United States Patent [19]

Barland

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[45] **July 24, 1973**

[54] **STITCHING HEAD APPARATUS**

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[21] Appl. No.: **154,418**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 37,190, May 14, 1970, Pat. No. 3,642,187.

[52] **U.S. Cl.** **227/90**

[51] **Int. Cl.** **B27f 7/02**

[58] **Field of Search** 227/82, 83, 84, 85, 227/86, 87, 88, 89, 90, 91, 92

[56] **References Cited**

UNITED STATES PATENTS

2,554,691	5/1951	Zeruneith	227/84
2,160,908	6/1939	Robinson	227/82
1,246,455	11/1917	Niskanen	227/91
2,226,916	12/1940	Zeruneith	227/89
3,173,592	3/1965	Herbst	227/7

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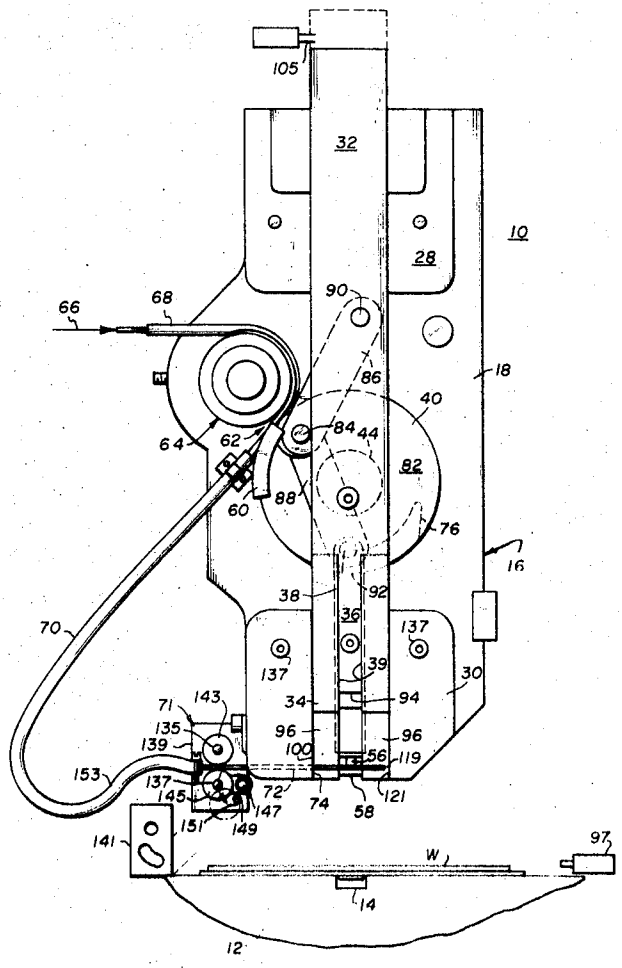
[57] **ABSTRACT**

A wire stitching head is disclosed for successively producing a series of uniformly shaped and sized stitches from a continuous length of wire and includes a reciprocating stitch forming bar and a relatively shiftable stitch driving bar operated by a rotating cam wheel provided with an arcuate feeding cam which coacts with a guide roller to feed a predetermined length of wire into stitch forming position upon each rotation of the cam wheel. The stitch forming bar and stitch driving bar are guided in their reciprocating paths of motion by a guide member having a channelway into which the preselected length of wire is positioned for the forming and driving operation. The preselected length of wire, determined by the arcuate length of the aforementioned feeding cam, is just slightly less than the width of the channelway in the guide member whereby such length of wire does not reach the opposite wall in the channelway at any time during the stitch forming or stich driving operation thereby avoiding deflection and bending of the wire which otherwise occurs especially at high speed operation. To more precisely regulate the length of wire fed into stitch forming position, the aforementioned guide roller is mounted on the frame of the apparatus for rotation with the cam wheel and preferably by being geared thereto. Also to aid in positioning the wire in the stitch forming apparatus, a novel wire check structure, comprising a pair of unidirectional clutches between which the wire passes, is mounted immediately adjacent the aforementioned guide member to minimize the distance between the wire check and a passageway in the guide member through which the wire passes to reach the stitch forming position. Additionally, wire guide means are provided which include a hollow tube, a portion thereof being disposed in a curvilinear path which is opposite the direction of the bias established by the supply of wire. In this manner, the natural bias of the wire in the direction of the coil rolls from which it was stored is reversed and the wire is straightened out prior to being fed to the stitch forming portion of the apparatus. Finally, after a stitching cycle has been completed, the deenergization of the driving mechanism of the stitching head apparatus is arranged to take place when the moving parts thereof approach a condition of zero momentum thereby substantially reducing the stresses which must be withstood by such elements as the clutch-brake utilized to halt the motion of the apparatus.

8 Claims, 3 Drawing Figures

United States Patent [19]
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SHEET 1 OF 3

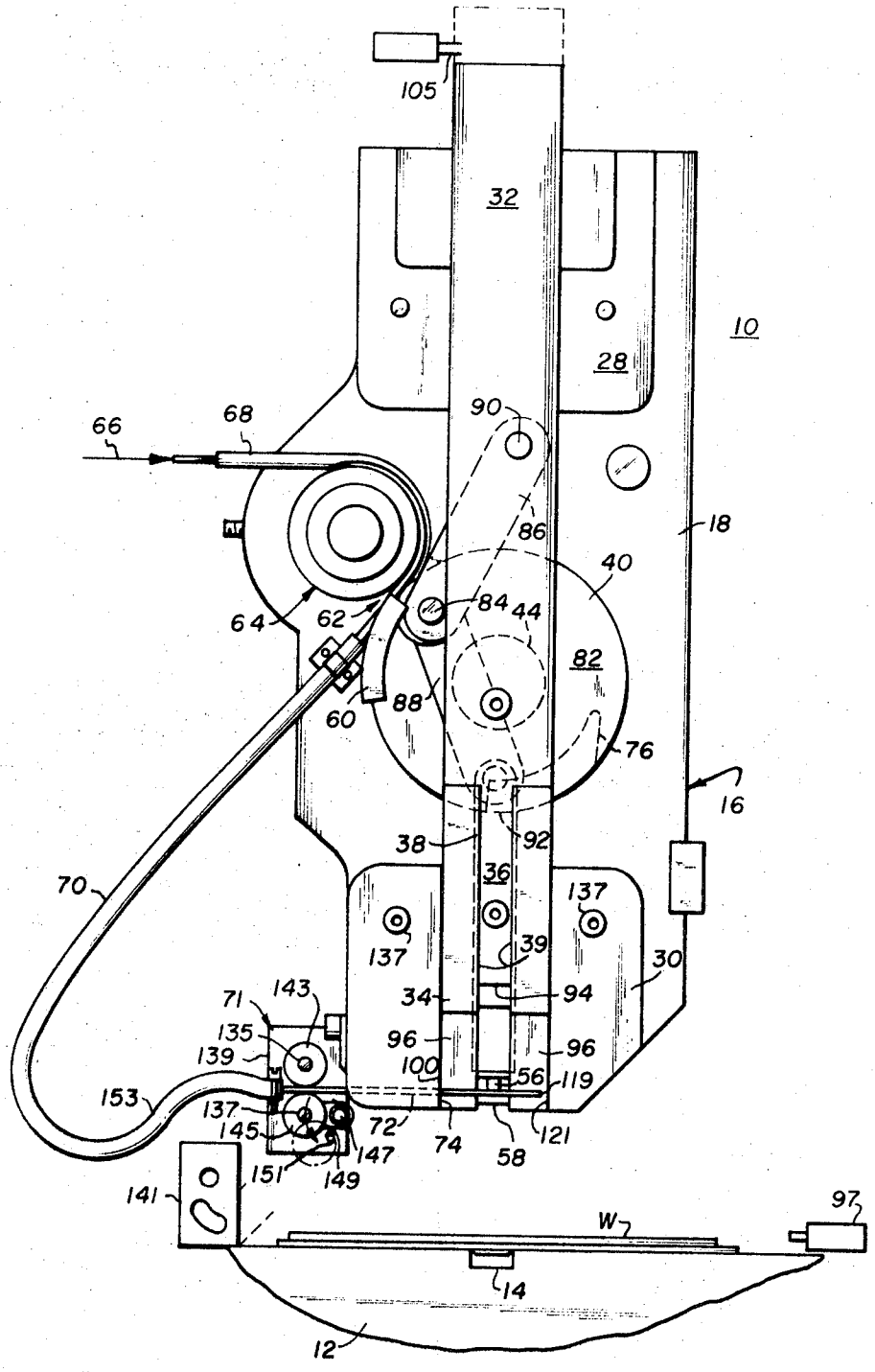


FIG. 1

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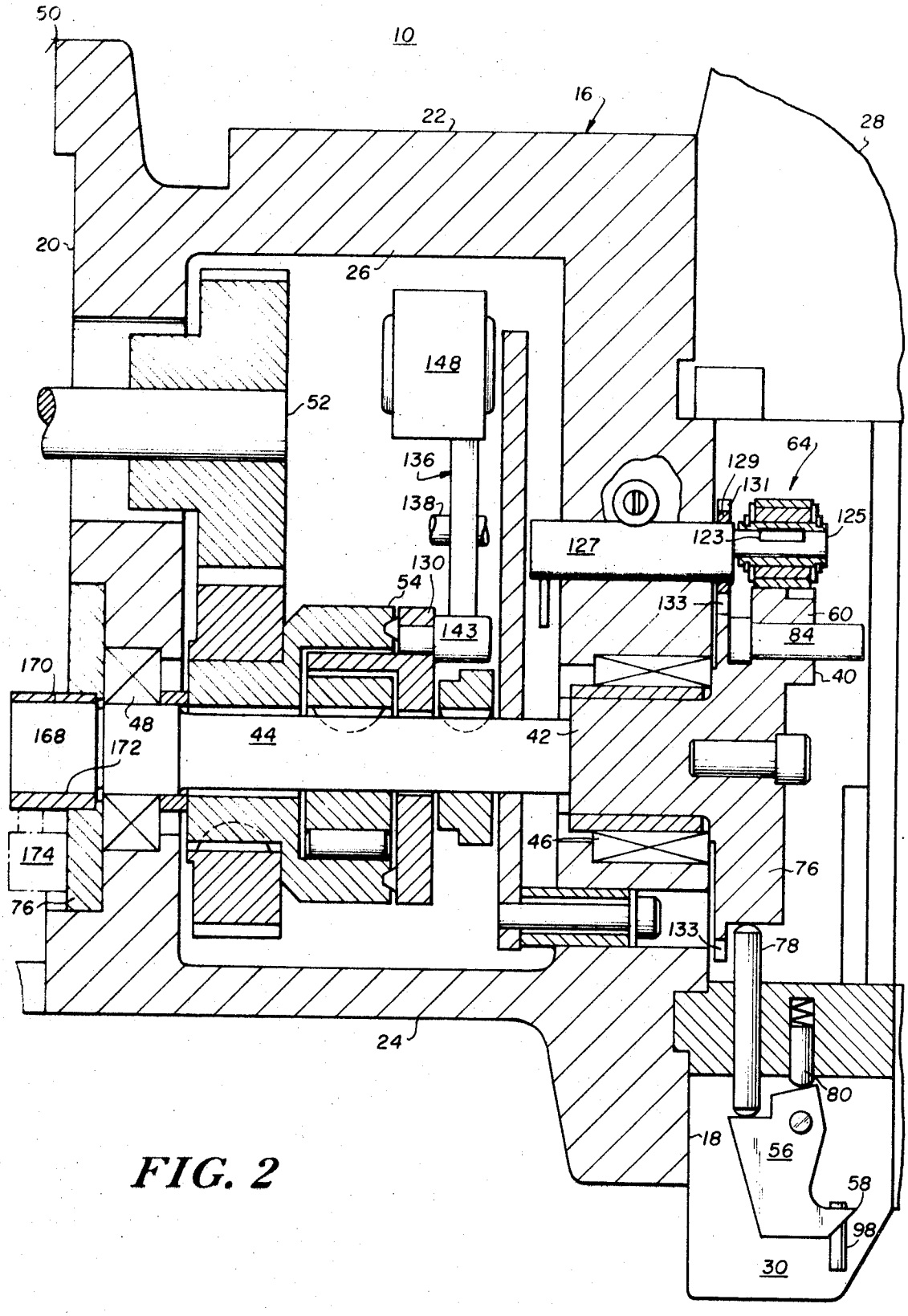

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64
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123
127
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54
133
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143
84
170
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98
30

FIG. 2

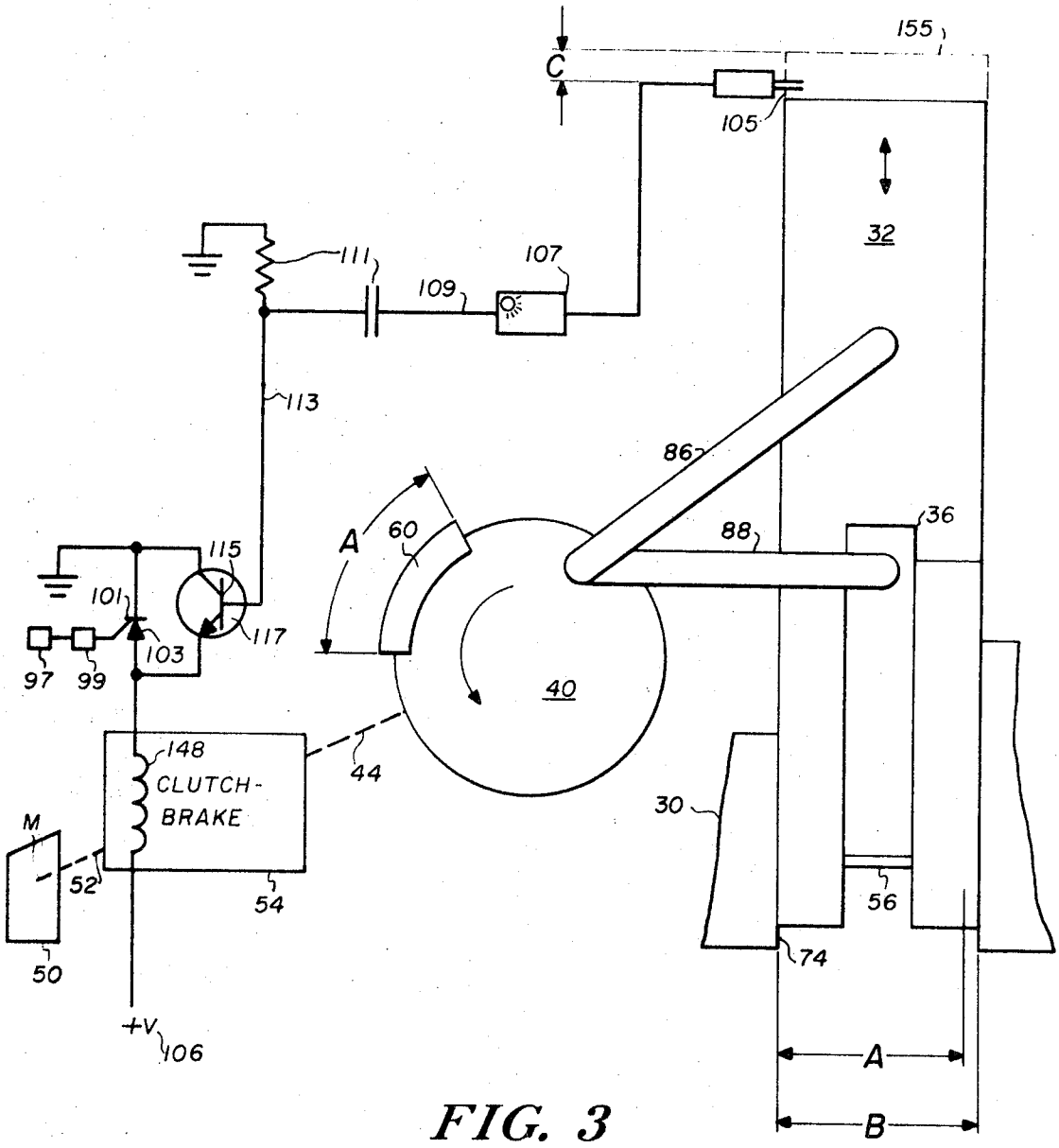

155
C
105
32
111
109
107
113
86
36
88
A
60
115
101
117
103
97
99
40
148
CLUTCH-
BRAKE
44
30
M
52
54
56
50
74
+V
106
A
B

FIG. 3

STITCHING HEAD APPARATUS

CROSS REFERENCES TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. Pat. application Ser. No. 37,190 filed May 14, 1970 in the name of Lauri C. Barland and entitled "Stitching Head Apparatus," now U.S. Pat. 3,642,187, assigned to the assignee of the instant application.

FIELD OF THE INVENTION

This invention relates to wire stitching heads, more particularly wire stitching heads capable of successively producing a series of uniformed shaped and sized stitches from a continuous length of wire, and more particularly to such a wire stitching head having significant improvements which make possible wire stitching at extremely high rates of speed.

BACKGROUND OF THE INVENTION

In U.S. Pat. application Ser. No. 37,190 filed May 14, 1970 in the name of Lauri C. Barland, and assigned to the assignee of the instant invention, there is disclosed a wire stitching head of the type to which the instant invention is directed. Thus the stitching head of the aforementioned Barland application includes, as the heart of its mechanism, a motor driven cam wheel which performs a number of functions which may be briefly summarized as follows.

First, the cam wheel carries along its periphery an arcuate feeding cam which, together with a cooperating guide roller, functions to intermittently feed preselected lengths of wire into the stitch forming position upon each revolution of the cam wheel. Secondly the cam wheel pivotally carries on a forward surface thereof a pair of links one of which is pivotally connected to a reciprocating stitch forming bar and the other of which is pivotally connected to a stitch driving bar which functions to drive a stitch into the work piece after the stitch has been formed by the aforementioned stitch forming bar. The stitch forming bar and stitch driving bar are guided in their reciprocating paths of travel by a guide member having a channelway into which each preselected length of wire is successively fed prior to being formed and driven into the work piece positioned therebeneath. This basic machine, although now enjoying wide spread popularity in the industry, has been found to encounter certain difficulties when the speed of operation thereof is substantially increased.

For example, at extremely high rates of stitching speed, for example **1500** stitches per minute, the stitches being produced by the stitching head tend to become non-uniformly shaped, leading sometimes to improper stitch placement or even worse, sometimes to a jamming of the stitching head. Also, at extremely high rates of stitching speed, the momentum of the moving parts becomes extremely high, and attempts to deactivate the stitching head, for example by applying a braking force to the rotating cam wheel to which the stitch forming bar and stitch driving bar are attached, sometimes applies such stresses that the braking mechanism completely fails (i.e., is physically destroyed). Moreover, at high rates of stitching speed, such problems as controlling the feeding of the wire and preventing back-slip during the interval between feeds, becomes

especially acute creating unacceptable deviations in the form, shape and placement of the stitches produced by the stitching head apparatus.

SUMMARY OF THE INVENTION

The instant invention is directed to a wire stitching head of the general arrangement discussed above, but is provided with significant improvements which have simply, inexpensively, and effectively eliminated the aforementioned problems associated with operating the wire stitching head at increased rates of speed.

Specifically, applicant has discovered that one of the reasons the wire stitches become deformed or otherwise improperly shaped, is because when a length of wire is fed into the channelway of the aforementioned guide member at an extremely high rate of speed, it must absorb a proportionally greater amount of energy from the shock it receives when its leading end "bangs" into the far wall of the channelway. Of course, the energy it absorbs is dissipated by the undesirable bending and deflection of the wire mentioned previously. In the instant invention, this problem is completely eliminated by providing that the preselected length of wire being fed into the aforementioned guide member for subsequent forming and driving is less than the width of the channelway such that the leading end of the wire never quite reaches the far wall of the channelway when it is fed into stitch forming and driving position. As will be described in greater detail, such result is accomplished by preselectively selecting the arcuate length of the aforementioned feeding cam to correspond to the preselected length of wire which is just less than the width of the aforementioned channelway. In addition, and in a manner to be further described, controlled accuracy is assured by providing a direct power drive for the aforementioned guide roller and by providing a novel wire check, comprising a pair of unidirectional clutches which prevents wire slippage back toward the supply roll in between periods of wire feed. Also, novel wire straightening means are provided adjacent the wire check such that the length of wire finally fed into the aforementioned channelway will be transversely oriented with respect to the direction of travel of the former and driving bars and not curved in the direction of its storage position on a supply roll.

With respect to the problem of clutch-brake failure at high speeds, the instant invention includes a system for deactivating the driving means associated with the aforementioned multifunction cam wheel at a point in time when the stitch forming means and stitch driving means are approaching a condition of zero momentum (at the point where the reciprocating forming and driving bars reverse their direction of travel). In this manner, the braking mechanism has virtually no momentum to absorb regardless of the speed at which the stitching head is operating.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

FIG. 1 is a front elevational view of the stitching head of the present invention with the front cover plate thereof removed to show the operative parts of the mechanism;

FIG. 2 is a side elevational view of the stitching head of the present invention; and

FIG. 3 is a schematic representation of the certain aspects of the instant invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

Turning to the Figures, wherein like numerals are employed to designate like elements, it will be observed from FIGS. 1 and 2 that the wire stitching head of the present invention is in the form of a compact motor driven organization which is adapted to be suitably mounted at the upper end of a main support frame (not shown), which is provided with a horizontally disposed work supporting surface **12** fitted with a clenching member **14** for clenching the wire stitches as the same are successively formed in the stitching head **10** and driven thereby through the work W to be stitched.

As mentioned previously, the instant invention represents improvements to the stitching head of the aforementioned Barland application Ser. No. 37,190, and as such includes: top and bottom channel guide members **28, 30** secured on the front surface **18** of a frame **16** for guiding a reciprocating stitch forming bar **32** which has a bifurcated lower end **34,** a driving bar **36** mounted for reciprocal motion within guideways **38** provided on the confronting inner surface **39** of the bifurcated lower end **34** of the forming bar **32**; a multi-function cam wheel **40** rigidly secured to one end **42** of a driven shaft **44** suitably journalled by ball bearings **46** and **48** in the front and rear surfaces **18** and **20** of the frame **16**; an electric motor **50** the output shaft **52** of which is selectively connectable to the driven shaft **44** by a clutch mechanism **54**; and a pivoting anvil **56** the nose portion **58** of which is utilized in the stitch forming operation in a manner more fully set forth in the aforementioned Barland application, the contents of which are hereby incorporated herein by specific reference thereto.

In order to understand the manner in which the improvements of the instant invention function in a wire stitching machine of the type set forth in the Barland application, it is perhaps worthwhile to begin a description of the instant invention by providing a short description of the overall operation of a stitching head of the type described in said Barland application Ser. No. 37,190.

Initially it should be pointed out that the cam wheel **40** carries an arcuate feeding cam **60** which projects slightly into the path of travel **62** defined by the periphery of the cam wheel **40** and a guide roller **64** the specific construction of which is set out in great detail in the aforementioned Barland application. Thus for each revolution of the cam wheel **40** (affected when the clutch **54** interconnects the continuously rotating output shaft **52** of the motor **50** with the driven shaft **44**), a preselected length of wire, corresponding to the arcuate length of the feeding cam **60** will be advanced from a supply reel (not shown) through tubular wire guides **68, 70,** through a wire check **71** forming a part of the instant invention, and a passageway **72** provided in the lower guide member **30,** into channelway **74** provided in the lower guide member **30.**

It will be appreciated that the clearance between the guide roller **64** and the periphery of the cam wheel **40** is such that the wire **66** fits freely therebetween under normal circumstances. It is only when the projecting feed cam **60** enters the path of travel **62** that the wire is "sandwiched" and thereby advanced. Of course, during intervals of non-feed, when the wire **66** is free with respect to the feeding mechanism, the wire check **71** to be described in greater detail, prevents the wire from being pulled back toward its supply roll, not shown. Also, it will be appreciated that the arcuate or peripheral length of the feeding cam **60** is preselectively choosen to correspond to the overall length of the ultimately desired stitch. Yet to be described in connection with an improvement of the instant invention is the manner in which the preselected length of wire corresponding to the arcuate length of the feed cam **60,** is chosen with respect to the width of the channelway **74** in the lower guide member **30.**

Provided on the rearward side of the cam wheel **40** (as viewed in FIG. **1**) is a second cam surface **76** which, as best seen in FIG. **2,** cooperates with a following rod **78** to maintain the pivotally mounted anvil **56** in the wire supporting position illustrated in FIG. **2.** It will be appreciated, that when the cam **76** rotates free of the following rod **78,** a spring biased plunger **80** will rotate the anvil **56** in a clockwise direction as viewed in FIG. **2** and out of the path of travel of the driver bar **36** as will be described below. It should be pointed out, that the placement of the cams **60** and **76** relative to one another, and the arcuate length of the cam **76,** are chosen such that the anvil **56** and its wire supporting nose **58,** will be in the proper wire supporting position illustrated in FIG. **2,** as the wire **66** is being advanced into the channelway **74** in the manner previously described.

Finally, the front surface **82** of the cam wheel **40** carries an outstanding pin **84** to which is pivotally connected to one end of a pair of links **86, 88** respectively. The opposite end of the link **86** is pivotally connected to the pin **90** outstanding from the forming bar **32,** and the opposite end of the link **88** is pivotally connected to pin **92** provided on the driver bar **36.** It will be noted that the pin **90** joining the link **86** to the former bar **32** is mounted off center and to the right (as viewed in FIG. **1**) with respect to the location of the pin **92** which joins the link **88** to the driving bar **36.** This mounting is intentionally chosen, such that the length of the reciprocating stroke of the driver bar **36** is greater than the length of the reciprocating stroke of the bifurcated forming bar **32** which together function in the following manner.

Assuming that the feeding cam **60** has positioned the next length of wire in the channelway **74** (appropriately supported by the anvil **56** by virtue of the cam surface **76** and the follower rod **78**), continued rotation of the cam wheel **40** causes the links **86** and **88** to begin the downward strokes of the former bar **32** and the driver bar **36** respectively. Because the lower end of the former bar **32** is initially lower than the bottom edge **94** of the driver bar **36,** the wedge like surfaces **96** of the bifurcated end **34** of the former bar **32** quickly engage the opposite ends of the wire length positioned in the channel **74** and bend them downward around the anvil nose **58** to form the desired U shaped stitch illustrated at **98** in FIG. **2.** Immediately thereafter, the lower end **94** of the driving bar **36** reaches the bight portion of the U shaped stitch and continues to drive the stitch (within the confines of the confronting faces **39** of the bifurcated forming bar) through the work piece W and into engagement with the clenching member **14.** It should be pointed out that the wire is initially cut from the continuous supply running through the passageway **72** by the side edge **100** of the bifurcated forming bar **32.** Additionally, it should be pointed out that the positioning and length of the second cam **76** provided on the cam wheel **40** is such that just as the driving bar **36**

engages the bight portion of the U shaped stitch, the cam **76** leaves the following rod **78** and the spring biased plunger **80** quickly rotates the anvil **56** out of the path of travel of the driving bar **36.**

Thus the stitch is fed, formed, driven, and clenched in one quick continuous operation, all motions of which are generated by the single multi-function cam wheel **40.** During the second half cycle of cam wheel rotation, the motions are reversed with the driving bar **36** being lifted before the forming bar **32.**

With respect to FIG. **3,** the actual initiation of a stitching cycle begins when an appropriate photoelectric sensing means **97** functions to sense the leading edge of the work piece **14** as it advances past the stitching head **10.** When the photocell detects the presence of the leading edge, it energizes a conventional timer **99** which is set to time out upon the expiration of a predetermined amount of time corresponding to the length of the front flaps of the carton to be constructed from the box blank **14** being stitched by the machine. When the timer **99** is timed out, it generates a signal applied to the gate **101** of a semiconductor controlled rectifier **103** which is thereby turned on to complete a circuit comprising voltage source **106,** clutch coil **148** (FIG. 2), the SCR **103,** and to ground. Once clutch coil **148** is energized, then in a manner described in further detail in the aforementioned Barland application, the clutch **54** is activated to interconnect the output of the motor **50** with the cam wheel **40.** It is to be understood, however, that any suitable clutch or clutch brake combination may be used in the instant invention and not just the clutch brake described in detail in the aforementioned Barland application.

To control the deactivation of the stitching operation, sensing contacts **105** are positioned in the path of travel of the reciprocating stitch former bar **32.** A counter **107** responsive to the pulses produced by the contacts **105** is utilized to preset the number of stitches desired. When the preset number of stitches have been sensed by contacts **105** and accumulated by counter **107;** a signal is applied on the line **109** which the capacitor-resistive network **111** converts to a pulse appearing on the line **113** which is applied to the base **115** of a transistor **117** which turns on to thereby momentarily "make" a low impedance bypass circuit around the SCR **103** which is thereby extinguished. Thus coil **148** is deenergized, the clutch **54** is braked, and the stitching head **10** ceases operation.

Turning to the specific contributions of the instant invention, it was previously mentioned that at extremely high rates of speed, there is a tendency for the leading end **119** of the wire to bang against the far wall **121** of the passageway **74** thereby bending and deforming the wire and the subsequent stitch formed thereby. To avoid this problem, the arcuate length A of the feeding cam **60** of the cam wheel **40,** corresponding to the length of wire which will be fed into the channelway **74,** is preselectively chosen to be slightly less than the width of the channelway **74** designated B in FIG. **3.** In this manner, the end **119** of the wire never reaches the far wall **121** and the aforementioned problem is completely eliminated.

Since the preselected length of wire fed into the channelway **74** is an important factor in eliminating the tendency of the wire to bang against the far wall thereof, it will be appreciated that the wire feeding operations described previously must be especially accurate. To this end, and to avoid any possibility of slippage during the feeding operation, the instant invention provides that the guide roller **64** be positively driven for rotation with the cam wheel **40** during the feeding operation. Specifically and as seen perhaps most clearly in FIG. **2,** the guide roller **64** (the details of which are disclosed and claimed in the aforementioned Barland application), is fixedly mounted by a key way **123** to the reduced diameter end **125** of a shaft **127.** The shaft **127** is provided with a gear **129** the teeth **131** of which mesh with gear teeth **133** provided around the periphery of the cam wheel **40.** In this manner, the guide roller **64** is driven synchronously with the cam wheel **40** thereby materially increasing the control and accuracy of the feeding operation.

At the other end of the feeding operation, the novel wire check means **71** is provided to prevent backup of the wire **66** toward its supply (not shown) during the intervals between positive wire feed. Before describing the wire check **71** in detail, it is to be appreciated, and considered one of the improvements of the instant invention, that the wire check **71** is secured to the frame **16** immediately adjacent the lower guide member **30** to thereby minimize the distance between the wire check and the passageway **72** through which the wire passes on its way to the channelway **74.**

In accordance with one aspect of the invention, the wire check **71** includes a pair of shafts **135, 137** supported between end plates **139** and **141** respectively. Mounted on each shaft is a roller **143, 145** spaced apart from one another to define a feed path for wire passing therethrough. Each of the rollers is rotatable in only one direction, that corresponding to the direction of feed of the wire toward the stitch forming channelway **74.** To accomplish such unidirectional rotation, the rollers may comprise for example the type of unidirectional clutches manufactured by the Torrington Company of Torrington, Connecticut but of course, any other suitable unidirectional roller arrangement may be provided to establish the direction of rotation desired.

To facilitate the insertion of the wire during an initial loading operation, the shaft **137** may be rotated in a counterclockwise direction about pivot **147.** A spring **149** wrapped around the pivot **147** and having one end connected to the arm upon which the shaft **137** is mounted and the other end connected to a fixed pin **151** normally biases the roller **145** toward the roller **143.**

To further help in properly aligning the length of wire within the channelway **74,** it is desirable that the length of wire in the channelway remain in a position transverse with respect to the reciprocating path of travel of the forming bar **32** and the driving bar **36.** To this end, the wire guiding tube **70** terminates in a portion **153** which is disposed in a curvilinear path which is opposite to the direction of bias established on the supply of wire by virtue of its storage on a roll (not shown). Thus by the time the wire emerges from the passageway **72** in the lower guide member **30** it has been straightened out and no longer attempts to return to the direction of curvature in which it was stored on the supply roll.

Finally, as was mentioned previously, when operating at extremely high rates of stitching speed, it sometimes happens that the clutch mechanism such as **54** physically fails in its attempt to apply a braking action to the moving parts of the stitching head which of course gather increasingly high momentum with higher oper-

ating speeds. To eliminate this problem, the instant invention provides that the sensing contacts **105** are positioned in the reciprocating path of motion of the forming bar **32** adjacent the uppermost point of travel designated **155** in FIG. **3** of the forming bars **32.** Of course it will be appreciated that the point **155** represents the point of reversal of travel of the reciprocating forming bar **32,** such that this point **155** corresponds to a condition of zero momentum for the reciprocating parts. Therefore, and in accordance with this aspect of the instant invention, location of the contacts **105** adjacent the point of zero momentum, guarantees that the clutch **54** will be subjected to a minimum, virtually zero, momentum when it applies a braking force to the moving parts of the stitching head. Thus, regardless of what speeds are attained, the clutch **54** never "sees" the high momentums involved when it applies the braking force and the aforementioned failure thereof is completely eliminated. Preferably, the contacts **105** are spaced from the uppermost point of travel **155** by a distance designated C in FIG. **3** corresponding to the time required for the circuitry to deenergize the coil **148** (and the mechanism responsive thereto, described in the aforementioned Barland application, to actually disengage the clutch and apply the braking action) whereby the stitch forming means and stitch driving means will just reach their zero momentum position when the brake is actually applied to the shaft **44.**

Although this invention has been described with respect to its preferred embodiments, it should be understood that many variations and modifications will now be obvious to those skilled in the art, and it is preferred, therefore, that the scope of the invention be limited, not by the specific disclosure herein, only by the appended claims.

I claim:

1. A wire stitching head comprising;

a frame;

stitch forming means mounted on said frame for forming a preselectively shaped stitch from a preselected length of wire which has been supplied thereto;

stitch driving means movably mounted with respect to said stitch forming means for driving the stitch formed by said stitch forming means into a work piece positioned in predetermined relationship with respect to said stitching head; and

wire feeding means for intermittently supplying said preselected length of wire to said stitch forming means from a supply of said wire; said wire feeding means including;

a cam wheel mounted on said frame, driving means for selectively rotating said cam wheel,

a guide roller mounted on said frame, said guide roller mounted on said frame in proximity to said cam wheel to define a path of travel for said supply of wire therebetween,

said cam wheel having an arcuate feeding cam of said preselected length, said arcuate feeding cam projecting into said path of travel each time said cam wheel is rotated a revolution by said driving means; and further including linking means connected between said cam wheel and said stitch forming means and said stitch driving means for operating said stitch forming means and said stitch driving means in reciprocating paths of motion in response to rotation of said cam wheel by said driving means; and further including start means for initiating the energization of said driving means; and

stop means for deenergizing said driving means; said stop means including sensing means for deenergizing said driving means when said stitch forming means and said stitch driving means approach a condition of zero momentum.

2. The wire stitching head of claim **1** wherein said sensing means includes switching means positioned in said reciprocating path of motion adjacent the uppermost point of travel of said stitch forming means.

3. The wire stitching head of claim **2** wherein said switching means is spaced from said uppermost point of travel of said stitch forming means by a distance corresponding to the time required for said stop means to deenergize said driving means; whereby said stitch forming means and stitch driving means will just reach their zero momentum position when said driving means is deactivated.

4. A wire stitching head comprising:

a frame,

stitch forming means mounted on said frame for forming a preselectively shaped stitch from a preselected length of wire which has been supplied thereto;

stitch driving means movably mounted with respect to said stitch forming means for driving the stitch formed by said stitch forming means into a work piece positioned in predetermined relationship with respect to said stitching head,

wire feeding means for intermittently supplying said preselected length of wire to said stitch forming means from a supply of said wire;

driving means for operating at least said stitch forming means and said stitch driving means; and further including

start means for initiating the energization of said driving means;

stop means for deenergizing said driving means; said stop means including sensing means for deenergizing said driving means when said stitch forming means and said stitch driving means approach a condition of zero momentum.

5. The wire stitching head of claim **4** wherein said stitch forming means and said stitch driving means move with respect to said frame in reciprocating paths of motion; and

wherein said sensing means includes switching means positioned in said reciprocating path of motion adjacent the uppermost point of travel of said stitch forming means.

6. The wire stitching head of claim **5** wherein said switching means is spaced from said uppermost point of travel of said stitch forming means by a distance corresponding to the time required for said stop means to deenergize said driving means; whereby said stitch forming means and stitch driving means will just reach their zero momentum position when said driving means is deactivated.

7. The wire stitching head of claim **4** and further including a guide member secured to said frame for guiding the movement of said stitch forming means, said guide member including a channelway into which said preselected length of wire is fed by said wire feeding means and within which said stitch forming means re-

ciprocates; said preselected length of wire being less than the width of said channelway.

8. The wire stitching head of claim 7 wherein said wire feeding means includes a cam wheel mounted on said frame, said driving means rotating said cam wheel upon activation thereof; a guide roller mounted on said frame in proximity to said cam wheel to define a path of travel for said wire therebetween; said cam wheel having an arcuate feeding cam of said preselected length projecting into said path of travel each time said cam wheel is rotated a revolution by said driving means; and

wherein the arcuate length of said feeding cam corresponds to said preselected length of wire.

* * * * *