65** maintains a predetermined orientation—one in which the length of the slots **66** and **67** is perpendicular to the axis of the arbor **22**. As larger arbors or thicker tapes T are used to form the square tubes **26**. the block **68** moves in the slot **69** to accommodate outward movement of the journals of the clutches **62** and **63** in the slots **60**, **61**, etc. The plates **56** and **57** are secured to the housing **55** by virtue of Allen screws **70** passing through openings **71** into threaded bores **72** in integral flanges **73** (see FIG. 5). The bars **65** are maintained in place by means of clips **74** which are threadably secured to the adjacent plates in the manner indicated in FIG. 5. Thus, the above-mentioned sliding movement of the bars **65** is readily accommodated.

It will be seen that the traveling gripper **23** differs from the stationary stripper in utilizing only one pair of roller clutches. The slots **58–61** are also angled but this arrangement may also be advantageously employed in the stripper **24**. In the stripper **24**, the four plates **31–34** are maintained in orthogonal (i.e., mutually perpendicular) relation by means of their attachment to the gearing (not shown) within housing **29**. Additionally machine bolts **75** (see FIG. **2**) secure the plates in the open-box construction shown and described. The spacers **50** maintain the bearing cage **47** (and thus the sleeve **49**) in centered relation with respect to the arbor **22**. Although the shafts **45** are slidable axially with the cages **47** and spacers **50**, there is no rotation of the shafts **45** tending to make them lose their seating within the slots **37**. Further, the springs **39**, **40**, etc. serve as stops to prevent any axial movement of the shafts **45**.

When dissassembly is required, it is only necessary to remove the springs **39**, **40** from the journals **38** (more precisely from the annular grooves **76**—see FIG. 7) and then slide the shafts axially out of one of the slots **37**. Thereupon, the remainder of the roller clutch **35** (i.e., the sleeve **49** with its internally received cage **47** and spacers **50**) is readily removable from the chassis **30** merely by moving the same longitudinally of the machine.

However, even on jams or wrap-ups, the distorting tubing is readily removed without dismantling as was necessary previously—it only being necessary to overcome the spring bias and hold the clutches apart.

Modified Jauch machine

Turning now to FIGS. 10–14, the numeral **120** designates generally (in FIG. 10) the frame of a Jauch-type machine. At the extreme left-hand end is seen a cylinder and piston rod unit **121** which is operative to advance and retract an arbor **122**. Tapes T are automatically wound around the arbor **122** as the latter is driven during advancement, i.e., movement to the right. In FIG. 10, the numeral **123** designates generally a stripper means which is employed to provide a restraining action on the wound tube **124** as the arbor is retracted. In other respects the machine shown is conventional.

To provide the novel stripping means, a subframe **125** (see FIG. 14) is provided which is rotatably mounted within a pedestal arrangement **126** (see FIG. 12) provided as part of the frame **120**. It will be seen that the journals **127** at the ends of the subframe **125** are equipped with bores corresponding to the shape of the tube-equipped arbor **122** and it is intended that the subframe **125** rotate with the arbor **122**.

To provide the desired gripping action, opposed pairs of clutch elements are provided as at **128** and **129** in FIG. 13. Each pair of clutch elements has corresponding ends resiliently coupled together as by springs **130** (see FIG. 12). The journal ends of the clutch elements are non-rotatably supported within slots **131** and **132** provided in the orthogonally related cover plates **133** provided on the subframe **125**, the plates and subframe being bolted together to constitute a chassis **134**.

As one proceeds along the length of the chassis **133**, it will be noted that the pairs of clutch elements are displaced 90° in proceeding from set to set. The actual number of sets (nine in the illustration given) may be varied depending upon the amount of restraining force desired. The subframe **125** is fabricated to provide alternating pairs of recesses **135**, **136**, **137** and **138** (FIG. 14). These recesses receive the various clutch members, the subframe rigidifying the chassis **134**.

In the operation of the Jauch-type stripper, the opposed pairs of clutch elements **128** and **129** resiliently grip the tube **124** and are, of themselves, virtually without backlash. This is in direct contrast to the ratchet and pawl arrangement previously employed in Jauch where substantial backlash or slack would occur as wear progressed. For set up, the inventive arrangement is distinctly superior in requiring only two springs for each pair (one at each end of a given clutch element) as contrasted to four springs previously required. Notwithstanding the advantages in ease of set up—and here it will be appreciated that a machine must be versatile in accommodating arbors of different cross-sectional dimensions for different size tubes—substantial advantages accrue from the inventive arrangement insofar as operation and maintenance are concerned. In the prior art construction, the rollers actually rotated within the elongated chassis and, as a result, tended to develop grooves or pockets in the side walls of the slots **131** and **132**. Such grooves or indentations could literally result in a camming action to prevent the resilient mounting of the knurled rollers in the prior art construction, often resulting in jamming or wadding so that substantial down time resulted. To remedy this, expensive repairs were required in the chassis. In contrast, the journals of the clutch elements here do not rotate so that there is no tendency to wear grooves in the side walls of the supporting slots **131** and **132**.

For larger sized arbors, the paired clutches merely position themselves further apart in the slots **130** and **131**. Spacers bars **139**, **140** are employed on each plate **133** to limit contraction of the springs **130** so that the entire chassis may be removed from its position about the arbor **124** without derangement of the clutches. Also, means are provided at **141** and **142** to vary the distance between spacer bars **139**, **140** although the journals normally do not contact these bars.

While in the foregoing specification a detailed description of the invention has been set down for the purpose of illustration, many variations of the details hereingiven may be made by those skilled in the art without departing from the spirit and scope of the invention.

I claim:

1. In the apparatus for the intermittent conversion of tapes into a tube of generally rectangular cross-section which includes a horizontally-elongated frame, and elongated arbor of generally rectangular cross-section mounted on said frame for rotation about the axis thereof and for axial movement in the direction longitudinally of said frame, means for advancing and retracting said arbor, means for supplying a plurality of tapes to said arbor at an angle to the length thereof, means on said frame for rotating said arbor during the advance thereof to helically wind said tapes on said arbor, and stripper means on said frame located in a position forward of the points of tape engagement with said arbor for coactive operation with said arbor in restraining a tube from being retracted with said arbor when the latter is retracted, the improved stripper means comprising:

a chassis having an opening there through in which said arbor is received, said chassis having a plurality

of shaft-mounting slots therein arranged to support resiliently interconnected elongated rollers in generally rectangular arrangement, and

a plurality of one-way, smooth-surface, cam-type roller clutches mounted on said chassis with each roller contacting a given side of said tube for rolling contact therewith only upon arbor advance.]

[2. The apparatus of claim 1 in which gripper means e movably positioned on said frame for movement with id arbor and located a spaced distance forward of said ripper means, said gripper means including a slot-uipped block having a pair of one-way roller clutches lapted to contact opposite sides of said tube in non-rotat-le relation only on the forward stroke of said arbor, said lock being arranged and constructed to automatically nter said roller clutches upon change in size of said be.]

[3. The structure of claim 1 in which said chassis in-udes four orthogonally related plates, said slots being ovided in each of said plates and arranged to provide first pair of said clutches in longitudinally offset relation a second pair of said clutches, said clutches having flat-ned journals to non-rotatably slide in said slots, and ring means resiliently interconnecting corresponding urnals of each clutch of a given pair to urge the same to gripping relation with a tube ensleeved on said bor.]

[4. The structure of claim 3 in which said clutches are uipped with through shafts providing said journals, said ller clutches also including sleeve means positioned with-said orthogonally related parts, said through shafts be-g slidable within said sleeve means to permit ready dis-aintling of said stripper means.]

[5. The structure of claim 3 in which said chassis in-ludes a unitary subframe within said orthogonally related lates, said subframe having recess portion accommodat-g said clutches, and spacer bar means on said chassis miting the movement toward each other of clutches in ach pair, said chassis accommodating more than two airs of said clutches.]

6. In the apparatus for the intermittent conversion of pes into a tube of generally rectangular cross-section hich includes a horizontally-elongated frame, and elon-ated arbor of generally rectangular cross-section mounted n said frame for rotation about the axis thereof and for xial movement in the direction longitudinally of said rame, means for advancing and retracting said arbor, eans for supplying a plurality of tapes to said arbor at an ngle to the length thereof, means on said frame for rotat-

ing said arbor during the advance thereof to helically wind said tapes on said arbor, srtipper means on said frame located in a position forward of the points of tape engagement with said arbor for coactive operation with said arbor in restraining a tube from being retracted with said arbor when the latter is retracted, and gripper means movably positioned on said frame for movement with said arbor and located a spaced distance forward of said stripper means, said gripper means including a slot-equipped subframe having a pair of one-way roller clutches adapted to contact opposite sides of said tube in non-rotatable relation only on the forward stroke of said arbor, said subframe being arranged and constructed to automatically center said roller clutches upon change in size of said tube.

7. The apparatus of claim 6 in which said clutches have flattened journals to non-rotatably slide in the slots of the slot-equipped subframe and spring means resliently interconnecting corresponding journals of each clutch to urge the clutches into gripping relation with a tube ensleeved on said arbor.

8. The apparatus of claim 6 in which the slot-equipped subframe includes a pair of spaced-apart plates, each plate being provided with a pair of converging elongated slots extending angularly with respect to the axis of the arbor, each of said clutches having a pair of journals with each journal received in one of said slots whereby the spacing between the clutches varies as the journals slide within the slots.

9. The apparatus of claim 8 in which the slots of each plate converge in the direction of retraction of the arbor.

10. The apparatus of claim 8 including a bar mounted on each of said plates, each bar being provided with an elongated slot which extends tranversely to the axis of the arbor and which slidably receives a journal of each clutch, the bar being mounted on the associated plate for sliding movement in direction parallel to the axis of the arbor whereby axial movement of the bars varies the spacing between the clutches.

References Cited

The following references, cited by the Examiner, are of record in the patented file of this patent or the original patent.

UNITED STATES PATENTS

Re. 25,820	7/1965	Macchione	93—80
1,625,471	4/1927	Jauch	93—80

BERNARD STICKNEY, Primary Examiner