United States Patent [19]

Steinmetz et al.

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[45] **Mar. 11, 1975**

[54] **CLAMPING AND TENSIONING A SHEET ON A CYLINDER**

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[21] Appl. No.: **425,910**

Related U.S. Application Data

[63] Continuation of Ser. No. 9,343, Feb. 6, 1970, abandoned.

[52] **U.S. Cl.** **101/415.1**

[51] **Int. Cl.** **B41f 27/06,** B41f 7/22

[58] **Field of Search** 101/415.1, 378

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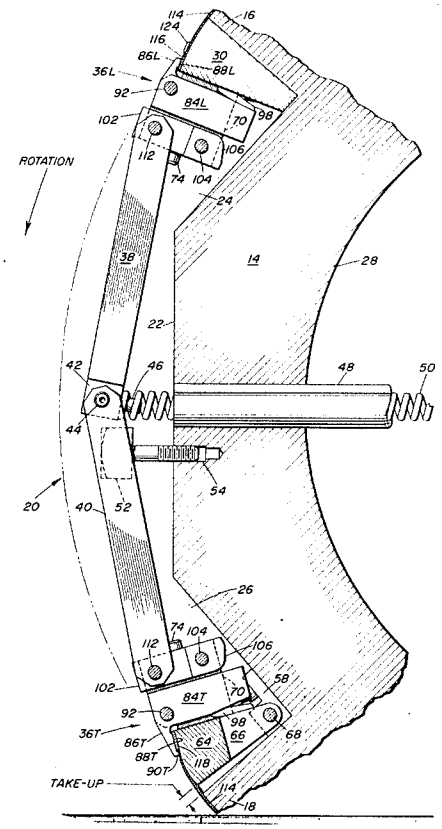
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[57] **ABSTRACT**

To avoid wrinkles in blankets and die sheets on cylinder impression machines, a clamp arrangement is disclosed in which a multiplicity of spring-tensioned clamps on the roll pull continuously on one end of the blanket or die sheet through a toggle action. These toggles, one for each clamp, can be individually collapsed while the associated clamp is released from the blanket and then the grip of the clamp reapplied so as to equalize the tension with respect to the other clamps. The invention is described in connection with paper carton blanking using photo-etched die sheets which must register accurately between the impression rolls.

16 Claims, 14 Drawing Figures



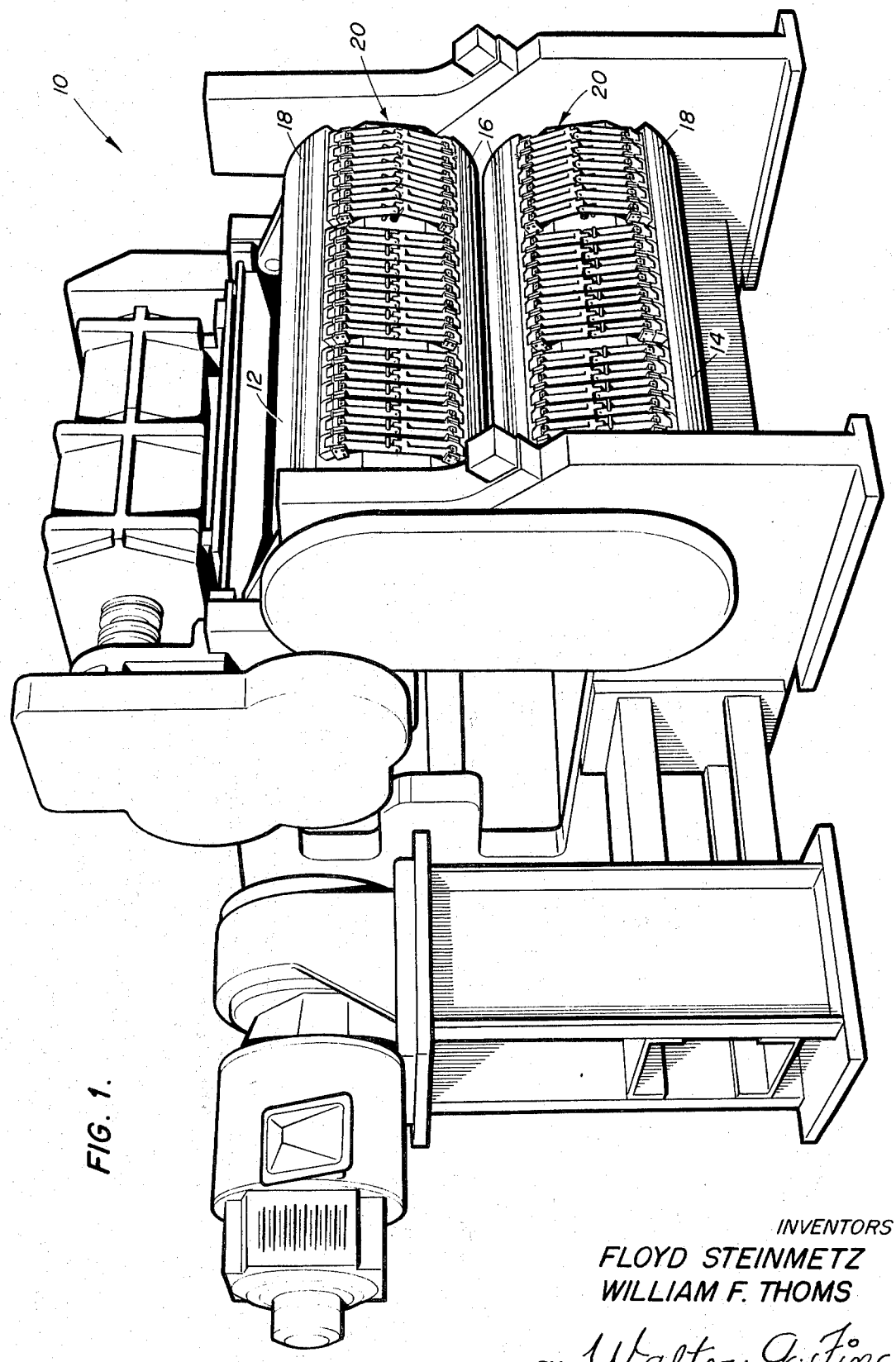


FIG. 1.

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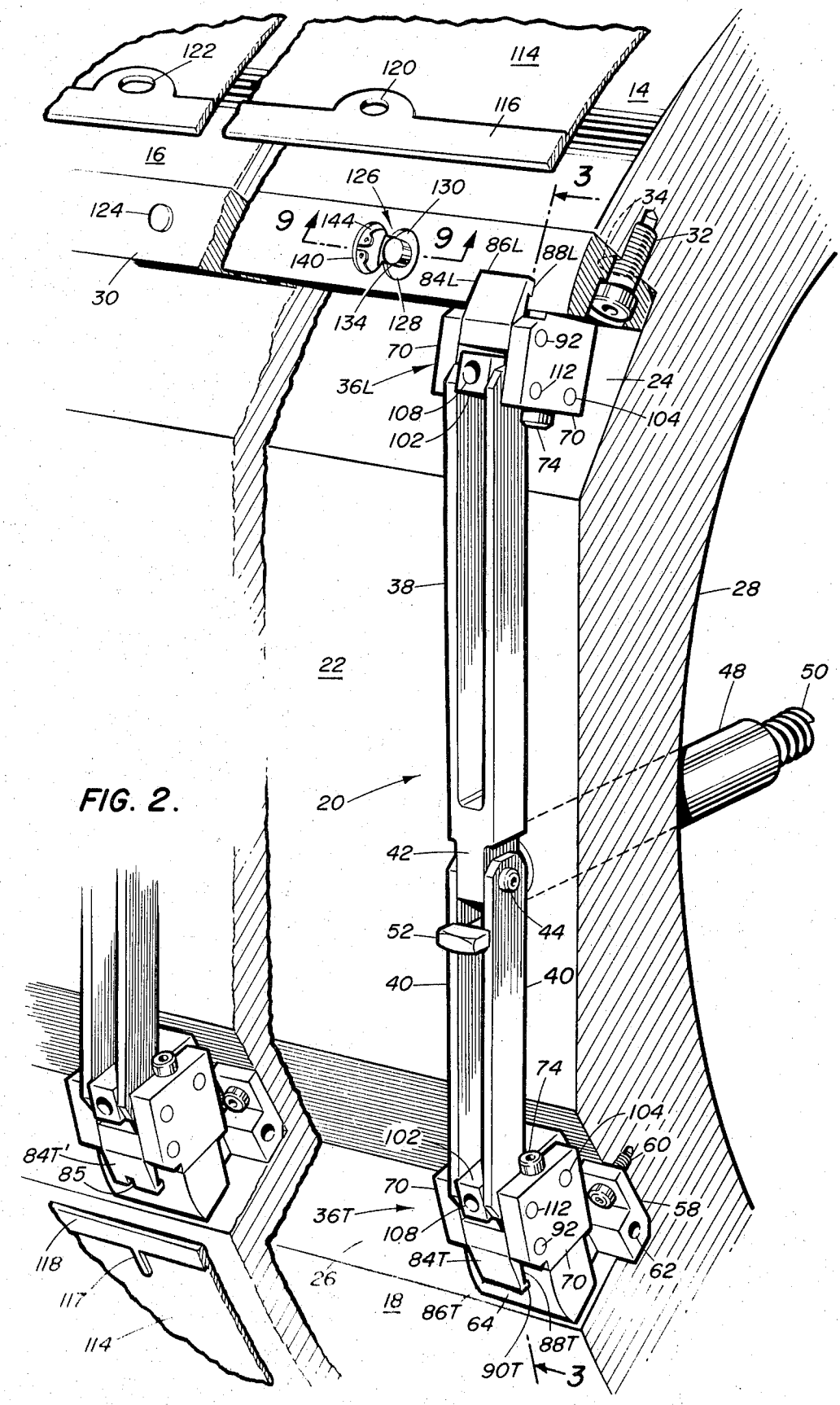

122
120
114
116
14
16
126
130
3
124
9
144
9
34
32
140
86L
88L
84L
30
134
128
70
92
36L
112
24
108
104
102
70
74
38
28
22
48
50
20
42
44
52
40
40
74
104
102
60
84T'
85
70
58
36T
112
108
92
118
84T
62
117
26
70
18
86T
64
114
88T
90T
3

FIG. 2.

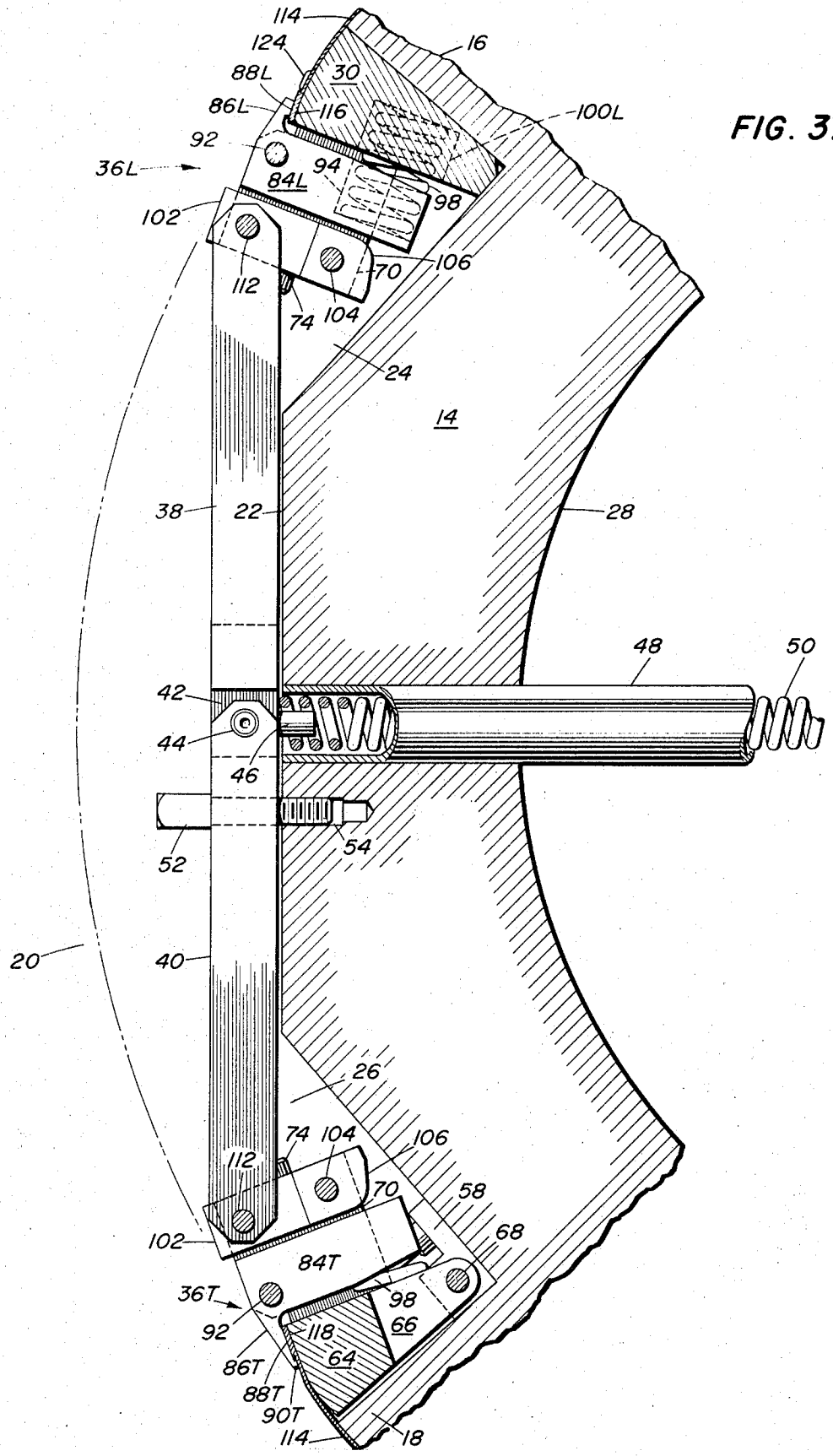

114
124
16
88L
30
86L
116
100L
92
36L
94
84L
98
102
106
70
112
74
104
24
14
38
22
28
48
50
42
44
46
52
54
20
40
26
74
104
106
112
70
58
68
102
84T
36T
98
92
118
66
64
86T
88T
90T
114
18

FIG. 3.

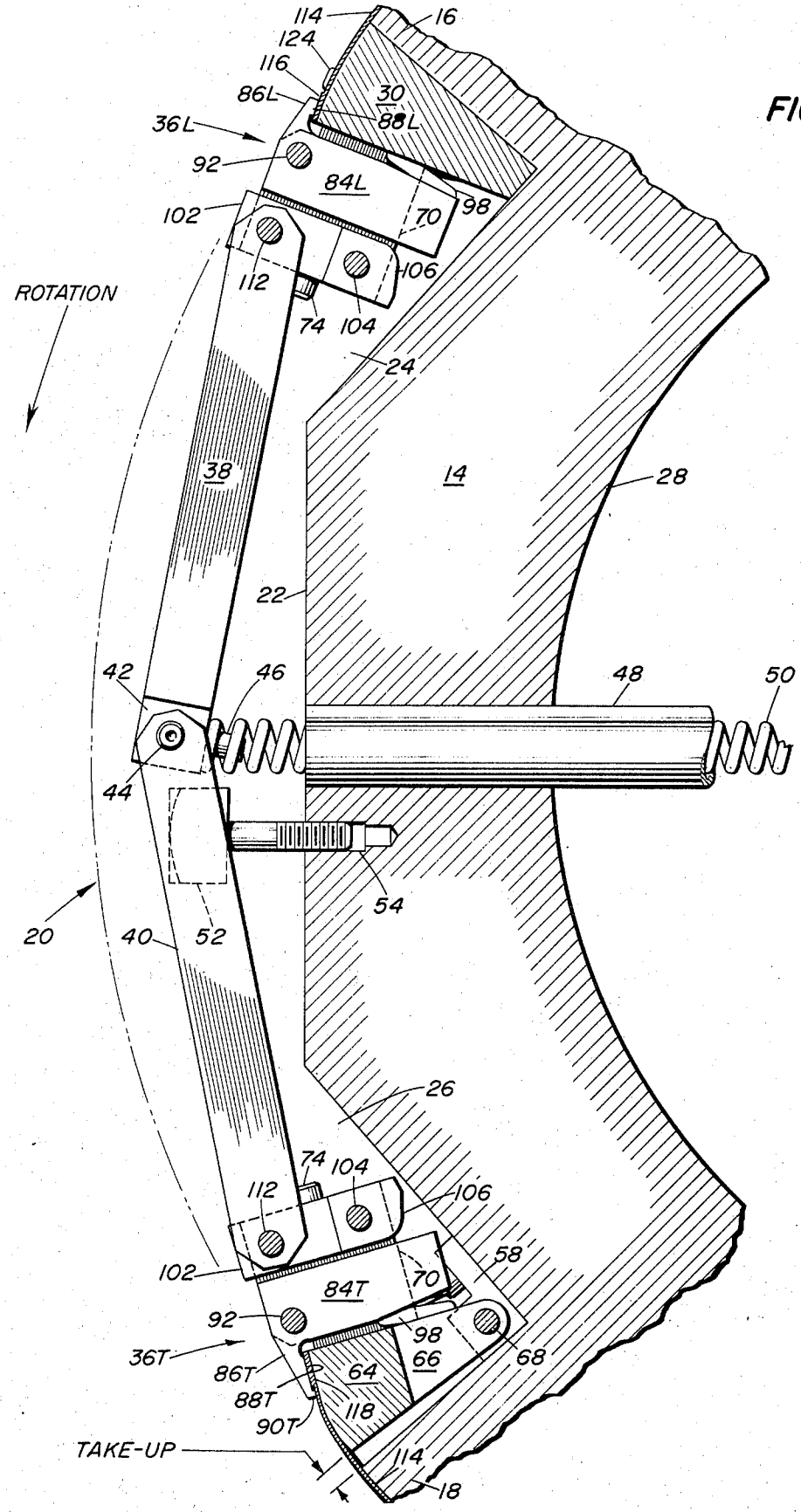

114
16
124
116
86L
30
88L
36L
92
84L
102
70
98
106
112
74
104
ROTATION
24
38
14
28
22
42
46
48
50
44
54
20
40
52
26
74
104
112
106
102
58
70
84T
92
98
66
68
36T
86T
64
88T
118
90T
TAKE-UP
114
18

FIG. 4.

FIG. 7.

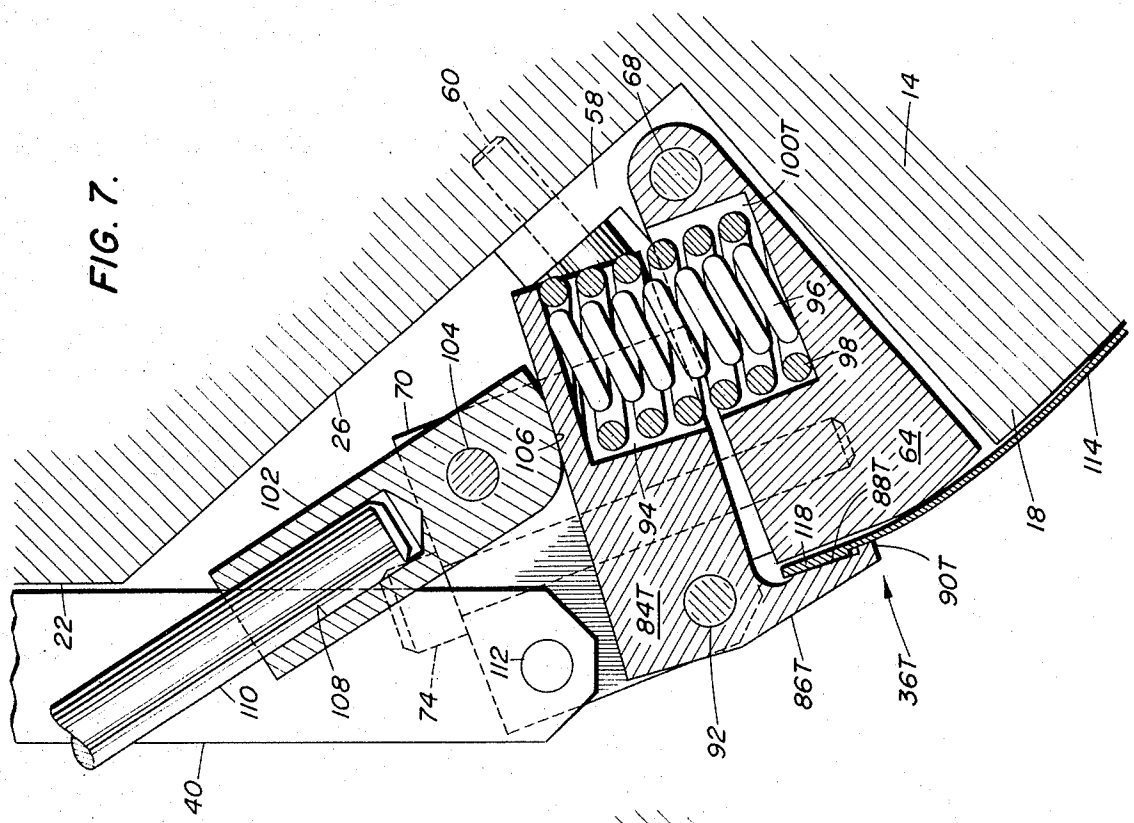
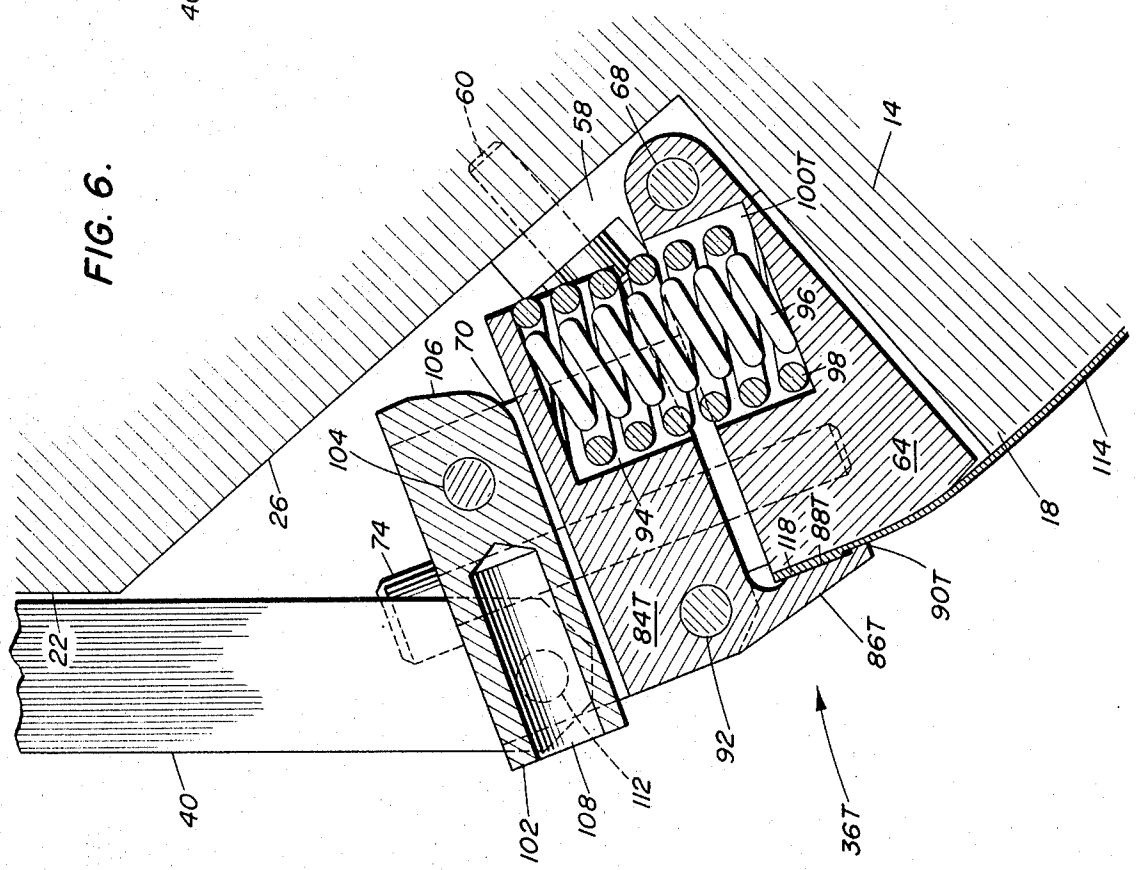

60
58
68
14
100T
96
98
104
70
26
106
102
64
88T
94
118
18
114
22
110
108
74
112
84T
90T
92
86T
36T
40

FIG. 6.


60
58
68
14
100T
96
98
106
70
104
64
26
94
118
88T
18
114
74
22
84T
90T
86T
92
40
102
108
112
36T

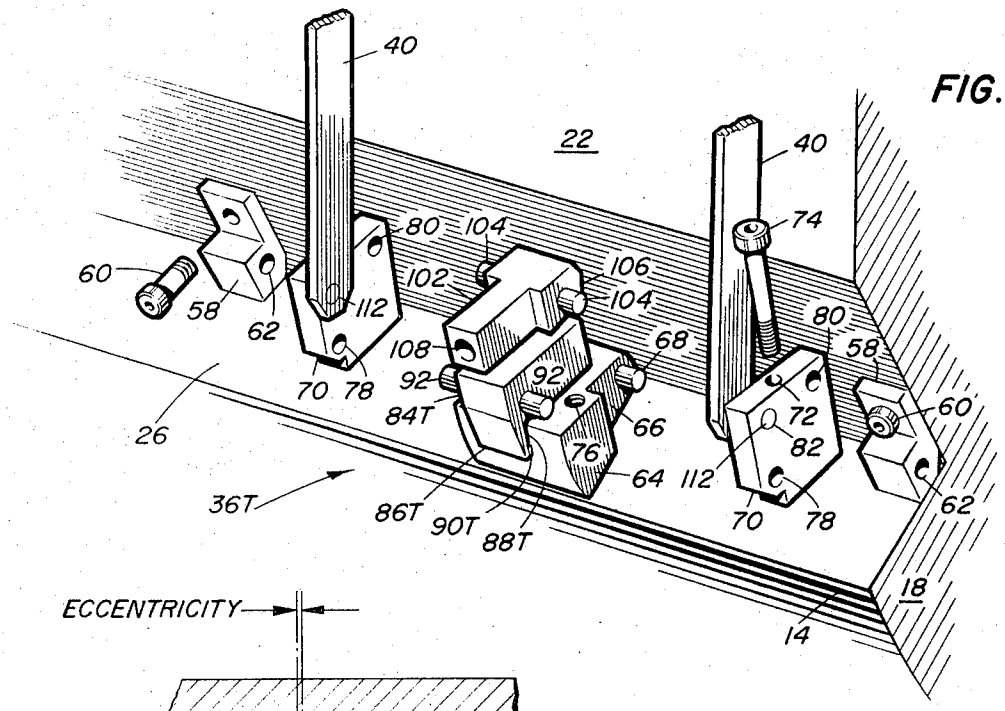


FIG. 5.

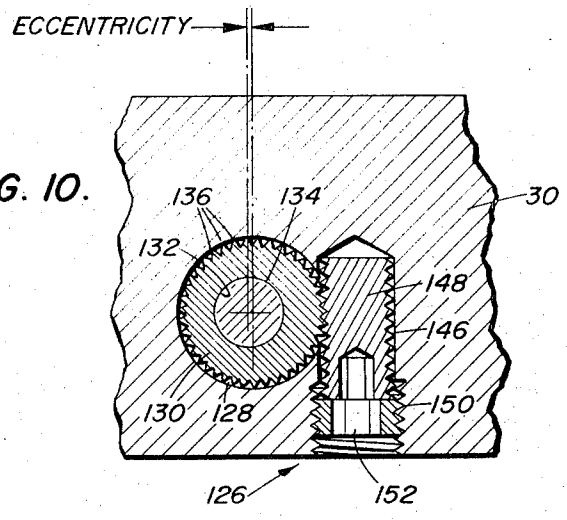


FIG. 10.

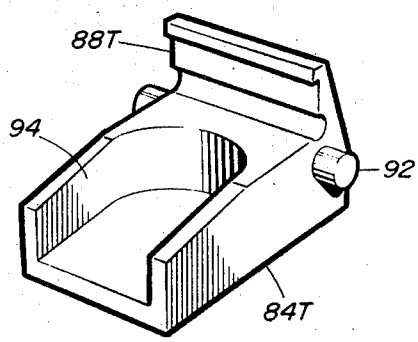


FIG. 8.

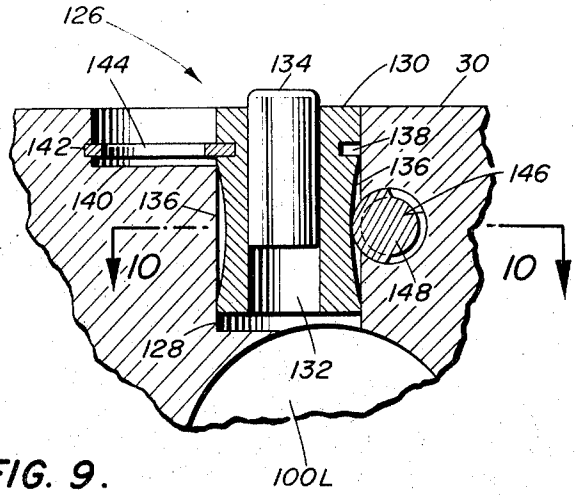
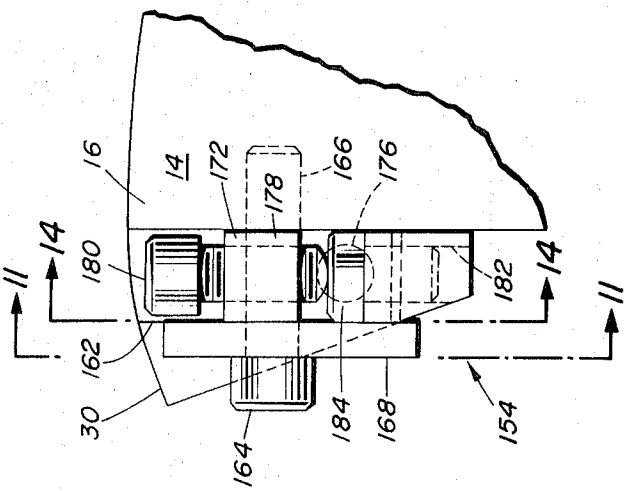


FIG. 9.

FIG. 12.



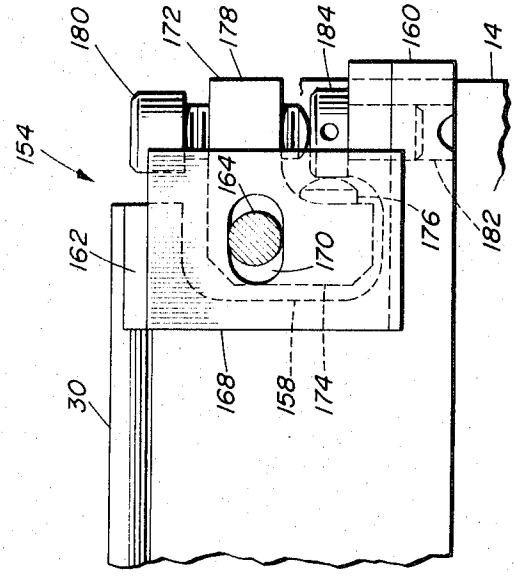


FIG. 11.

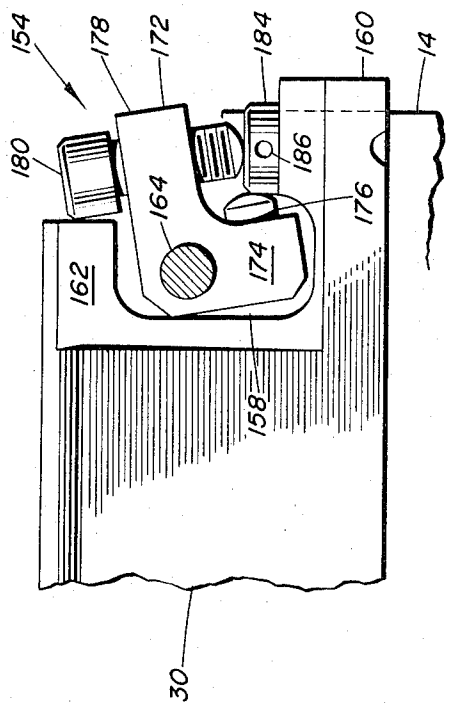


FIG. 14.

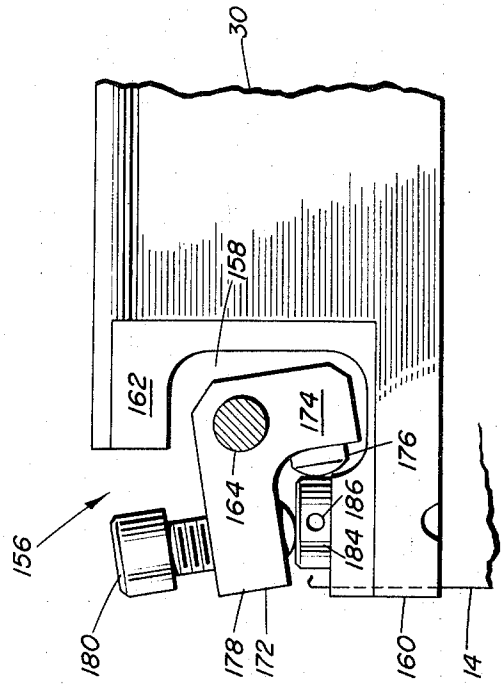


FIG. 13.

CLAMPING AND TENSIONING A SHEET ON A CYLINDER

This is a continuation of application Ser. No. 9,343, filed Feb. 6, 1970, now abandoned.

This invention relates generally to flexible sheet securing devices for rotary cylinders, and more particularly to an arrangement for eliminating wrinkles in blankets and die sheets on cylinder impression machines.

In the packaging industry, large-diameter cooperating drums are used between which paper webs are fed. These drums carry blanket dies for slitting and creasing the web to form container blanks. The die normally consists of a male and female die arrangement using a special technique where the cutting is a pinch force or crushing action. The cutting elements are raised portions of a thin flexible sheet which must be very accurately positioned.

Prior drums, in addition to supporting the die sheet, were also required to have clamping fingers to pull the sheet of stock accurately through the die. The presence of these clamping fingers occupied space behind the leading edge clamp of the die itself and in order to minimize waste of the paper sheet, the distances had to be held to an extreme minimum.

This forced the design of the clamp arrangement to make a sharp bend in the leading edge of the sheet metal die blanket. Invariably, this caused cracks to form and an ultimate early failure of those dies.

It is an object of this invention, therefore, to provide an improved clamping arrangement for dies which would require no sharp bends in the die blanket.

Another object of this invention is to provide a die blanket tensioning arrangement which has a multiplicity of clamping points, each individually applied and tensionable to more effectively remove wrinkles and bulges from the die blanket.

Yet another object of this invention is to provide adjustable mounting means for accurately positioning and securing a wrap-around member upon a rotary drum in a web-fed machine.

To provide a spring bias arrangement for a circumferential tension toggle on cylinder blankets, is still another object of this invention.

Other objects and attendant advantages of this invention will become more readily apparent and understood from the following detailed specification and accompanying sheets of drawings in which:

FIG. 1 is a perspective view showing the clamping arrangement of the present invention as applied to the die cylinders of a web-fed variable repeat cutter-creaser machine;

FIG. 2 is a detailed perspective view of one of the clamping and tensioning units for the die cylinders of the web-fed variable repeat cutter-creaser machine of FIG. 1 with a die positioned in readiness for installation;

FIG. 3 is a section taken on line 3—3 of FIG. 2 showing the die applied and clamped but not tensioned;

FIG. 4 is a section taken on line 3—3 of FIG. 2 and similar to FIG. 3, but with the die under tension and ready for use;

FIG. 5 is an exploded perspective view of various elements of the movable trailing edge clamps;

FIG. 6 is a section through the trailing edge clamps in a locked, or clamped, condition;

FIG. 7 is a section similar to FIG. 6 through the trailing edge clamps but with the clamps unlatched;

FIG. 8 is a perspective view of a clamping block;

FIG. 9 is a section taken on line 9—9 of FIG. 2 showing details of an adjustable die-locating dowel;

FIG. 10 is a section taken along line 10—10 of FIG. 9;

FIG. 11 is a detail, partly in section, and taken on line 11—11 of FIG. 12;

FIG. 12 is an end elevation of a shifting mechanism for positioning the die;

FIG. 13 is a fragmentary detail showing the left-hand shifting mechanism for translating the clamp bar; and

FIG. 14 is a view taken on line 14—14 of FIG. 12 showing the right-hand shifting mechanism.

Referring now to the details of the invention as shown first in FIG. 1, reference numberal 10 indicates generally a web-fed variable repeat cutter-creaser machine for use in the paper carton industry. This machine 10 has a pair of cylinders or drums 12 and 14 which rotate together cooperatively upon a continuous web of paper carton stock, not shown, fed between them.

Each drum 12 and 14 has a leading edge 16 relative to rotation directions as shown in FIG. 4, which defines the position to be occupied by the first edge of a cutting die 114 to be affixed about the drum 14. The trailing edge of each drum 12 and 14 is shown by reference numeral 18.

A multi-element clamping and tensioning means 20 bridges the gap between these positions of the leading and trailing edges 16 and 18 of each drum 12 and 14. This clamping and tensioning means 20 occupies a flat 22 machined across each drum 12 and 14 so as to lie below their peripheries as best shown in FIG. 2. Only one element of the clamping and tensioning means 20 is shown in FIG. 2 for clarity, but in a typical arrangement these elements may total nineteen across each drum as shown in FIG. 1. The number of elements of the clamping and tensioning means 20 utilized, however, will depend on the requirements of a particular machine 10.

In addition to the flat 22 and adjacent thereto, there is machined a leading edge cutout and a trailing edge cutout in the drum, reference numerals 24 and 26 respectively. The drums 12 and 14 are hollow, with each drum being provided with a large bore 28.

A clamping bar extends across the length of each drum 12 and 14 and it is seated in the cutout 24 and it is secured there with bolts 32. It is also secured at locations one-third and two-thirds across the length thereof by screws where the gap occurs between clamping elements. These bolts 32 pass through longitudinally elongated slots 34 intermediate the ends of the bar 30.

Each toggle-like element of the clamping and tensioning means 20 as shown in FIGS. 2 and 3, is a toggle joint and is dependent from the bar 30 by means which includes a leading edge clamping mechanism 36L. A pair of links comprising a bifurcated link 38 and a tensioning linkage 40 extend to a trailing edge clamping mechanism 36T.

Instead of joining to another long bar at this end, short individual clamp bars 64 are used. The links 40 articulate on a hinge bolt 44 which passes through a tongue 42 on the bifurcated link 38.

The tongue 42 is also provided with an extending boss 46 shown in FIG. 3 which receives the end of a

long compression coiled spring **50** that is housed in a tube **48** and backs up against the far wall of the bore **28** and thus act as a substantially radially acting biasing means.

As shown in FIG. **4**, this spring **50** normally urges the pair of links **38, 40** radially outwardly from the drum **14** or drum **12** as the case may be. The linkage can be collapsed and held to the flat **22**, the links **38** and **40** being co-linear in this position by means of a quarter turn screw **52** which is secured in a threaded hole **54** as best shown in FIGS. **2** and **3**.

Short individual hinge brackets **58** are fastened to the drum **14** within the trailing edge cutout **26** with bolts **60**, as shown best in FIGS. **2, 3, 4** and **5**, and each has a transverse hole **62**. Narrowed portions **66** of the clamp bars **64** pivot here on hinge pins **68**.

The leading edge and trailing edge clamping mechanisms **36L** and **36T** are similar. Each mechanism **36L** and **36T** is provided with a pair of side plates **70**. At the trailing edge of mechanism **36T**, these plates **70** are bolted to the hinged clamp bars **64**, while at the leading edge of the mechanism **36L**, they are bolted to the fixed clamp bar **30** using bolts **74**.

As shown in FIG. **5**, a hole **72** in the plate **70** is provided to receive this bolt **74** which extends through to engage a threaded hole **76** in the clamp bar **64**.

Each plate **70** is provided with a pair of holes **78** and **80** diagonally opposed from each other and another hole **82** in an intermediate corner, as best shown in FIG. **5**. The holes **78** receives a pin **92** extending from the side of a clamping block **84T** (or **84L**).

The hole **80** receives a pin **104** extending from the side of a T-shaped latch **102**. The remaining hole **82** engages a pin **112** near the end of the tensioning link **40**. Thus articulated, the clamping block **84T** presents a nose **86T** having a safety flange **90T** to a clamping surface **88T** on the clamp bar **64**.

In the same way, as shown in FIG. **2**, the clamping block **84L** presents a nose **86L** to a clamping surface **88L** on the clamp bar **30** in the case of the leading edge clamping mechanism **36L**.

In both cases, the confronting nose and surface are normally biased together by means of coiled compression springs **96, 98** housed at one end in a pocket **94**, as shown best in FIGS. **6, 7**, and **8**, of the clamping block. At the other end, the springs **96, 98** are received in a pocket **100L** in the bar **30** and in an opposing pocket **100T** of the bar **64**.

As shown best in FIGS. **6** and **7**, a camming surface **106** is provided on the latch **102** as well as a tool socket **108**. A rod-like tool **110** can be inserted in the socket **108** to rotate the latch **102** approximately 90° about hinge pin **104** from the position in FIG. **6** to the position in FIG. **7**. This action compresses the springs **96** and **98** and separates the confronting nose **86T** (or **86L**) and clamping surface **88T** (or **88L**) and allows the introduction of the end of a die blanket **114** therebetween.

The die is a thin flexible sheet or plate able to be bent to the diameter of cylinder **12** or **14** and is provided with a thickened edge **116** at the leading edge **16** and a similar thickened edge **118** at the trailing edge **18**, as best shown in FIGS. **3** and **4**. These thick edges **116** and **118** are the portions engaged by the clamping action and also serve as a failsafe provision in conjunction with the safety flange **90** should a clamp release occur in operation of the machine **10** or during a set-up of the die **114**.

It is to be noted as shown in FIG. **2** that the trailing edge of the die **114** is provided with a centering rib **117** adjacent the thickened edge **118**, which is used to line up the die **114** with a notch **85** in the center clamp block **84T** when the die is mounted on the cylinder.

The thickened edge **116** of the leading edge of the die blanket **114** has a pair of holes **120** and **122**, with the latter hole **122** being elongated transversely. Hole **122** is engaged by a fixed dowel **124** as shown in FIG. **2** and the hole **120** by an adjustable dowel arrangement **126**. Both dowels **124** and **126** extend from the bar **30**.

The adjustable dowel **126** is housed in a bore **128** as best shown in FIGS. **9** and **10**, and it consists of a rotatable spindle **130** having a dowel pin **134** protruding from an eccentrically bored hole **132**. The spindle **130** is provided with a circumferential groove **138** by which it is retained in the bore **128** of clamping bar **30** with a snap ring **144**. The snap ring **144** is contained in a shallow bore **140**, as shown in FIGS. **2** and **9**, which extends partly into the bore **128**. This bore **140** has a groove **142**. This groove **142** engages the snap ring **144** to the bar **30**.

The spindle **130** is rotated by means of teeth **136** on its periphery which engage in worm gear manner with the threads of a setscrew type worm **148**. This worm **148** is held captivated but free to rotate in a cross bore **146** by means of an apertured lock screw **152** in a threaded counterbore **150**. A wrench inserted through the lock screw **152** into the worm **148** will rotate the latter, which, in turn, rotates the spindle **130** and sweeps the dowel pin **134** in an eccentric path.

The clamping bar **30** is translatable lengthwise to a small degree by means of shifting mechanisms **154** and **156** at the right and left ends thereof, respectively. As shown in FIGS. **11** to **14** inclusive, this mechanism **154** or **156** works in a notched-out area **158** at each end of the clamping bar **30**. This machining leaves an extended area **160**. Further machining is done to finish a front plane surface **162** parallel to the rear face of the clamping bar **30**.

A flat washer plate **168** bears against this surface **162** (FIGS. **11** and **12** only). A bolt **164** passes through a slot **170** in the plate **168**, thence freely through a bell crank **172** and into a threaded hole **166** in drum **14**. This hole **166** is near each end in the leading edge **16** of the drum **14** (or **12**).

The depending leg **174** of a bell crank **172** has a spherical abutment **176** which may be the rounded point of a setscrew. The horizontal leg **178** of the bell crank **172** has an oval or rounded point adjustment screw threaded vertically therethrough. The rounded ends can thusly be brought to bear respectively at right angles against a hardened rest button **184**. This rest button **184** mounts in a threaded hole **182** in the extended area **160** of the bar **30** and is there secured with a wrench engaged with wrenching holes **186**.

Since the bell crank **172** is on a fixed pivot, namely bolt **164**, in the drum **14**, when its adjustment screw **180** is tightened, the side pressure of abutment **176** against the rest button **184** causes the clamping bar **30** to shift relative to the drum **14** in a lateral direction.

In operation, as best shown in FIGS. **2** and **4**, a die **114** in the form of a flexible sheet or plate is mounted to the drum **14** by camming the leading edge clamping mechanisms **36L** of all the clamping and tensioning ele-

ments of the tensioning means **20.** The leading edge of the die **114** is inserted into these open mouths and located over the dowel pins **124** and **126.**

The camming latches **102** are then released which allows the clamping blocks **84T** to move under their spring tension and hold the thickened edge **116** of the die **114** against the clamping bar **30.**

At this point in the installation, the linkages **38** and **40** would be pressed inwardly, compressing spring **50** and held thusly by the cross-wise position of quarter turn screw **52.**

The die **114** is then passed around the drum **14** and the trailing edge inserted into the similarly cammed-open trailing edge clamping mechanisms **36T.** Normal procedure would be to close three of the latter clamping mechanisms **36T,** one at each extreme edge and one at the center. These three associated linkages **38** and **40** are next released by the quarter turn screw **52,** thus tensioning the die **114** under force of springs **50.** Further tension may now be put on the die **114** by selecting other linkages **38** and **40** to similarly be clamped and released, thus removing wrinkles or bulges from the die **114** by opening and reclosing the originally used clamps **36T** or **36L** as required.

If the die **114** is skewed on the drum **14,** the leading edge of the clamping bar **30** may be moved sideways with the bell cranks **172** in correction of the condition.

After satisfactory positioning and clamping of the die **114,** the quarter turn screw **52** are all rotated to parallelism with the linkages and the springs **50** all functioning to maintain the die **114** under tension during use, which force resolves to the take-up distance indicated at the bottom of FIG. **4.**

Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In a rotating cylinder impression machine, a device for clamping and tensioning the ends of a die sheet on a cylinder, comprising in combination with a cylinder having a leading edge relative to its rotational direction and defining the position to be occupied by the first end of said die sheet and a trailing edge defining the position to be occupied by the opposite end of said die sheet, said cylinder having a leading edge cutout portion, a trailing edge cutout portion, and a flat cutout portion positioned between said leading and trailing edge cutout portions, all the said cutout portions extending substantially axially across the cylinder, the clamping and tensioning device bridging said flat cutout portion and lying below the periphery of the cylinder between the positions occupied by the ends of the die sheet and within the space defined by the cutout portions and further being secured to the cylinder, the clamping and tensioning device further comprising:

a stationary clamping bar disposed within the leading edge cutout portion of the cylinder and secured thereto, the bar having a radially facing clamping surface fitting flushly with the perimetric surface of the cylinder;

at least one pivotally movable clamp bar disposed within the trailing edge cutout portion of the cylinder and pivotally attached thereto, the bar having a radially facing clamping surface;

first clamping means opposing the clamping surface of the clamping bar and including spring means held between the clamping bar and said first clamping means and biasing said clamping means toward the clamping surface of the clamping bar for tensionably holding the first end of the die sheet therebetween;

second clamping means opposing the clamping surface of the movable clamp bar and including spring means held between the movalbe clamp bar and said second clamping means and biasing said clamping means toward the clamping surface of the clamping bar for tensionably holding the second end of the die sheet therebetween;

first link means pivotally connected to the first clamping means and extending transversely of the cylinder toward the second clamping means;

second link means pivotally connected to the second clamping means and extending transversely of the cylinder toward the first clamping means and connecting pivotally with the first link means medially of the flat cutout portion of the cylinder;

hinge means hingeably connecting the first and second link means at their respective inner ends for articulating the said link means relative to each other to allow the pivotally joined inner ends of the link means to be movable outwardly from the cylinder in a radial direction; and,

coil spring means housed within the cylinder and extending radially from therewithin to abut and act against the first and second link means at substantially the hinged juncture thereof, the coil spring means biasing the hinged ends of the said link means outwardly from the cylinder in a radial direction, thereby to bias the first and second clamping means toward each other in substantially a circumferential direction to tension the die sheet on the cylinder.

2. The clamping and tensioning device of claim **1** and further comprising:

means for holding the first and second link means against the flat cutout portion of the cylinder.

3. The clamping and tensioning device of claim **1** wherein the stationary clamping bar extends lengthwise of the cylinder over subsantially the full length thereof and wherein a plurality of the pivotally movable clamp bars are disposed at spaced intervals within the trailing edge cutout portion of the cylinder, each of the movable clamp bars having one of said second clamping means disposed oppositely therefrom.

4. The clamping and tensioning device of claim **1** wherein the first end of the die sheet is formed with hole means and the device further comprises dowel means disposed on the stationary clamping bar and being received within the hole means in the die sheet to maintain the die sheet in a desired position relative to the stationary clamping bar.

5. The clamping and tensioning device of claim **4** wherein the dowel means includes an adjustable dowel mechanism housed substantially within a bore means in the stationary clamping bar and comprising:

a rotatable spindle having an eccentrically bored hole disposed longitudinally therein, the spindle also having a circumferential groove disposed in its outer end and further having teeth about the periphery thereof, the spindle being disposed in the aforesaid bore means in the stationary clamping

bar with the outer end of the spindle located in the upper portion of the bore;

a dowel pin disposed in the eccentrically bored hole and protruding therefrom, the pin extending from the bore means in the stationary clamping bar;

a snap ring fitting into a portion of the circumferential groove disposed in the spindle, the snap ring being held within a shallow portion of the bore means contiguous to that portion of the bore means in which the spindle is held; and,

worm gear means disposed in the stationary clamping bar and engaging the teeth on the rotatable spindle, rotation of the worm gear means acting to rotate the spindle and to sweep the dowel pin in an eccentric path, thereby to move the dowel pin within the hole means in the die sheet during placement and removal of the die sheet from the cylinder.

6. The clamping and tensioning device of claim **1** wherein the stationary clamping bar has notched-out portions at each end thereof and bar lateral translation means disposed in each of the notched-out portions, the translation means each comprising:

plate means bearing against the innermost surface of the notched-out portion;

bellcrank means of substantially L-shaped conformation disposed between the plate means and that surface of the leading edge cutout portion which is parallel to the plate means, the bellcrank means being pivotally held therebetwen at the elbow portion thereof, the bellcrank means having a substantially horizontally disposed arm member and a substantially vertically disposed arm member;

button means disposed on the lower surface of the notched-out portion; and,

stationary pressure means disposed on one of the arm members and adjustable pressure means disposed on the other of the arm members, the respective pressure means bearing on adjacent surfaces of the button means and at right angles relatively thereto, movement of the adjustable pressure means toward or away from the button means causing the lateral pressure exerted on the button means by the stationary pressure means to respectively increase or decrease, thereby to cause the clamping bar to be laterally movable relative to the cylinder.

7. The clamping and tensioning device of claim **1** and further comprising:

camming means surmounting both the first and second clamping means and rotatable to bias the said clamping means away from respective clamping surfaces of the stationary clamping bar and movable clamp bar, thereby allowing the respective ends of the die sheet to be positioned between or removed from between the said clamping means and the said clamping surfaces.

8. The clamping and tensioning device of claim **1** wherein the pivotally movable clamp bar comprises:

opposed hinge brackets secured to the trailing edge cutout portion of the cylinder and having oppositely facing and aligned bores disposed therein; and,

aligned hinge pin means on opposite sides of a narrowed rear portion of the clamp bar, the hinge pin means being received within the oppositely facing and aligned bores in the hinge brackets, the clamp bar being pivotally movable about the hinge pin means.

9. The clamping and tensioning device of claim **8** wherein the first clamping means comprise:

spaced side plates secured to the stationary clamp bar, each of the side plates having diagonally disposed holes formed therein and aligning with corresponding holes in the opposing side plate, and further having an additional pair of aligned holes in the forwardmost portions thereof; and,

a clamping block having hinge pins extending from opposite sides thereof and received rotatably within one pair of aligned holes in the spaced side plates, thereby to allow said clamping block to pivot thereabout, the clamping block having a nose member on the outermost portion thereof and which confronts the clamping surface on the stationary clamping bar, the spring means being disposed between the rear portion of the clamping block and the stationary clamp bar and acting to bias the nose member of the clamping block toward the clamping surface of the clamping bar.

10. The clamping and tensioning device of claim **9** and further comprising camming means surmounting the first clamping means and including a T-shaped latch having aligned hinge pins extending from the arms of the latch, the pins being received in a second pair of the holes in the side plates of the first clamping means, the latch being rotatable about the hinge pins, the latch further having a camming surface formed on the rear portion of the arms and engageable with said clamping means on rotation of the latch about the hinge pins to bias the nose member of the clamping block away from the clamping surface of the clamping bar.

11. The clamping and tensioning device of claim **10** wherein the second clamping means comprise:

spaced side plates secured to the movable clamping bar, each of the side plates having diagonally disposed holes formed therein and aligning with corresponding holes in the opposing side plate, and further having an additional pair of aligned holes in the forwardmost portions thereof; and,

a clamping block having hinge pins extending from opposite sides thereof and received rotatably within one pair of aligned holes in the spaced side plates, thereby to allow said clamping block to pivot thereabout, the clamping block having a nose member on the outermost portion thereof and which confronts the clamping surface on the movable clamping bar, the spring means being disposed between the rear portion of the clamping block and the movable clamping bar and acting to bias the nose member of the clamping block toward the clamping surface of said clamp bar.

12. The clamping and tensioning device of claim **11** and further comprising camming means surmounting the second clamping means and including a T-shaped latch having alinged hinge pins extending from the arms of the latch, the pins being received in a second pair of the holes in the side plates of the second clamping means, the latch being rotatable about the hinge pins, the latch further having a camming surface formed on the rear portion of the arms and engageable with said clamping means on rotation of the latch about the hinge pins to bias the nose member of the clamping block away from the clamping surface of the clamping bar.

13. The clamping and tensioning device of claim 12 wherein the first link means are pivotally hinged to the side plates secured to the stationary clamp bar within the additional pair of aligned holes in the forwardmost portions thereof and the second link means are pivotally hinged to the side plates secured to the movable clamping bar within the additional pair of aligned holes in the forwardmost portion thereof.

14. The clamping and tensioning device of claim 13 wherein a plurality of said pivotally movable clamp bars, first and second clamping means, first and second link means, hinge means, and coil spring means are provided, each combination thereof being laterally spaced from each other such that selected portions of the ends of the die sheet can be independently clamped and moved toward each other thereby.

15. The clamping and tensioning device of claim 14 and further comprising means for securing said first and second link means in a position whereby the link means are substantially parallel and in a co-linear condition so as to maintain said first and second clamping means respectively apart from the stationary clamping bar and the movable clamp bars.

16. The clamping and tensioning device of claim 15 and further comprising means for releasing each pair of said first and second link means independently from the ends of the die sheet.

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