May 11, 1965 A. F. RODRIGUES 3,182,991

WEB FANFOLDING MECHANISM

Filed July 2, 1962 6 Sheets-Sheet 1

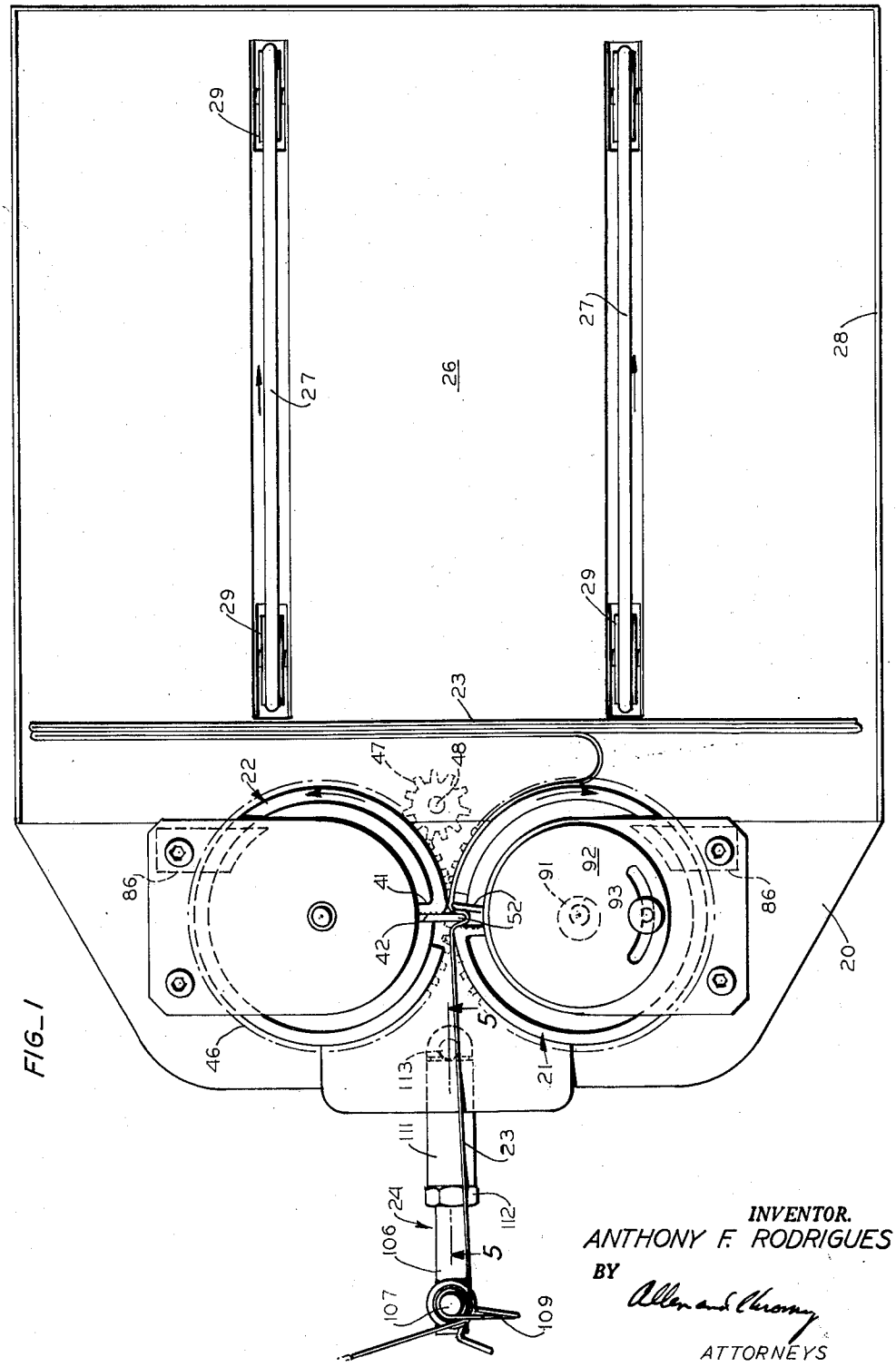


FIG_1

INVENTOR.
ANTHONY F. RODRIGUES
BY
Allen and Chromy
ATTORNEYS

May 11, 1965 A. F. RODRIGUES 3,182,991

WEB FANFOLDING MECHANISM

Filed July 2, 1962 6 Sheets-Sheet 2

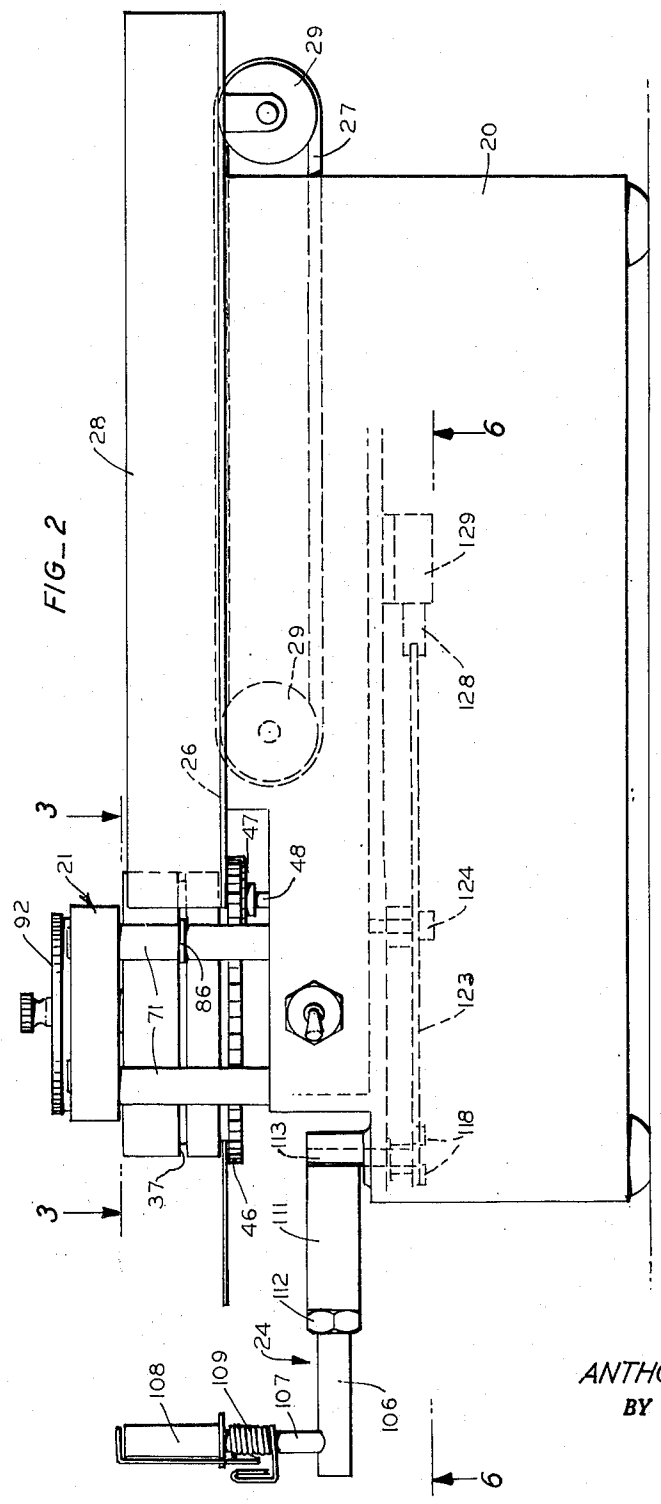


FIG_2

INVENTOR.
ANTHONY F. RODRIGUES
BY
Allen and Cheney
ATTORNEYS

May 11, 1965 A. F. RODRIGUES 3,182,991

WEB FANFOLDING MECHANISM

Filed July 2, 1962 6 Sheets-Sheet 3

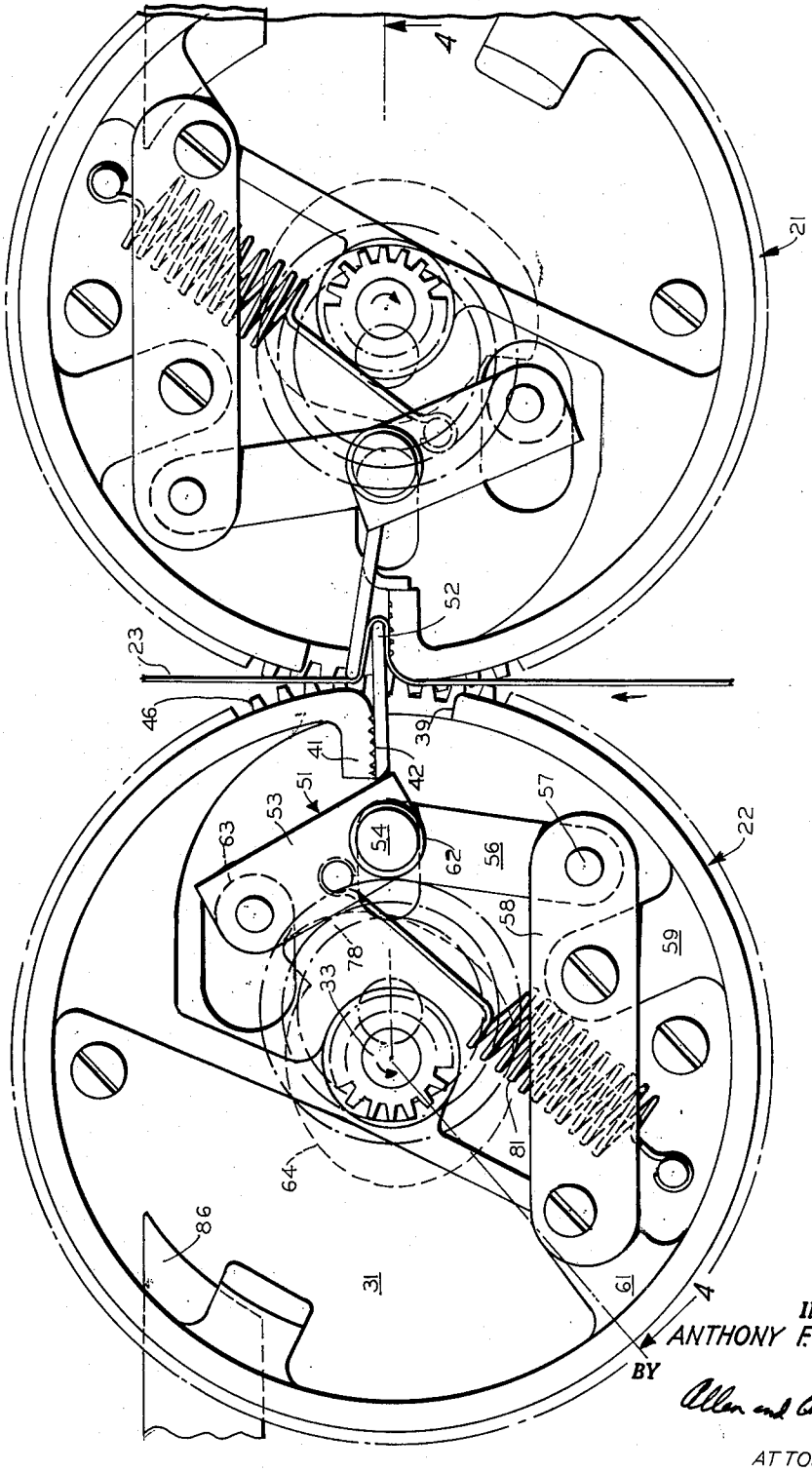


FIG_3

INVENTOR.
ANTHONY F. RODRIGUES
BY
Allen and Allen
ATTORNEYS

May 11, 1965 A. F. RODRIGUES 3,182,991

WEB FANFOLDING MECHANISM

Filed July 2, 1962 6 Sheets-Sheet 4

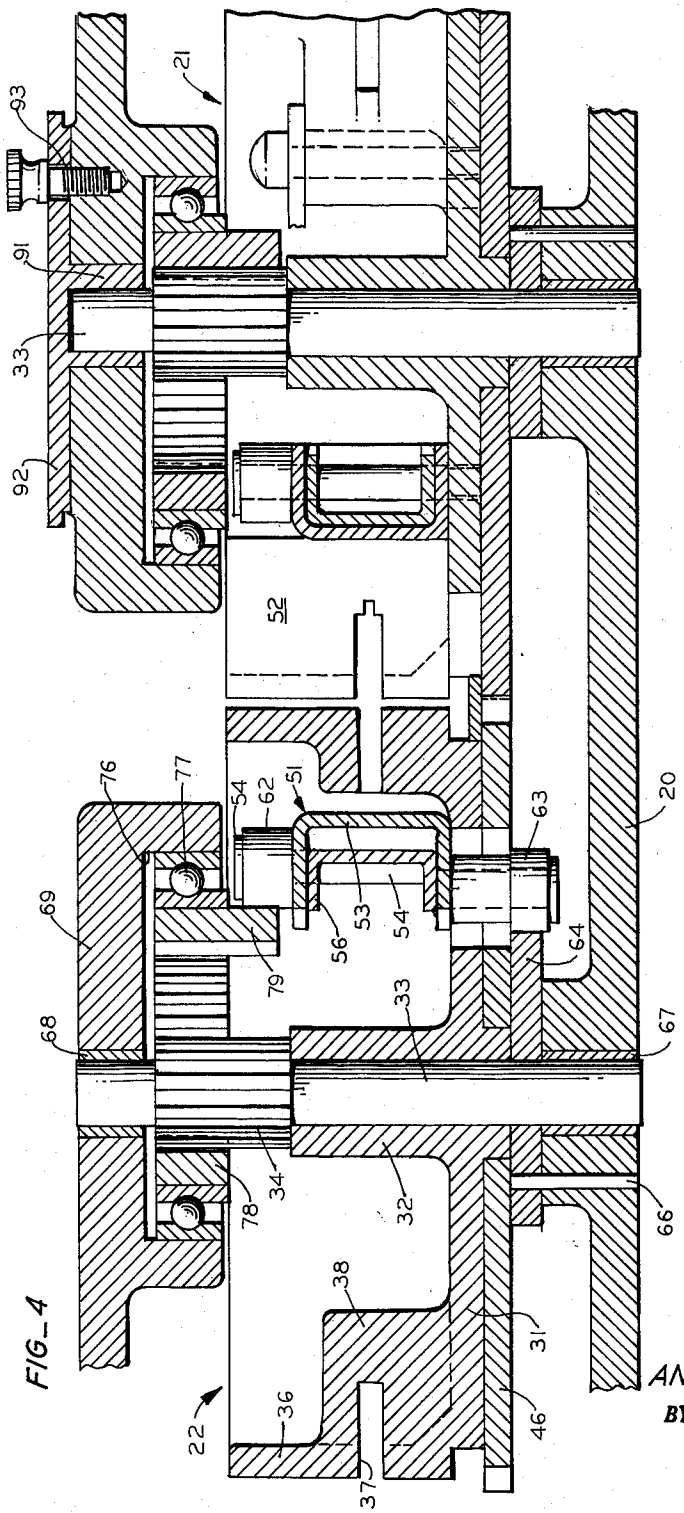
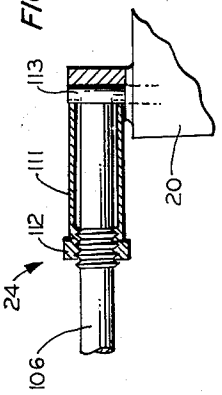


FIG_4

FIG_5



INVENTOR.
ANTHONY F. RODRIGUES

BY

Allen and Chromy

ATTORNEYS

May 11, 1965 A. F. RODRIGUES 3,182,991

WEB FANFOLDING MECHANISM

Filed July 2, 1962 6 Sheets-Sheet 5

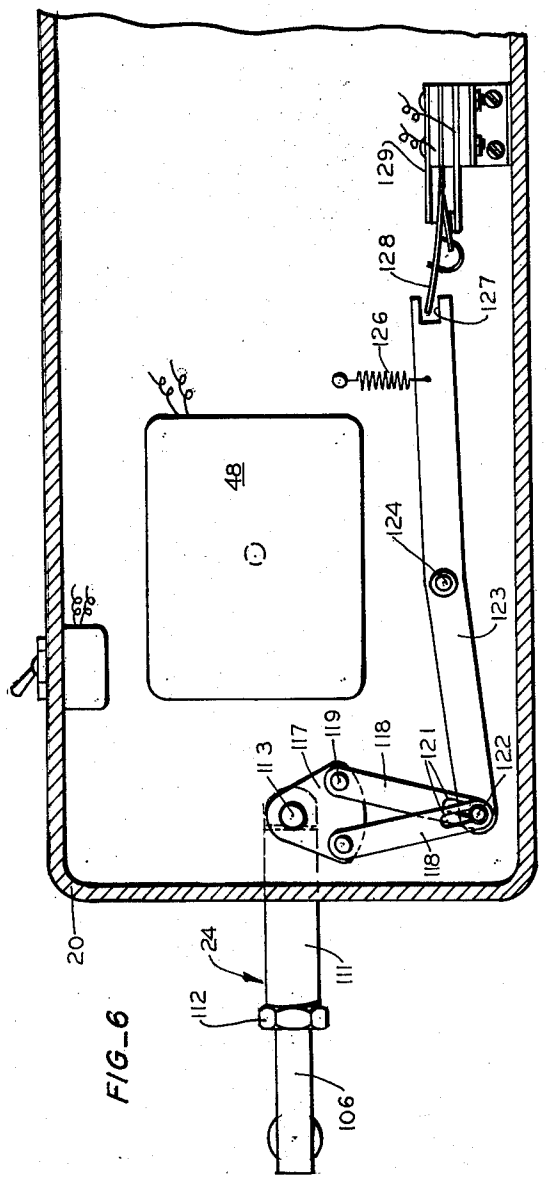
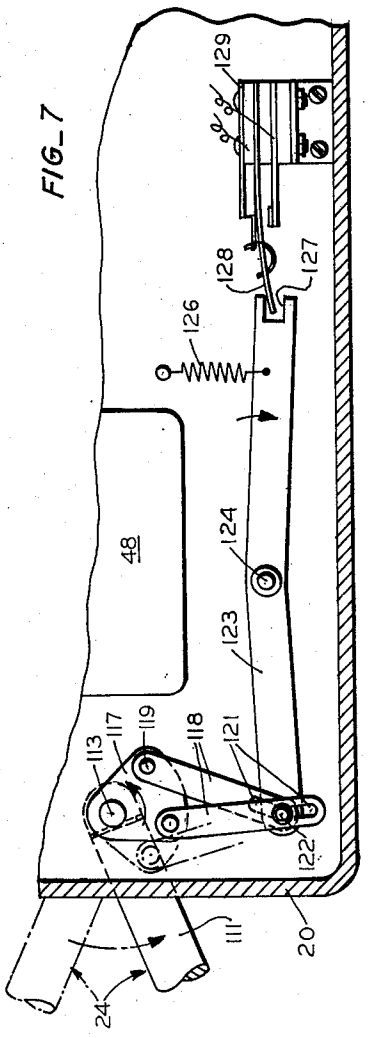


FIG_6

FIG_7



INVENTOR.
ANTHONY F. RODRIGUES
BY
Allen and Chromy
ATTORNEYS

May 11, 1965 A. F. RODRIGUES 3,182,991

WEB FANFOLDING MECHANISM

Filed July 2, 1962 6 Sheets-Sheet 6

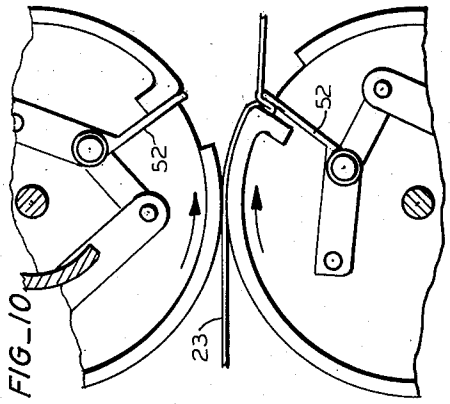


FIG_10

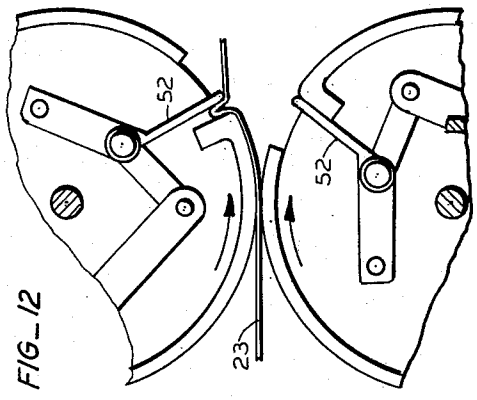


FIG_12

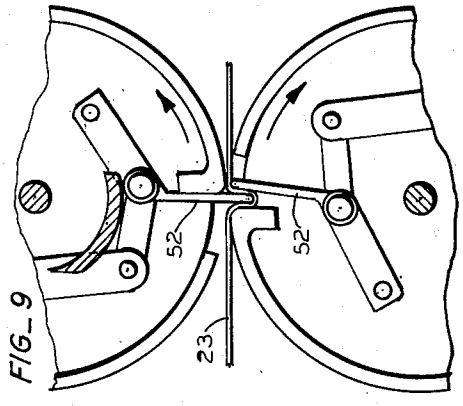


FIG_9

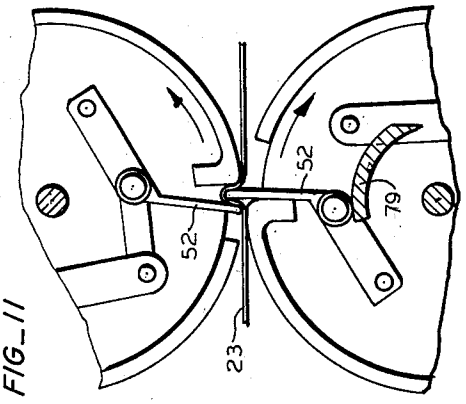


FIG_11

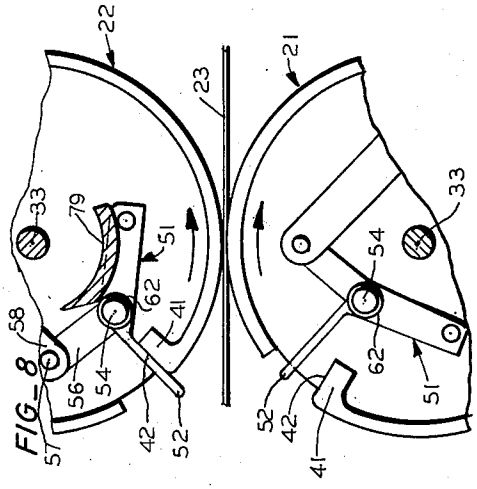


FIG_8

INVENTOR.
ANTHONY F. RODRIGUES

BY Allen and Cheney

ATTORNEYS

United States Patent Office 3,182,991 Patented May 11, 1965

3,182,991

WEB FANFOLDING MECHANISM

Anthony F. Rodrigues, Los Gatos, Calif., assignor to Cycle Equipment Company

Filed July 2, 1962, Ser. No. 206,942
7 Claims. (Cl. 270—73)

The present invention relates to tape receiving means or fanfolding mechanisms for tape such as perforated paper tape, for example, and is concerned more particularly with fanfolding mechanism of compact construction to enable reduced size of the machine.

It is an object of the invention to provide an improved fanfolding mechanism.

It is a further object of the invention to provide an improved fanfolding mechanism, in which a blade can be used either as a folding blade or as a tucking blade to enable the halving of the size of the folding mechanism.

Still another object of the invention is to provide tape-receiving means having a tape-responsive control arm movable in either direction from its normal inactive position to effect a control of the machine, and associated therewith control means producing an invariable control in the machine irrespective of the direction of the movement of the control arm.

A further object of the invention is to provide a tape control arm which can be set to the desired adjusted position on its supporting axis in accordance with the desired position of feed of the tape to the control arm.

The above and other objects of the invention are attained as set forth in the accompanying specification, taken in connection with the attached drawings, in which:

FIG. 1 is a plan view of a fanfolding machine;

FIG. 2 is a side elevational view of the fanfolding machine, with certain parts shown in dotted lines;

FIG. 3 is an enlarged fragmentary plan view illustrating the folding drums and their associated mechanism;

FIG. 4 is an enlarged vertical sectional view taken in planes indicated by the line 4—4 in FIG. 3;

FIG. 5 is a detail sectional view taken as indicated by the line 5—5 in FIG. 1;

FIG. 6 is a horizontal sectional view taken as indicated by the line 6—6 in FIG. 2;

FIG. 7 is a view similar to FIG. 6 but showing other operating positions of the linkage means;

FIGS. 8 through 10 are schematic views illustrating the operation of one of the blades as a folding blade and the other of the blades as a tucking blade;

FIGS. 11 through 12 are schematic views similar to FIGS. 8 through 10 but illustrating the reversed operation of the blades.

Referring first to FIGS. 1 and 2, the fanfolding machine includes a casting 20 comprising the body or frame of the machine and the housing, and on this housing there is mounted a pair of folding drums 21 and 22, described in detail hereinafter, which operate with respect to paper tape 23 fed over a control arm 24 to fanfold this tape and to deliver it to a receiving surface 26 which forms part of the removable or detachable tray 28. The bottom wall 26 of this tray is apertured or slotted to admit two conveyor belts 27 which are carried by respective sets of sheaves 29 which are suitably driven in a direction indicated by the arrow to move the fanfolded tape from the region of the folding drums.

The respective folding drums 21 and 22 are similar but are assembled in left hand and right hand fashion so that only one of these drums will be described in detail. The drum 22 includes a bottom wall 31, a central boss 32 in which is press-fitted a shaft 33 carrying a pinion 34 at its upper end. Each drum also includes a cylindrical side wall 36 which has an annular groove formed therein at 37. A boss 38 at one portion of the periphery serves to connect the upper part of the surface 36 to the lower part and the wall 31. Each drum in this case is also provided with an opening 39 in the cylindrical wall 36, and the trailing side of this opening in the direction of rotation of the drum 22 is formed by a folding wall 41 having a roughened or serrated surface 42.

Also, the drum 22 carries a spur gear 46, the two spur gears of the drums meshing together, and one of these spur gears meshing with a drive pinion 47 which may be suitably connected to and driven by a motor 48 (FIGS. 1 and 6).

Referring again to FIGS. 3 and 4, each folding drum includes a folding blade which is operative either as a trucking blade or a folding blade on alternate revolutions of the drum so that with each revolution or cycle the character of operation of this blade changes and suitable control means are provided for effecting this function.

Referring to FIG. 3, drum 22 has a bell crank 51, one end 52 of which is formed as a blade cooperating with the folding surface 41 of the drum, and the other end of which is formed as a U-shaped body portion 53. The bell crank 51 is pivotally mounted by a pin 54 on the lever 56 whose other end is pivotally mounted at 57 in the mounting strap 58 secured to respective bosses 59 and 61 of the drum. The movable pivot pin 54 carries an upper cam follower roller 62, and a lower or second cam follower roller 63 is journaled at the end of the U-shaped body portion 53 of the bell crank 51 and depends therefrom to engage a stationary cam 64 secured against rotation by one or more pins 66 in the frame.

Also, each shaft 33 (FIG. 4) is journaled at its bottom in a bearing 67 in the frame, and at its top by a bearing 68 in a bracket 69 secured in spaced relation from the frame by means of a pair of posts 71 (FIG. 2). This cover or bracket 69 has a cylindrical recess 76 which is offset from the axis of the shaft 33 and has seated therein a bearing 77 carrying an internal gear 78 having a cam or stop projection 79 depending therefrom. This internal gear 78 meshes with the pinion 34 on the shaft 33 and is in the ratio of 1 to 2 so that the gear 78 and the cam projection 79 will turn once for each two revolutions of the shaft 33. The bell crank 51 is urged counter-clockwise as viewed in FIG. 3 by a spring 81 tensioned between the bell crank and associated drum 22 as viewed to the left of FIG. 3, and this spring tends to urge the bell crank 51 counter-clockwise and also to cause it to remain in retracted position on pivotal movement about pin 54 to open and close as a folding blade under control of the cam 64. This is the normal operation of the blade 52 under control of the cam 64, but every other revolution, the cam extension 79 operates on the cam roller 62 to cause the blade 52 to be projected, as shown in the left hand drum of FIG. 3, and to position the tape be-

tween the folding surface **41** and the folding blade in the opposite drum.

From the above description, it will be seen that in alternate cycles or revolutions of this tape control means or folding means, each bell crank **51** and its blade **52** is alternately controlled to be either the tucking blade or the folding blade.

Means are provided for stripping tape from a drum after the folding operation, and this means comprises a stripping blade **86** (FIG. 3) projecting into the slot **37** of the associated drum. The fanfolded tape **23** then is fed out onto the table **26** and into engagement with the feed belts **27** to cause it to accumulate in the tray **28**. The sharpness of the folds is exaggerated in FIG. 1.

To open the drums, means is provided to mount one of these drums for inward and outward movement with respect to the other, and for this purpose, as seen in FIG. 4, the right hand drum **21** has its shaft **33** journalled in an eccentric bushing **91** carried by a control disk **92** which is adjustable between two positions to bring the drums together or to separate them, and this control disk **92** has associated therewith a manually operable clamping notch **93**.

The sequence of the folding operations is shown in FIGS. 8 through 12, and from a study of these views, it will be seen that beginning with FIG. 8 the upper blade **52** is projected by its cam **79** and the lower blade **52** is opened as a folding blade so that the tape is introduced between the lower blade **52** and its associated folding surface **42** by the upper blade **52**, and subsequently the folding is effected. As rotation of the drums continues, in FIGS. 11 and 12, it is seen that the blades reverse their functions and the upper blade **52** becomes the folding blade and the lower blade **52** becomes the tucking blade.

As noted above, the tape receiving means of the instant invention is a slave machine, and operates to fold the tape only when tape is available and stops operation when tape is not available. In order to receive the tape advantageously from any direction, control arm **24** (FIGS. 1, 2 and 5) comprises a rod **106** carrying an upright shaft **107** on which a roller **108** is mounted in conjunction with a spring-type tape retainer **109**. The rod **106** is releasably received in a sleeve **111** and has its inner end notched to embrace shaft **113**. Sleeve **111** is clamped by a nut **112** and may be released so that the shaft **106** is positioned in any desired angular position on the shaft **113** pivoted in the frame **20**.

At its lower end the shaft **113** (FIGS. 1, 6 and 7) carries a control segment or lever **117** having two links **118** pivoted about respective axes **119** which are symmetrically arranged with respect to the shaft **113**. Each of the levers **118** has a slot **121** at its other end which is engaged with a pin **122** at the end of a switch control lever **123** pivoted at **124**. The opposite end of the lever **123** is urged counter-clockwise by a spring **126** and is slotted at **127** to engage the control arm **128** of a conventional two-position set switch **129** for the motor **48**. Thus in either direction of the movement of the control arm **24**, as seen for example in FIG. 7, the rocking of the segment lever **117** in either direction will produce the same invariable movement of the switch lever **123** so that the power control lever **123** enables the source of power invariably irrespective of the direction of movement of the control arm **24**. In this way the tape can be placed over the roller **108** extending either from the top side or the bottom side of the view. In this way, when the tape becomes taut, and the fanfolding drums continue to feed the tape, the control arm **24** will be moved to position the switch **129** in its off position. When tape is available and the spring **126** serves to return the arm **24** to its central position, the switch will again be flipped from its "off" position to its "on" position.

While I have shown and described a preferred embodiment of the invention, it is apparent that the invention is

capable of variation and modification from the forms shown so that its scope should be limited only by the proper scope of the claims appended hereto.

What I claim:

1. In a fanfolding machine for tape such as perforated paper tape, a frame, a pair of folding means mounted for movement on said frame, including a folding blade in each folding means and a folding surface cooperatively related to said folding blade, means for operating said folding means in cyclic fashion, control means for the blade of each fanfolding means for opening and closing said blade with respect to the associated folding surface during one cycle of its operation as a folding blade, and other control means for said blade to cause said blade to project in the next succeeding cycle to tuck the tape with respect to the blade and the associated surface of the other folding means, whereby corresponding blades of said pair of folding means operate alternately with respect to each other as tucking blades and folding blades.

2. In a fanfolding machine for tape such as perforated paper tape, a frame, a pair of folding means mounted for movement on said frame, including a folding blade in each folding means and a folding surface cooperatively related to said folding blade, means for operating said folding means in cyclic fashion, means for carrying the blade of each fanfolding means through one endless path and for opening said blade and for closing said blade with respect to the associated folding surface during one cycle of its operation as a folding blade, other means for varying the path of said blade to cause said blade to project in the next succeeding cycle to tuck the tape with respect to the blade and the associated folding surface of the other folding means, whereby corresponding blades of said pair of folding means operate alternately with respect to each other as tucking blades and folding blades.

3. In a fanfolding mechanism for fan folding paper tape such as perforated paper, a pair of folding drums mounted about parallel axes on said frame and having surfaces in substantial engagement to effect feeding of the tape therethrough, each of said drums including a folding surface, a combined folding and tucking blade movably mounted on each of said drums for cooperation with the folding surface and the corresponding blade of the other drum, control means for effecting operation of the blade of one of said drums during one rotation or cycle as a folding blade to open said blade with respect to the associated folding surface, and another control means operative to control said blade during the next succeeding rotation or cycle to cause operation of said blade as a tucking blade to move into the space between the other folding blade and its associated folding surface.

4. In a fanfolding mechanism as recited in claim 3, in which said first control means includes spring means normally operative to control the operation of the blade as a folding blade, and cam means automatically brought into play during every other cycle or rotation of said drum to override the control of said spring means and to cause operation of said blade as a tucking blade.

5. In a fanfolding mechanism as recited in claim 3, in which said first control means includes means normally operative to control the operation of the blade as a folding blade, and means automatically brought into play during every other cycle or rotation of said drum to override the control of said control means and to cause operation of said blade as a tucking blade.

6. In a fanfolding mechanism or machine as recited in claim 3, in which said fanfolding blade is formed as a bell crank, means pivotally mounting said bell crank at an intermediate portion thereof including a lever pivotally mounted on the associated drum, a first control roller coaxial with said pivotal axis, and a second control roller at the end of said bell crank remote from said blade, a stationary cam for cooperating with said second roller to control with said spring the folding operation, and a rotatable cam means driven in synchronization

with said drum at a ratio of 1 to 2 in cooperation with said first roller to cause projection of said blade as a tucking blade.

7. In a fanfolding mechanism or machine as recited in claim 2, in which said fanfolding blade is formed as a bell crank, means pivotally mounting said bell crank at an intermediate portion thereof including a lever pivotally mounted on the associated drum, a control roller coaxial with said pivotal axis, and a second control roller at the end of said bell crank remote from said blade, means for cooperating with said second roller to control with said spring the folding operation, and other means driven in synchronization with said drums at a ratio of

1 to 2 in cooperation with said first roller to cause projection of said blade as a tucking blade.

References Cited by the Examiner

UNITED STATES PATENTS

691,751	1/02	Cumming	270—73
860,004	7/07	Windle	226—11
2,468,254	4/49	Delove	270—73
2,819,068	1/58	Loase	270—73
2,896,944	7/07	Windle	226—11
2,981,540	4/61	Harless	270—77

EUGENE R. CAPOZIO, *Primary Examiner.*