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Bakermans et al.

[11] **3,846,896**

[45] **Nov. 12, 1974**

[54] **TERMINAL BLOCK ASSEMBLY APPARATUS**

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[73] Assignee: **E. I. du Pont de Nemours and Company,** Wilmington, Del.

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[21] Appl. No.: **406,304**

[52] **U.S. Cl.** ..... **29/203 DT**

[51] **Int. Cl.** **H01t 43/04**

[58] **Field of Search** ..... 29/203 DT, 203 D, 203 S, 29/203 MW, 625, 630 D

[56] **References Cited**

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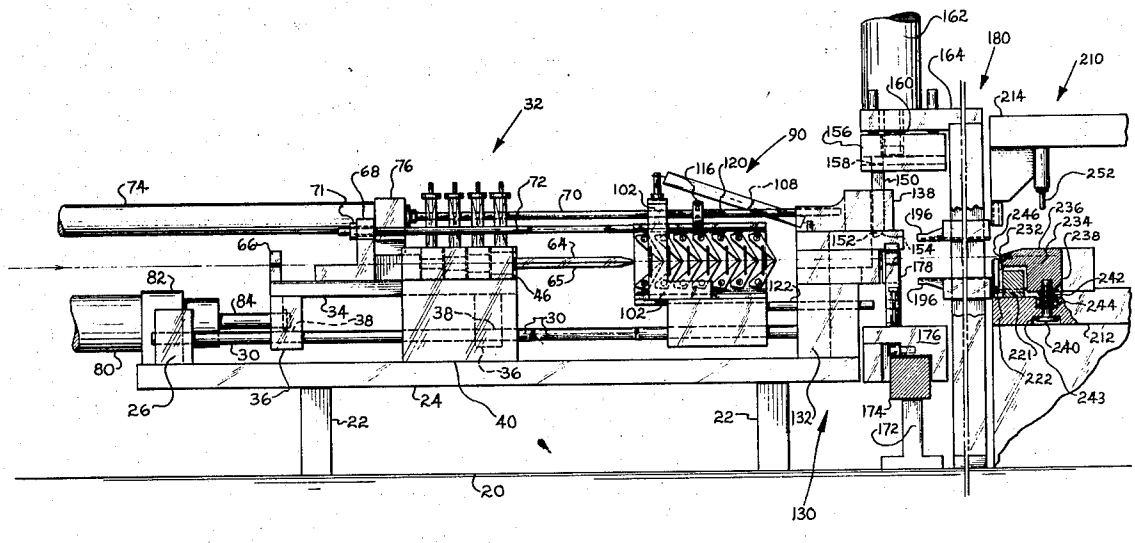
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Primary Examiner—Thomas H. Eager

[57] **ABSTRACT**

An apparatus is provided for assembling terminal blocks having a plurality of spring wire contacts interconnected with a plurality of lead wires in an insulated terminal block. The apparatus comprises a terminal block assembly station, a reciprocal spring wire feed assembly for inserting a plurality of spring wires through a terminal block positioned at a terminal block assembly station, a first positioning member for aligning the spring wires with holes in the terminal blocks at the assembly station, a second positioning member for receiving the spring wires inserted through the terminal blocks and aligning the spring wires with a plurality of lead wires attached to a carrier strip, and a spring wire-lead wire splice assembly having a carrier strip feed path for receiving a carrier strip having a plurality of lead wire attached to the carrier strip. The spring wires are spliced to the lead wires, the lead wires are severed from the carrier strip, and the spring wire feed assembly is retracted drawing the spliced interconnection into the insulated terminal block in the assembly station.

21 Claims, 14 Drawing Figures



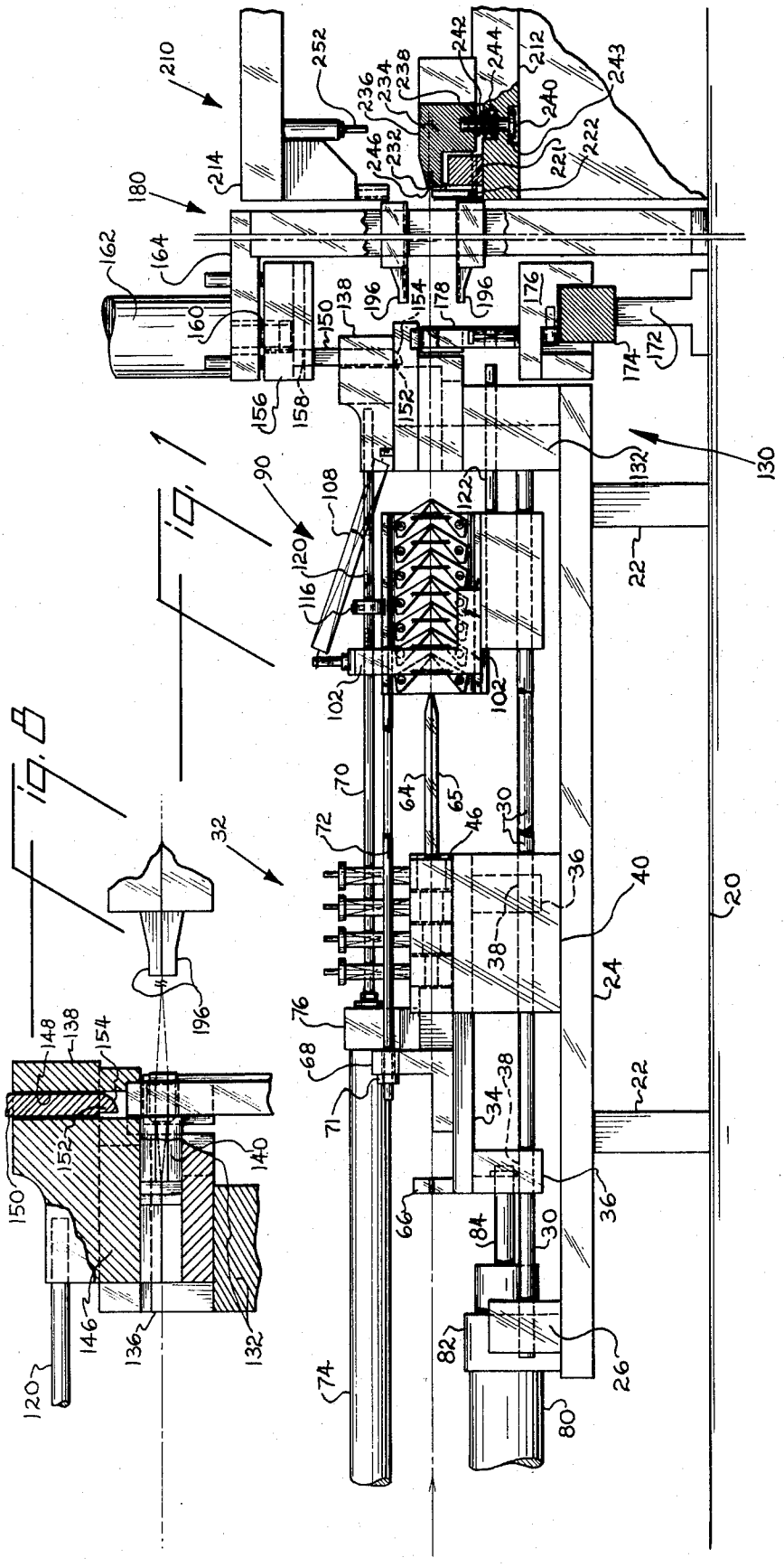

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Fig. 1

Fig. 8

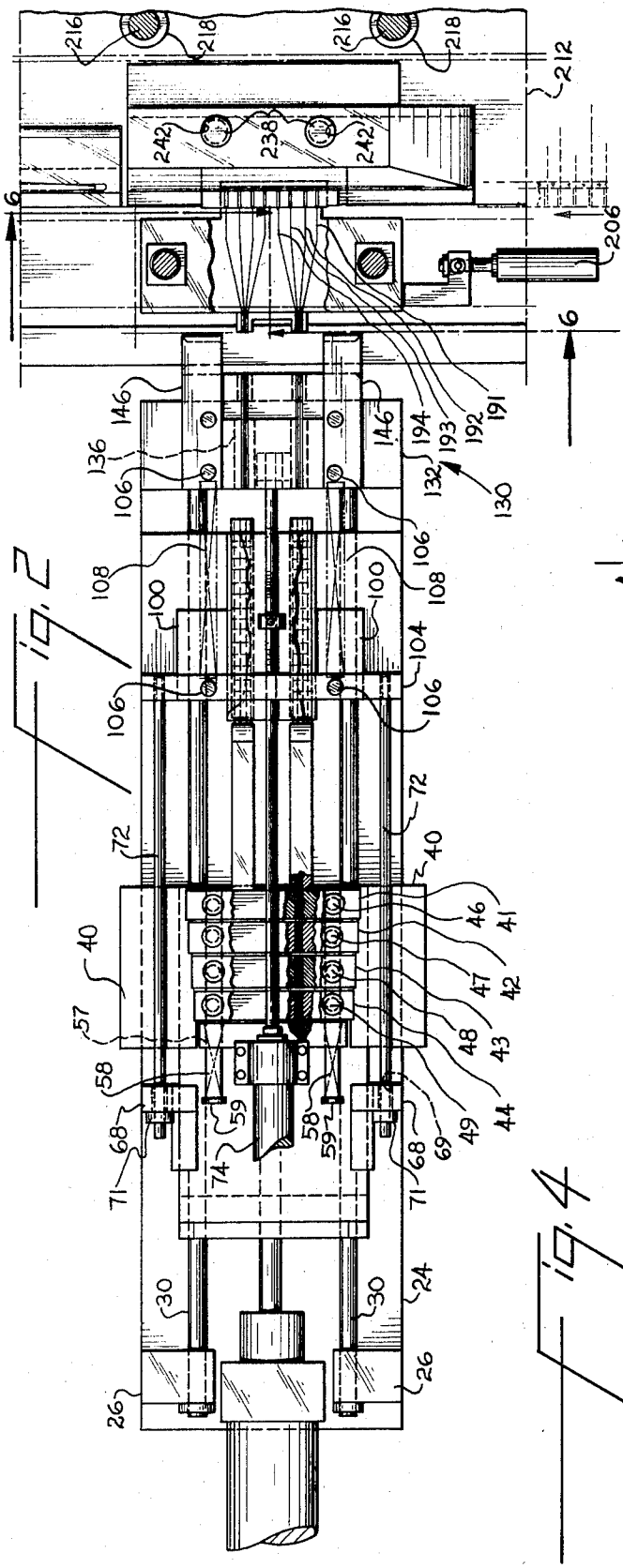


Fig. 2

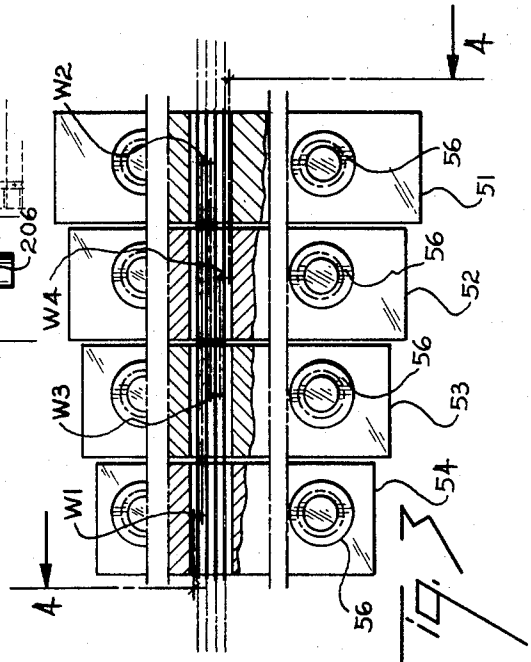


Fig. 3

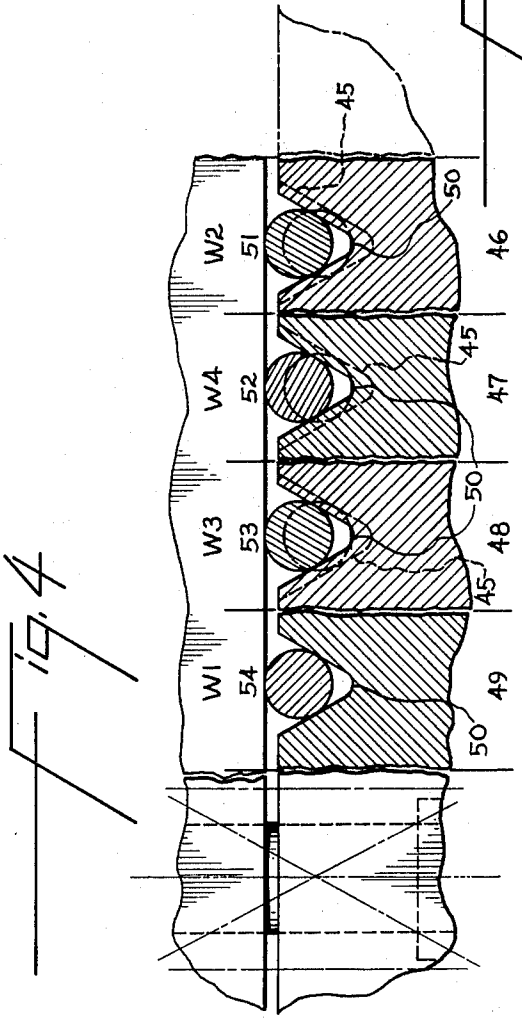


Fig. 4

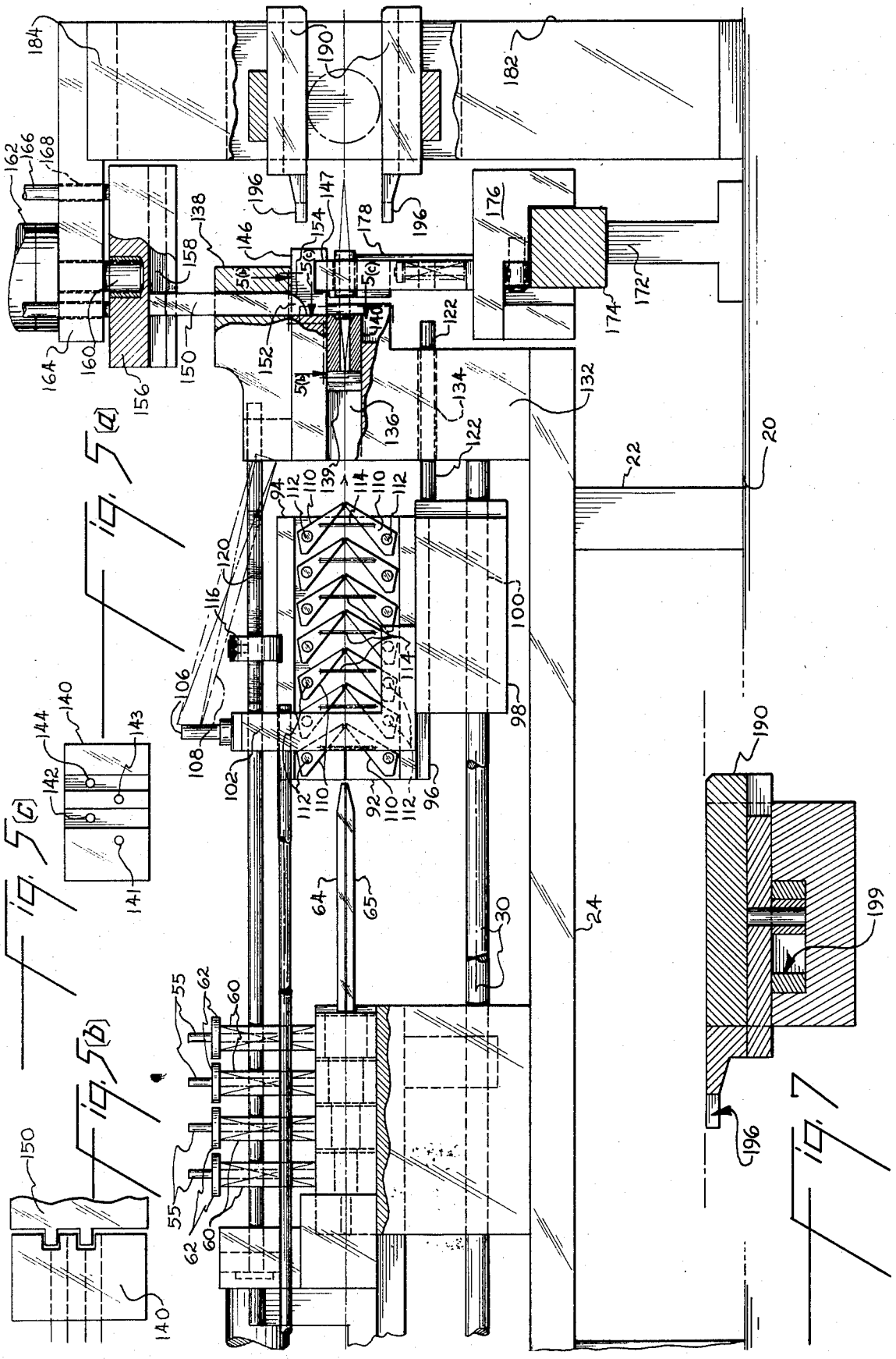

Fig. 5(a)
Fig. 5(c)
Fig. 5(b)
Fig. 7

Fig. 6

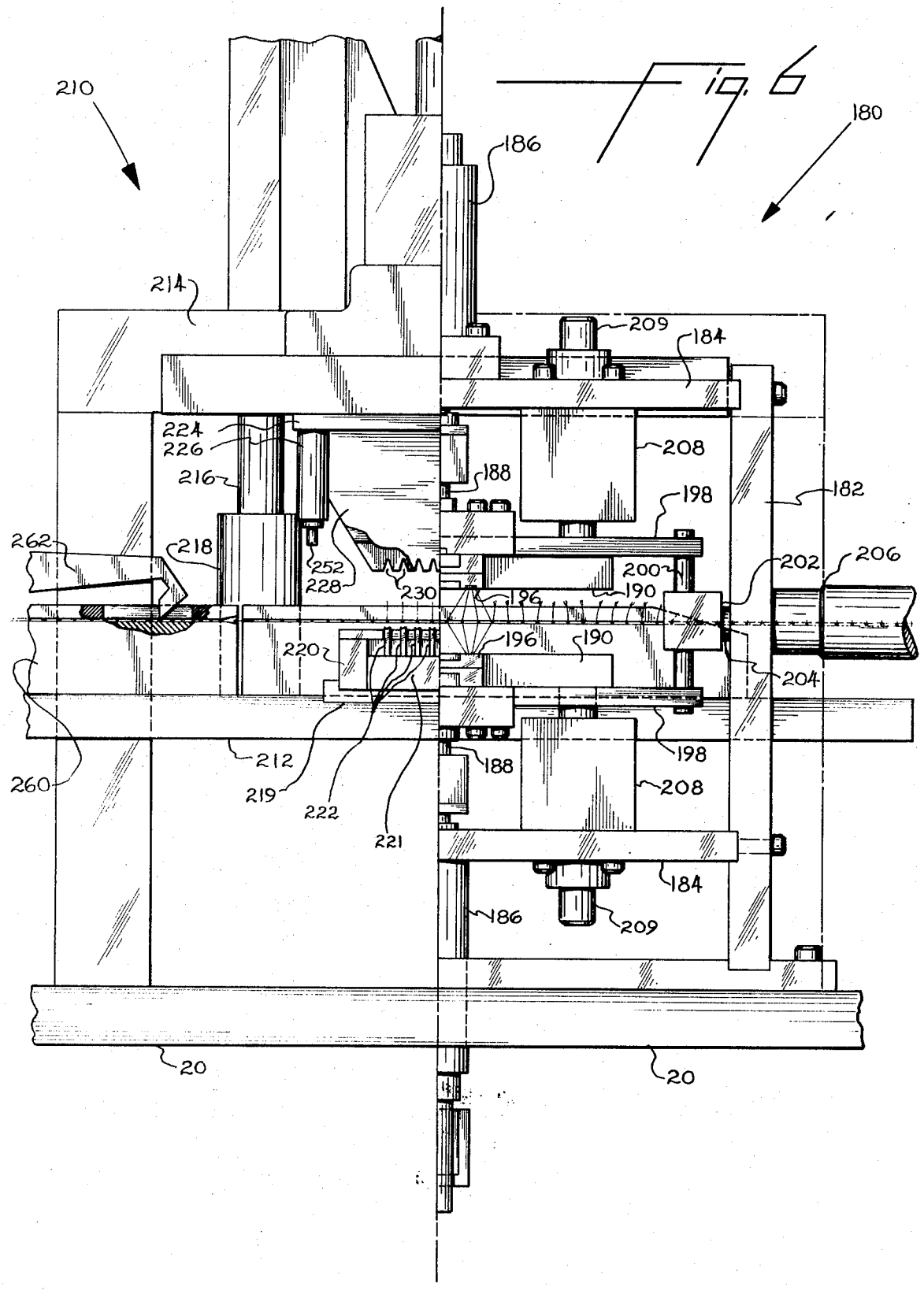
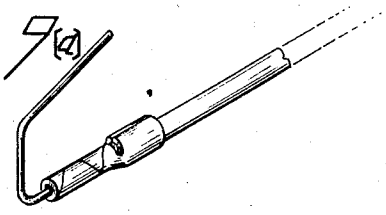

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Fig. 9(a)



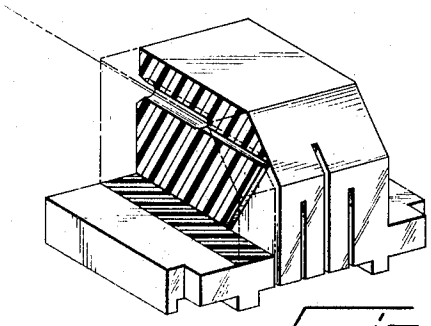


Fig. 9(b)

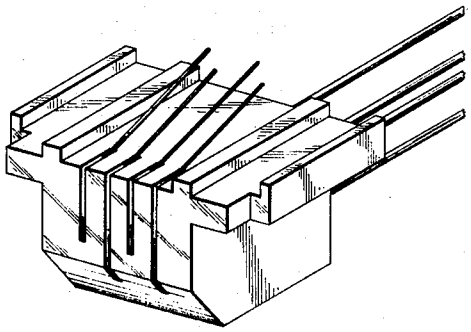


Fig. 9(c)

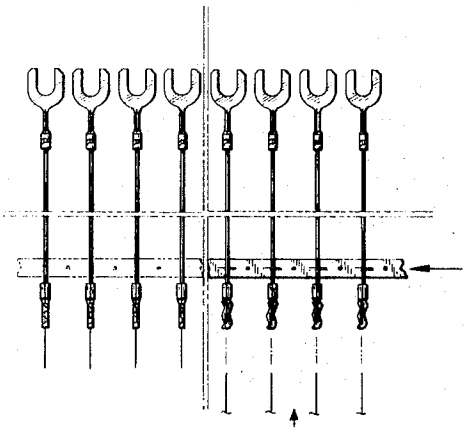


Fig. 10

TERMINAL BLOCK ASSEMBLY APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an apparatus for assembling terminal blocks having a plurality of spring wire contacts interconnected with a plurality of lead wires in an insulated terminal block, and particularly relates to an apparatus for assembling terminal blocks wherein spring contact wires are fed different lengths and positioned in vertically and horizontally spaced holes in terminal blocks and more particularly, it relates to apparatus for assembling terminal blocks wherein a plurality of continuous spring contact wires are spliced to a plurality of lead wires and the splice is drawn back into the insulated terminal block.

2. Description of the Prior Art

Terminal blocks and apparatus for assembling them, including inserting wires through holes in the blocks, attaching terminals to the free ends of the wires and retracting the wires and terminals into the blocks, are disclosed in U.S. Pat. Nos. 3,289,284 and 3,444,607. A method and apparatus for forming and pulling contact terminals into an electrical receptacle is described in U.S. Pat. No. 3,191,271. A method of making an electrical circuit assembly by inserting flexible wires through guide tubes in an insulated block into passageways is described in U.S. Pat. No. 3,377,698. On reaching the ends of the passageways, slip clutches on each of the wire feed rolls stall out stopping the feed of the wires.

The apparatus of the present invention provides for assembling a terminal block having a plurality of spring wire contacts interconnected with a plurality of lead wires within the terminal block. The spring contact wires are positively fed differential lengths through a plurality of supporting fingers and postioned for insertion through a plurality of spaced holes in a terminal block. The wires inserted through the terminal blocks are positioned in alignment with a plurality of lead wires, spliced to the lead wires and the spliced interconnection is retracted into the terminal block.

SUMMARY OF THE INVENTION

According to the present invention an apparatus is provided for assembling terminal blocks having a plurality of spring wire contacts interconnected with a plurality of lead wires within a terminal block, comprising a terminal block assembly station for postioning a terminal block for receiving a plurality of spring wires and interconnecting the spring wires with a plurality of lead wires,

means for feeding a plurality of continuous spring wires different lengths through spaced holes in a terminal block positioned at a terminal block assembly station,

first means for positioning the plurality of spring wires in alignment with the plurality of spaced holes in the terminal block at the terminal block assembly station,

second means for positioning the plurality of spring wires inserted through the spaced holes in the terminal block at the terminal block assembly station in alignment with a plurality of lead wires,

means for splicing the spring wires and lead wires at the terminal block assembly station to form a permanent electrical interconnection,

means for retracting the spring wire lead wire interconnection into the terminal block at the terminal block assembly station, and

means for severing the continuous spring wires a spaced distance from the terminal block in the terminal block assembly station to provide a plurality of spring wire contacts on the terminal block interconnected with a plurality of lead wires.

In a preferred embodiment of the apparatus of the invention the terminal blocks have a plurality of horizontally and vertically spaced holes requiring different lengths of spring wire extending therefrom to provide uniform length spring wire contacts for the terminal blocks. Because of the close proximity of the horizontally and vertically spaced holes in the terminal block, it is preferred to feed the plurality of wires on the same horizontal spacing and position them in vertical alignment with the spaced holes previous to insertion in the holes in the terminal blocks. The different length spring wires are inserted through vertically and horizontally spaced holes in the terminal block and are positioned in a horizontal plane and fanned out to increase the horizontal spacing to align with a plurality of lead wires attached to a continuous carrier strip having a different horizontal spacing from the holes in the terminal block. In a preferred embodiment the carrier strip extends along the length of a lead wire assembly with a splice-type crimp barrel spaced at regular intervals along the strip on one side thereof, and the lead wires extend across the strip with one end of each wire secured in each crimp barrel. The ends of the lead wires extend across the strip and are secured to the strip by an insulation crimp barrel, which together with wire crimp barrels form splice barrels for receiving the continuous spring wires inserted through the terminal blocks. The spring wires are spliced to the lead wires by crimping to form a permanent electrical interconnection between the spring wires and lead wires.

The apparatus of the invention provides a significant technical advance for automatic assembly of terminal blocks, having a plurality of uniform length spring wire contacts interconnected to a plurality of lead wires, by reducing the heretofore intensive labor requirements and by yielding higher production rates than previously obtainable for assembling similar terminal blocks. The terminal blocks are particularly useful in communication terminals, e.g., telephone and data terminal equipment.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevation view in partial section of the apparatus of the invention.

FIG. **2** is a plan view in partial section of the embodiment of the invention of FIG. **1.**

FIG. **3** is a detailed drawing broken away showing the stepped upper feed bars of the apparatus of the invention.

FIG. **4** is a detailed drawing in section and broken away taken along line **4—4** of FIG. **3.**

FIGS. **5**(*a*), (*b*) and (*c*) are elevation and plan views in detail of the embodiment of the invention of FIG. **1.**

FIG. **6** is a split view in detail taken along line **6—6** of FIG. **2.**

FIG. 7 is a detailed drawing in section of the guide means for receiving spring wires inserted through the terminal block.

FIG. 8 is a detailed drawing of the assembly station of the apparatus.

FIGS. 9 (*a*), (*b*) and (*c*) illustrate a spring wire lead wire crimp interconnection and a terminal block for use with the apparatus of the invention.

FIG. 10 illustrates a plurality of lead wires attached to a carrier strip for use in the apparatus of the invention.

DETAILED DESCRIPTION OF THE INVENTION

A preferred embodiment of an apparatus of the invention is described with reference to the attached drawings wherein the same numerals are used throughout to identify the same elements.

With reference to FIG. 1, the apparatus comprises a wire feed carriage assembly **32**, a wire insertion support guide assembly **90**, a terminal block assembly station **130**, a spring wire positioning assembly **180**, and a press assembly **210**.

With particular reference to FIGS. 1 and 2, table **20** is provided for mounting the various component assemblies of the apparatus. Plate **24** supported by cross members **22** is mounted on table **20**. Mounting blocks **26** and stationary block **132** are fixedly mounted on opposite ends of the plate **24**. A pair of carriage rods **30** are mounted between blocks **26** and **132**. A wire feed carriage assembly **32** is mounted on plate **34** having mounting blocks **36** with holes **38** for slidably mounting the carriage assembly **32** on carriage rods **30**. Side plates **40** are fixedly mounted on plate **24** and have stepped spaced recesses **41–44** for receiving lower and upper feed bars **46–49** and **51–54**. Lower feed bars **46–49** have a plurality of guide grooves **45** and a clamp groove **50** machined therein. The guide grooves **45** allow the wire disposed therein to move freely, and the clamp grooves **50** cooperate with the upper bars to provide a three point clamp for the individual wires disposed therein. Posts **55** are thread-mounted in lower bars **46–49** through holes **56** in upper bars **51–54**. Springs **60** are mounted over posts **55** and retained thereon by adjustable spring retainers **62**. The adjustable spring retainers provide for individual adjustment of the upper bars **51-54** with the clamp grooves and the lower bars **46–49**. A pair of rods **57** are mounted in holes provided in the lower feed bars **46–49**. The rods **57** are fixedly connected to lower feed bar **46**. Springs **58** are mounted on the other ends of the rods **57** with spring retainers **59**. The springs **58** close up the spaced feed bars when they are advanced with the carriage feed assembly **32** from the stepped spaced recesses **41–44** in side plates **40**. The spacing of the stepped recesses **41–44** determines the different length of feed for the spring wires W_1, W_2, W_3 and W_4, and may be varied to obtain the different lengths desired. Insertion guide members **64, 65** having guide grooves (not illustrated) therein are fixedly mounted on lower feed bar **46**. A wire guide member **66** is also provided on carriage feed assembly **32**. Brackets **68** mounted on opposite sides of plate **34** slidably receive a pair of guide rods **72** in guide holes **69**. Air cylinder **74** is fixedly mounted on the feed carriage assembly in bracket **76**. Piston rod **70** of air cylinder **74** connects to an extension shaft **120**. Air cylinder **80** is fixedly mounted in a bracket **82** on plate **24**. Piston rod **84** of air cylinder **80** connects to block **36** on the underside of the carriage assembly **32**.

A wire insertion guide assembly **90** is slidably mounted on carriage rods **30** through mounting block **98** having guide holes **100** therein. Brackets **102** are mounted on opposite sides of lower plate **96** and are connected by cross member **104**. Wire insertion guide assembly **90** is spring biased toward stationary block assembly **130** by springs **108** connected between standoffs **106** on cross member **104** and guide members **146** on stationary block **132**. A plurality of opposing guide fingers **110** for supporting the spring wires are pivotally mounted on stub shafts **112** connected to mounting block **92**. Springs **114** are connected between the upper and lower guide fingers **110**. Rods **72** are fixedly connected in brackets **102** on the wire insertion assembly **90** and are slidably received in holes **69** provided in brackets **68**. Retaining nuts **71** are adjustably positioned on rods **72**. Piston rod **70** of air cylinder **74** is attached to the wire insertion support assembly **90** by collar **116** on extension shaft **120** connected to piston rod **70**.

Block **132** is mounted on plate **24** and has channel **136**. A knife guide block **138** attached to wire positioning members **139** and **140** is slidably mounted in channel **136**. Extension shaft **120** is fixedly connected to knife guide block **138**. Wire positioning member **140** has a plurality of guide tubes **141–144** for positioning the continuous spring wires in the vertically and horizontally spaced configuration in alignment with the holes in the terminal blocks as shown in FIG. 5 (*c*). Members **146**, having slots **147** for receiving upright member **178** of car carrier **176**, are mounted on block **132**. Holes **134** are provided in block **132** for positioning rods **122**. Additional guide grooves **148** are provided in block **138** for guiding the spring wire cutting knife **150**.

The spring wire cutting knife **150** having cutting edge **152** and curved edge **154** is slidably mounted in member **156** having grooves **158** which mate with grooves provided in the shank of the knife **150**. Member **156** is mounted on piston rod **160** of air cylinder **162** which is mounted on fixed member **164**. Guide posts **166** are mounted on member **156** and slidable in guide holes **168** provided in fixed member **164**.

The terminal block carrier car assembly comprises a monorail **174** supported by stanchion **172** mounted on table **20**. A plurality of carrier cars **176** having upright members **178** are mounted on a conventional monorail conveyor. Upright carrier member **178** is mounted on car **176**. In the preferred embodiment of the apparatus illustrated, car **176** carries two terminal blocks.

A spring wire positioning assembly **180** comprises upper and lower guide plates **190**, having cooperating fanout grooves **191–194** machined therein. The guide plates **190** are actuatably mounted on piston rods **188** of air cylinders **186** mounted on cross members **184** between stanchions **182**. Spring wire receiving guide members **196** are mounted on guide plates **190** and are cam operated by cams **198** connected to connecting block **202** by pin **200**. Connecting block **202** is mounted on piston rod **204** of an air cylinder **206** fixedly mounted on stanchion **182**. Guide bushings **208** for receiving guide rods **209** on plates **190** are mounted on cross members **184**.

A press assembly **210** comprising press plate **214** and stationary plate **212** is mounted on support members

(not shown). Press plate **214** is mounted on post **216** in sleeve bearings **218** mounted on plate **212.** Lower tooling blocks **220** are mounted on sub-plate **219** on plate **212.** Tool member **221,** having a plurality of crimp anvils **222,** is mounted between tooling blocks **220.** Upper tooling blocks **226** are mounted on sub-plate **224** on plate **214.** Tool member **228,** having a plurality of crimp elements **230,** is mounted between tooling blocks **226.** Block **234,** having a slot **232** machined therein, is mounted on shafts **238.** Shafts **238** having flanged sections **240** are slidably mounted in holes **242** provided in plate **212.** Holes **242** have recesses **243** for receiving flanged section **240** on shafts **238.** The block **234** is spring loaded away from plate **212** by springs **244** on shafts **238** in recesses **242** in plate **212.** A knife **236** for severing the terminals from the carrier strip is mounted on block **234** providing a carrier strip feed path for receiving a plurality of lead wires attached to a carrier strip. An anvil **246** is mounted between tooling blocks **220** below slot **232.** Members **252** mounted on tooling blocks **226** drive the knife **236** past the anvil during closing of the press to sever the terminals, attached to the lead wires, from the carrier strip. The carrier strip is advanced from the assembly station along block **260** by pawl **262.**

The operation of the apparatus can readily be understood with reference to the attached drawings and the detailed description of the operation below.

A preferred terminal block for use in the apparatus of the invention is shown in FIGS. **9** (*b*) and (*c*). A group of four spring contact wires is inserted through vertically and horizontally spaced holes in the block in communication with the four vertical slots. The spaced vertical slots of different height terminate along one edge of the block with the recess extending into the intersecting surface. The continuous spring wires are inserted in the vertical slots and through the communicating vertical and horizontal spaced holes in the block. On emerging from the vertical and horizontal spaced holes in the block the wires are positioned in a horizontal plane and then fanned out to align with a lead wire assembly having splice crimp terminals attached to the individual lead wires and connected to a continuous carrier strip. A suitable carrier strip is described in applicants' commonly assigned co-pending application S. N. 386,410 filed Aug. 7, 1973, which is incorporated by reference herein. The spring wires are splice crimped with the lead wires, and the continuous carrier strip severed from the lead wire terminals. The continuous spring wires interconnected with the lead wires in the splice crimp terminals are withdrawn into the vertical and horizontal spaced holes in the terminal block. The continuous wires are severed at a spaced distance from the surface of the block having the vertical slots therein. The curved back of the knife bends the severed spring wires into the vertical slots to form spring wire contacts. Preferably the spring wire contacts are then bent around the edge of the block wherein the vertical slots terminate, and the wire contacts form an acute angle with the surface of the block adjacent the surface having the vertical slots.

In a preferred embodiment of the apparatus of the invention described above and shown in the attached drawings two groups of four continuous spring wires are initially threaded through wire guide **66,** wire feed carriage assembly **32,** wire insertion guide assembly **90** and wire positioning guide member **140** in the terminal block assembly station **130.** The wires are initially trimmed by activating air cylinder **162** and cycling the knife **150** to sever the wire ends at the differential faces of positioning guide member **140.** A plurality of lead wires having splice crimp terminals attached to the ends thereof and the terminals connected by the crimp terminals to a continuous carrier strip are positioned in the wire splice crimping assembly **210** by pawl **262.**

Although in the preferred embodiment of the apparatus shown in the attached drawings two groups of four wires are shown, the detailed description of the operation of the apparatus which follows refers only to a single group.

Air cylinders **186** are activated and through piston rods **188** close cooperating guide plates **190.** Air cylinder **206** is activated and piston rod **204,** through connecting block **202** and pin **200,** emerges cams **198** with cam follower surfaces **199** to engage spring wire positioning members **196** with the terminal block in the terminal block assembly station **130.**

Air cylinder **80** is activated and piston rod **84** starts the wire feed carriage assembly **32** toward the terminal block assembly station **130.** Retaining nuts **71** on guide rods **72** release the wire insertion support guide assembly **90.** Air cylinder **74** and springs **108** urge the wire insertion support guide assembly **90** along carriage rods **30** and into engagement with stationary block **132.** Knife guide block **138** attached to wire positioning members **139** and **140,** and connected by extension shaft **120** to piston rod **70,** slide in channel **136** to engage member **140** with the terminal block in the terminal block assembly station **130.** The face of member **140** and the knife blade **152,** are alternatively spaced to provide for cutting the spring wires at different lengths corresponding to the different length required to provide uniform length contacts when the spring contacts are bent along a surface of the terminal block. This length corresponds to the vertical spacing of the holes in the terminal block. The spaced vertical and horizontal holes **141–144** in the member **140** correspond to the holes in the terminal block. The four spring wires W_1, W_2, W_3 and W_4 are respectively clamped by upper bars **51, 52, 53** and **54** and lower bars **46, 47, 48** and **49.** The upper and lower bars cooperate to clamps wires W_2, W_4, W_3 and W_1, respectively disposed in spaced stepped recesses **41, 42, 43** and **44** of side plates **40** on plate **24.** Springs **60** on posts **55** are adjusted for three point clamping of the wires between the upper bars and the clamp groove **50** in the lower bars. Guide members **64** and **65** having grooves (not illustrated) advance the wires W_1, W_2, W_3 and W_4 to the spring biased support fingers **110** as the carriage feed assembly **32** is advanced in the direction of stationary block **132** and inserts wires W_1, W_2, W_3 and W_4 through the terminal block. The spaced bars in the stepped recesses are brought together on rods **57** by springs **58,** and the wires, respectively clamped by the bars as described above, are fed different lengths corresponding to the spacing of the stepped recesses.

Members **196** receive the vertically and horizontally spaced spring wires from the terminal block and position them in a horizontal plane. As the carriage feed assembly **32** is advanced on carriage rods **30** air cylinder **206** is deactivated and the guide members **196** are retracted toward guide plates **190** in unison with the feed of the spring wires. The horizontal spaced wires are received in plates **190** and fanned out by cooperating

grooves **191, 192, 193** and **194** to position the ends of the continuous spring wires into splice crimp terminals on the lead wires positioned on the crimping anvils **222** and attached to the carrier strip by the crimp terminals. Crimp tools **230** on tool member **228** engage the crimp barrels of the splice terminals on anvils **222** to form a permanent electrical interconnection between the spring wires and lead wires. Press plate **214** is conventionally driven to perform the crimping function. Members **252** drive the knife **236** and block **234** down against springs **244** to sever the terminals and lead wires therein from the carrier strip in slot **232** by the action of knife **236** past anvil **246.** Air cylinders **186** are deactivated opening guide plates **190.** Air cylinder **80** is deactivated and the reciprocal carriage feed assembly **32** is withdrawn by piston rod **84.** The four spring wires W_1, W_2, W_3 and W_4 clamped between upper and lower bars **51–54** and **46–49** are withdrawn pulling the splice crimp barrels interconnecting the spring wires and lead wires into the insulated terminal block. When the crimp barrels are seated in the insulated terminal blocks, springs **60** allow the lower and upper feed bars **46–49** and **51–54** to slide along the continuous spring wires the remaining reicprocal travel of the carriage feed assembly **32.** Air cylinder **162** is activated, and the knife **150** is driven downward. Knife edges **152** sever the continuous spring wires at different lengths spaced from the terminal block and the curved edge of the knife bends the severed ends of the wires along the surface of the terminal block to provide a plurality of spring wire contacts. The car carrier **176** is advanced from the terminal block assembly station. Additional stations may be provided along the monorail for subsequent operations on the terminal blocks, e.g., additional bending means can be provided for bending the spring wire contacts along the intersecting surface of the terminal block to provide spring wire contacts forming an acute angle with the intersecting surface of the terminal block surface from which the spring wires extend. Additionally, inspection stations can be provided for both visual and electrical inspection of the terminal block, and the electrical interconnection of the spring wire contacts and the lead wires.

Suitable control means for sequencing and timing of the operation of the apparatus is provided, e.g., air cylinders can be used as shown in the preferred embodiment and controlled by solenoid valves and sequenced by limit switches and/or programmed by a conventional sequencer. Alternatively, the apparatus can be driven mechanically, e.g., through toggle linkages, clutches and cams and sequenced by limit switches and relay and/or programmed by a conventional sequencer.

The apparatus can be used for assembling various types of terminal blocks and is not limited by the terminal block illustrated with the preferred embodiment of the apparatus. Additionally the apparatus can be modified to assemble terminal blocks having greater or fewer spring wire contacts and lead wires. While the above description and attached drawings illustrate a preferred embodiment of the invention, it being apparent that other embodiments and modifications are equivalent and will be obvious to one skilled in the art, the invention is not to be limited except by the appended claims.

What is claimed is:

1. An apparatus for assembling terminal blocks having a plurality of spring wire contacts interconnected with a plurality of lead wires in a terminal block, comprising

a terminal block assembly station for positioning a terminal block for receiving a plurality of spring wires and interconnecting the spring wires with a plurality of lead wires,

first means for positioning the plurality of spring wires in alignment with a plurality of spaced holes in the terminal block at said terminal block assembly station for insertion through the spaced holes in the terminal block,

means for feeding a plurality of spring wires through the spaced holes in the terminal block at said terminal block assembly station,

second means for positioning the spring wires inserted through the spaced holes in the terminal block in alignment with the lead wires at the terminal block assembly station,

means for positioning the plurality of lead wires at said terminal block assembly station,

means for splicing the spring wires and lead wires at said terminal block assembly station to form a permanent electrical interconnection,

means for retracting the spliced interconnection between the spring wires and the lead wires into the terminal block, and

means for severing the plurality of continuous spring wires a spaced distance from the terminal block in said terminal block assembly station to provide a plurality of spring wire contacts on the terminal block interconnected to a plurality of lead wires within the terminal block.

2. An apparatus, as recited in claim **1,** additionally including means for supporting said plurality of continuous spring wires fed to said terminal block assembly station.

3. An apparatus, as recited in claim **1,** wherein said means for feeding the plurality of continuous spring wires feeds each wire a different length to provide uniform length spring wire contacts.

4. An apparatus, as recited in claim **1,** wherein said means for feeding the continuous spring wires and said means for retracting the spliced interconnection comprises a reciprocal carriage.

5. An apparatus for assembling terminal blocks having a plurality of spring wire contacts interconnected with a plurality of lead wires in a terminal block, comprising

a terminal block assembly station for positioning a terminal block for receiving a plurality of spring wires and interconnecting the spring wires with a plurality of lead wires,

first means for positioning the plurality of spring wires in spaced vertical and horizontal alignment with a plurality of spaced holes in the terminal block at said terminal block assembly station for insertion through the spaced holes in the terminal block,

means for feeding a plurality of continuous spring wires different lengths through the spaced holes in the terminal block at said terminal block assembly station,

second means for positioning the spring wires inserted through the spaced holes in horizontal alignment with the lead wires at the terminal block assembly station,

means for positioning a plurality of lead wires at said terminal block assembly station,

means for splicing the spring wires and lead wires at said terminal block assembly station to form a permanent electrical interconnection,

means for retracting the spliced interconnection between the spring wires and the lead wires into the terminal block, and

means for severing the plurality of continuous spring wires different lengths from the terminal block in said terminal block assembly station to provide a plurality of uniform length spring wire contacts on the terminal block interconnected to a plurality of lead wires within the terminal blocks.

6. An apparatus, as recited in claim **5**, wherein said means for splicing the spring wires and lead wires comprises crimp means.

7. An apparatus, as recited in claim **5**, wherein wherein said second means for positioning the spring wires comprises opposing members actuatably engagable with the terminal block for receiving the plurality of spring wires inserted through the spaced holes in the terminal block.

8. An apparatus, as recited in claim **5**, wherein said means for feeding the plurality of spring wires and said means for retracting the spliced interconnection comprises a reciprocal carriage assembly.

9. An apparatus, as recited in claim **8**, wherein said reciprocal carriage assembly includes means for supporting the plurality of spring wires.

10. An apparatus, as recited in claim **6**, wherein the plurality of lead wires includes crimp terminals attached to a continuous carrier strip, and said means for positioning the plurality of lead wires comprises a carrier strip feed path.

11. An apparatus, as recited in claim **5**, additionally comprising means for bending the spring wires to provide spring wire contacts at an acute angle with a surface of the terminal block.

12. An apparatus, as recited in claim **5**, wherein said means for severing the plurality of spring wires serves said wires at alternatively spaced different lengths from the terminal block to provide uniform length spring wire contacts when the spring wires are bent to form an acute angle with a surface of the terminal block.

13. An apparatus, as recited in claim **5**, wherein said means for feeding the plurality of spring wires different lengths comprises a plurality of cooperating bars for clamping each wire successively spaced distances from the terminal block assembly station, said feed bars being operably connected to close up the successively spaced distances and feed each wire a different length corresponding to the successively spaced distances to said terminal block assembly station.

14. An apparatus, as recited in claim **9**, wherein said means for supporting the plurality of wires comprises a plurality of opposing fingers.

15. An apparatus, as recited in claim **5**, wherein said first means for positioning the spring wires comprises a member having a plurality of alternatively spaced surfaces with holes in alignment with the spaced holes in the terminal block.

16. An apparatus, as recited in claim **11**, wherein said means for severing the plurality of spring wires comprises a knife having a plurality of cutting edges alternatively spaced from the terminal block in the terminal block assembly station.

17. An apparatus, as recited in claim **16**, wherein said knife has a back surface adjacent the terminal block for bending the spring wires to provide a plurality of spring wire contacts at an acute angle with a surface of the terminal block.

18. An apparatus, as recited in claim **17**, additionally comprising second means for bending the spring wire contacts to form an acute angle with an intersecting surface of the terminal block from which the spring wires extend.

19. An apparatus for feeding a plurality of wires different lengths to an assembly station, comprising a wire feed assembly, having a plurality of cooperating bars for clamping each wire a successively spaced distance from the assembly station, said feed bars being operably connected to close up the successively spaced distances and feed the respective wires different lengths corresponding to the successively spaced distances to said assembly station.

20. An apparatus as recited in claim **14**, additionally comprising a pair of stationary side plates on opposite sides of said feed assembly, said sideplates having a plurality of successively spaced recesses for receiving said plurality of cooperating bars.

21. An apparatus, as recited in claim **15**, wherein said feed assembly includes a carriage and additionally comprises a member slidable on said carriage having a plurality of opposing fingers for supporting the wire during feeding to the assembly station.

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