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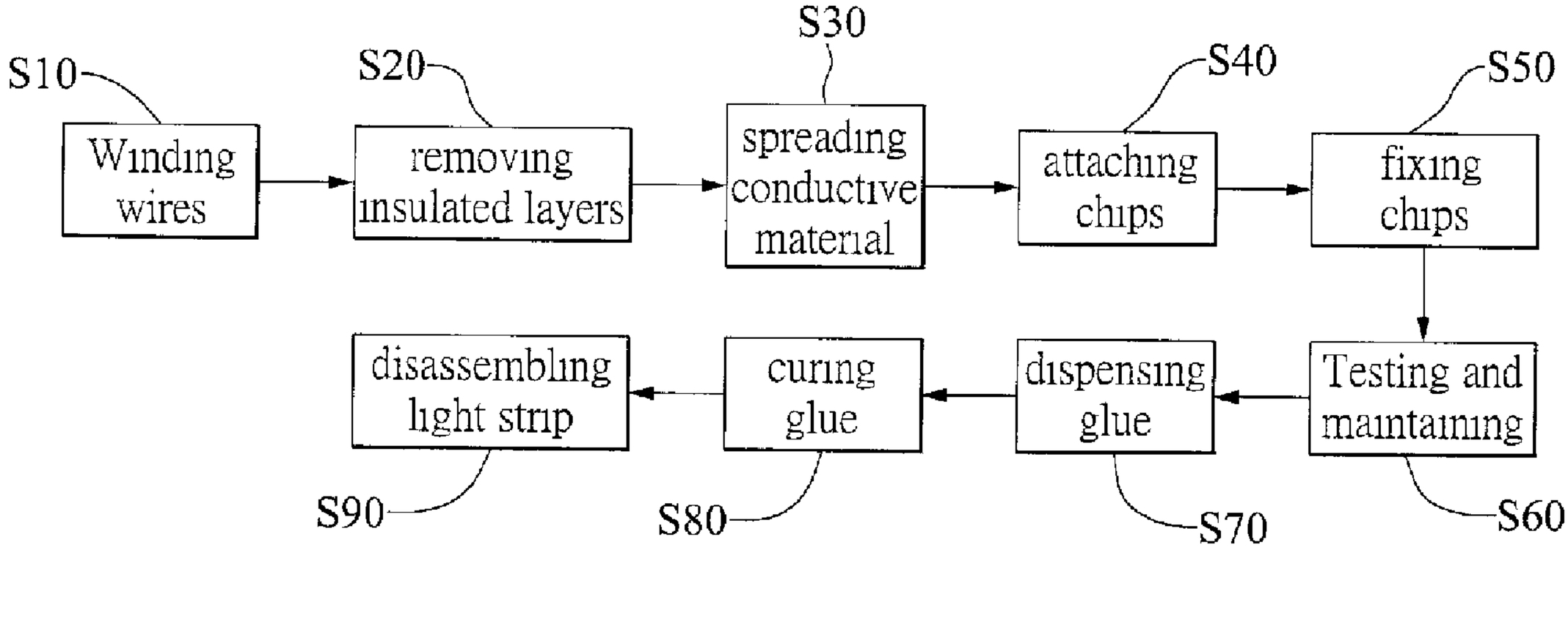
(71) Demandeur/Applicant:
COSMO LIGHTING INC., US

(72) Inventeur/Inventor:
TSAI, NAI-CHEN, CN

(74) Agent: RIDOUT & MAYBEE LLP

(54) Titre : METOHDE DE FABRICATION D'UNE BANDE D'ECLAIRAGE ET SUPPORT D'ENROULEMENT EN VUE DE SA FABRICATION

(54) Title: METHOD FOR MANUFACTURING LIGHT STRIP AND WINDING RACK FOR MANUFACTURING THE SAME



(57) Abrégé/Abstract:
A method for manufacturing a light strip at least includes: winding a plurality of wires, removing an insulation layer, and attaching and fixing LED chips. The step of winding the wires includes providing a winding rack having a wire fixing portion at both ends of the winding rack, forming the winding rack with a hollow portion along a longitudinal direction, and winding the wires around the winding rack, wherein each of the wires has an insulation layer, and the wires are repeatedly wound across the hollow portion. The step of removing the insulation layer includes removing a part of the insulation layer from each of the wires to expose a core wire therein. The step of attaching and fixing the LED chips is attaching and fixing the LED chips on the core wires of the wires. Accordingly, the LED chips are firmly and electrically connected to the wires.

ABSTRACT

A method for manufacturing a light strip at least includes: winding a plurality of wires, removing an insulation layer, and attaching and fixing LED chips. The step of winding the wires includes providing a winding rack having a wire fixing portion at both ends of the winding rack, forming the winding rack with a hollow portion along a longitudinal direction, and winding the wires around the winding rack, wherein each of the wires has an insulation layer, and the wires are repeatedly wound across the hollow portion. The step of removing the insulation layer includes removing a part of the insulation layer from each of the wires to expose a core wire therein. The step of attaching and fixing the LED chips is attaching and fixing the LED chips on the core wires of the wires. Accordingly, the LED chips are firmly and electrically connected to the wires.

METHOD FOR MANUFACTURING LIGHT STRIP AND WINDING RACK FOR MANUFACTURING THE SAME

CROSS-REFERENCE TO RELATED PATENT APPLICATION

This Application claims priority to U.S. provisional application Ser. No. 62/565327, filed September 29, 2017 entitled LIGHT STRIP ASSEMBLY, and U.S. provisional application Ser. No. 62/584619, filed November 10, 2017, entitled LIGHT STRIP ASSEMBLY, now pending.

FIELD OF THE DISCLOSURE

The present disclosure relates to a method for manufacturing a light strip and a winding rack for manufacturing a light strip, and in particular, to a method for automatic production of an LED light strip and a winding rack for manufacturing a light strip.

BACKGROUND OF THE DISCLOSURE

LED light strips are often used in festive occasions or special occasions as decorations; however, conventional methods for manufacturing the LED light strips cannot achieve automatic production, leading to low productivity and high costs.

SUMMARY OF THE DISCLOSURE

The present disclosure is to provide a method for manufacturing a light strip that can automatically manufacture an LED light strip so as to lower the costs associated therewith.

In order to solve the technical issue mentioned above, according to one of the technical solutions of the present disclosure, a method for manufacturing a light strip is provided and includes at least the following steps:

winding a plurality of wires: providing a winding rack having a wire fixing portion at both ends of the winding rack, forming a hollow portion at the winding rack along a longitudinal direction, and winding the plurality of the wires around the winding rack. Each of the wires has an insulation layer, and the wires are repeatedly wound across the hollow portion;

removing the insulation layer: removing a part of the insulation layer from each of the wire along the hollow portion to expose a core wire therein; and

attaching and fixing a plurality of LED chips on the core wires of the wires so that the LED chips are firmly and electrically connected to the wires.

Another purpose of the present disclosure is to provide a winding rack for manufacturing a light strip that can participate in automatic production of the LED light strip to lower costs.

In order to solve the above technical issue, according to one of the technical solutions of the present disclosure, a winding rack for manufacturing a light strip is provided. The winding rack has cross sections that are substantially the same along a longitudinal direction, a top surface, at least one hollow portion along the longitudinal direction and a plurality of anti-slip strips configured around the winding rack and partially exposed to the top surface.

These and other aspects of the present disclosure will become apparent from the following description of the embodiment taken in conjunction with the following drawings and their captions, although variations and modifications therein may be affected without departing from the spirit and scope of the novel concepts of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

The present disclosure will become more fully understood from the detailed description and the accompanying drawings, in which:

FIG. 1 is a flow chart of a method for manufacturing a light strip according to the present disclosure.

FIG. 2 is a schematic view of a winding rack wound with wires according to the present disclosure.

FIG. 2A is a partially enlarged view of the winding rack according to the present disclosure.

FIG. 2B is a sectional view of the winding rack according to the present disclosure.

FIG. 3 is a schematic view of removing an insulation layer according to the present disclosure.

FIG. 4 is a top view of the wires after the removal of the insulation layer according to the present disclosure.

FIG. 5 is a schematic view of spreading a conductive material according to the present disclosure.

FIG. 6 is a schematic view of attaching a chip according to the present disclosure.

FIG. 7 is a schematic view of fixing the chip according to the present disclosure.

FIG. 8 is a schematic view of dispensing glue according to the present disclosure.

FIG. 9 is a schematic view of the winding rack and a carrier according to the present disclosure.

FIG. 10 is a sectional view of a winding rack combination according to the present disclosure.

FIG. 11 is a schematic view of a solder paste groove seat according to the present disclosure.

FIG. 12 is a sectional view of another winding rack combination according to the present disclosure.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

FIG. 1 is a flow chart of a method for manufacturing a light strip according to the present disclosure. The method of the present disclosure includes the steps of: winding a plurality of wires S10, removing an insulation layer S20, spreading a conductive material S30, attaching chips S40, fixing the chips in position S50, testing and maintaining S60, dispensing glue S70, solidifying the glue S80 and extracting the light strip S90, which will be respectively described in detail in the following.

Referring to FIG. 2 to FIG. 2B, a winding rack 10 is provided in the step of winding a plurality of wires S10. A wire fixing portion 12 is formed at both ends of the winding rack 10. A hollow portion 14 is formed at the winding rack 10 along a longitudinal direction of the winding rack 10. The winding rack 10 may be a metal component, such as but not limited to a metal component made of an aluminum material extruded from aluminum, or may be made of a thermal plastic material. The

hollow portion 14 may be a partially open groove.

As shown in FIG. 2 and FIG. 2B, regarding the winding rack 10 made of metal, the winding rack 10 preferably has a plurality of anti-slip strips 15 configured around the winding rack 10 and being able to slightly protrude from a surface of the winding rack 10, but not limited thereto, so as to prevent wires W1 and W2 from slipping. The anti-slip strips 15 may be, for example, rubber, plastic, and so on. In this embodiment, two of the anti-slip strips 15 are disposed opposite to each other at two sides of the hollow portion 14 of the winding rack 10, and partially exposed from the top surface of the winding rack 10. In the present disclosure, the term "exposed from" may include the meaning of "protruding from". Preferably, the anti-slip strips 15 are replaceably configured on the winding rack 10.

In FIG. 2, the plurality of the wires W1 and W2 are wound around the winding rack 10 in a plurality of coils so that the wires W1 and W2 extend repeatedly across the hollow portion 14. During the winding process, the ends of the wires W1 and W2 are fixedly wound to the wire fixing portion 12. In FIG. 2A, the wire fixing portion 12 includes a concave portion 120 and a winding pin 123. The concave portion 120 is formed at an end of the winding rack 10, and the winding pin 123 is fixed in the concave portion 120, wherein an end of the wires W1 and W2 is wound to the winding pin 123. Then, a motor M rotates the winding rack 10. The wires W1 and W2 may be, for example, enameled wires, but are not limited thereto. Each of the wires W1 and W2 has an insulation layer covered on the outside (the outer layer shown in FIG. 2, not labeled). When the wires W1 and W2 are the enameled wires, the insulation layer of each of the wires W1 and W2 can be an enamel covering. In this embodiment, the two wires W1 and W2 are taken as an exemplary example, but the present disclosure is not limited thereto. The number of the wires may be two or more, depending on the requirements of the light strip.

Referring to FIG. 3 and FIG. 4, in the step of removing an insulation layer in S20, a part of the insulation layer is removed from each of the wires W1 and W2 along the hollow portion 14 to expose core wires C1 and C2. In FIG. 3, removal of the insulation layer may be performed by a laser light source L emitting a laser ray to radiate the plurality of the wires W1 and W2 along the hollow portion 14.

Then, LED chips C are attached and fixed to the core wires C1 and C2 of the

wires W1 and W2, so that the LED chips C are fixedly connected to the wires W1 and W2. Specifically, the process of attaching and fixing the LED chips C include the steps S30, S40 and S50.

Referring to FIG. 5, in the step of spreading a conductive material S30, a conductive material S is coated on each of the core wires C1 and C2 exposed from the wires W1 and W2. For example, with a combination of a screen plate 90 and a scraper 92, the conductive material S can be coated at a preset position. The conductive material S may be a solder paste, a silver paste, a conductive paste and so on, but is not limited thereto. A practical example is given by using the solder paste as the conductive material S, and the specific steps are as follows. Referring to FIG. 9, for batch production, this embodiment preferably provides a carrier 100. The plurality of the winding racks 10 with the wires W1 and W2 wound thereon are fixed side by side to the carrier 100, the carrier 100 has a pair of positioning seats 102, each of the positioning seats 102 is formed with a plurality of insertion concaves 1020, and two ends of each of the winding racks 10 are respectively placed in the insertion concaves 1020 to print the conductive material S on the wires W1 and W2 in a printing manner. A pair of grips 103 can also be configured on two sides of the carrier 100.

Referring to FIG. 6, the plurality of the LED chips C are placed on the conductive material S in the step of attaching the LED chips C. In this embodiment, chip placing positions where the insulated layers are removed from the wires W1 and W2 are obtained by visual determination, and the LED chips C are held and moved by a suction head 30 to the chip placing positions.

Referring to FIG. 7, in the step of fixing the chips in position S50, the conductive material S is baked along the hollow portion 14 of the winding rack 10 at a predetermined temperature so that tin powder in the conductive material S is melted to fixedly connect the LED chips C to the wires W1 and W2. In this embodiment, the step of fixing the chips includes baking the positions where the LED chips C are disposed by a hot air device H along the hollow portion 14.

A purpose of the step of testing and maintaining S60 is to inspect whether the LED chips C are able to emit light by being electrically connected to the wires W1 and W2, before being fixedly welded. If the LED chips C fail to emit light, they should be checked and replaced.

In the step of dispensing glue S70, referring to FIG. 8, the LED chip C is covered by a glue g with a glue gun G.

In the step of solidifying the glue S80, the glue g is usually solidified by baking with, for example, an oven.

In the step of extracting the light strip S90, the plurality of the wires W1 and W2 are unwound from the winding rack 10.

Referring to FIG. 10 and FIG. 11, in the method for manufacturing the light strip of the present disclosure, besides having cross sections that are substantially the same along a longitudinal direction, the winding rack 10 has a top surface, a hollow portion 14 along the longitudinal direction, and a plurality of anti-slip strips 15 configured around the winding rack 10 and partially exposed from the top surface. Further, the present disclosure provides a winding rack 10 for manufacturing the light strip having relevant auxiliary elements. The winding rack 10 further has a top wire seat 20 and an outer seat 30. The top wire seat 20 is movably inserted in the winding rack 10, the winding rack 10 is placed in the outer seat 30, the top wire seat 20 includes a bottom 21 and a protrusion 22 protruding upward from the bottom 21, the bottom 21 of the top wire seat 20 has a bottom pad 28, and a wire groove 220 can be formed on the top surface of the top wire seat 20 to fix the wires W1 and W2 in position so as to prevent slippage. A depth of the wire groove 220 is smaller than the diameter of the wires W1 and W2, and the wires W1 and W2 can be slightly exposed from the top surface of the top wire seat 20.

FIG. 11 shows another way of coating the conductive material. A solder paste groove seat 95 is provided, and the winding rack 10 is inverted to coat the conductive material S on the wires W1 and W2.

As shown in FIG. 12, a winding rack 10a has a plurality of insertion portions 17a and 17b, and a bottom 21a of a top wire seat 20a can be inserted into the different insertion portions 17a and 17b such that the length of winding the wires W1 and W2 would be different, namely, a circumference of the wires W1 and W2 would be different. Accordingly, the chip placing positions of the LED chips can be adjusted to manufacture a light strip having the LED chips with different spacing.

The feature of the present disclosure is that the LED light strip can be automatically manufactured to lower the costs associated therewith.

The foregoing description of the exemplary embodiments of the disclosure has been presented only for the purposes of illustration and description and is not intended to be exhaustive or to limit the disclosure to the precise forms disclosed. Many modifications and variations are possible in light of the above teaching.

The embodiments were chosen and described in order to explain the principles of the disclosure and their practical application so as to enable others skilled in the art to utilize the disclosure and various embodiments and with various modifications as are suited to the particular use contemplated. Alternative embodiments will become apparent to those skilled in the art to which the present disclosure pertains without departing from its spirit and scope.

CLAIMS

What is claimed is:

1. A method for manufacturing a light strip, comprising:

winding a plurality of wires: providing a winding rack having a wire fixing portion at both ends of the winding rack, forming a hollow portion at the winding rack along a longitudinal direction, winding the plurality of the wires around the winding rack, wherein each of the wires has an insulation layer, and the wires are repeatedly wound across the hollow portion;

removing the insulation layer: removing a part of the insulation layer from each of the wires along the hollow portion to expose a core wire therein; and

attaching and fixing a plurality of LED chips on the core wires of the wires to have the LED chips firmly and electrically connected to the wires.

2. The method of claim 1, wherein the wire fixing portion includes a concave portion and a winding pin, the concave portion is formed at an end of the winding rack, and the winding pin is fixed in the concave portion, and wherein an end of the wires is fixedly wound to the winding pin.

3. The method of claim 1, wherein the winding rack further has a plurality of anti-slip strips configured around the winding rack to prevent the wires from slipping.

4. The method of claim 3, wherein two of the anti-slip strips are opposite to each other at two sides of the hollow portion of the winding rack and partially exposed on the top surface of the winding rack.

5. The method of claim 1, wherein the removal of the insulation layer is performed by radiating the plurality of the wires along the hollow portion with a laser ray.

6. The method of claim 1, wherein the hollow portion is a partially open groove.

7. The method of claim 1, wherein the attaching and fixing of the plurality of LED chips includes the steps of:

spreading a conductive material: coating the conductive material on each of the core wires exposed from each of the wires;

attaching the chips: placing the plurality of LED chips on the conductive material; and

fixing the chips in position: fixedly connecting the LED chips on the wires; and

wherein the method of claim 1 further includes:

dispensing glue: covering the LED chips in the glue along the hollow portion;

solidifying the glue: solidifying the glue; and

extracting the light strip: unwinding the plurality of the wires from the winding rack.

8. The method of claim 7, wherein the conductive material is a solder paste and in the step of fixing the chips in position, the solder paste is baked along the hollow portion at a predetermined temperature to fixedly connect the LED chips to the wires.

9. The method of claim 7, wherein the conductive material is a solder paste, and the step of spreading the conductive material includes providing a carrier to fix the plurality of the winding racks wound with the wires to the carrier side by side, the carrier having a pair of positioning seats, each positioning seat forming a plurality of insertion concaves, and two ends of each of the winding racks being respectively placed in the insertion concaves to print the conductive material on the wires in a printing manner.

10. The method of claim 9, wherein the attachment of the chips includes obtaining

chip placing positions where the insulated layers are removed from the wires by visual determination, and holding and moving the LED chips by a suction head to the chip placing positions.

11. The method of claim 1, wherein the fixing of the chips includes baking the positions where the LED chips are disposed by a hot air device along the hollow portion.

12. A winding rack for manufacturing a light strip, comprising cross sections that are substantially the same along a longitudinal direction, a top surface, at least one hollow portion along the longitudinal direction, and a plurality of anti-slip strips configured around the winding rack and partially exposed from the top surface.

13. The winding rack of claim 12, wherein the winding rack further comprises a top wire seat movably inserted in the winding rack.

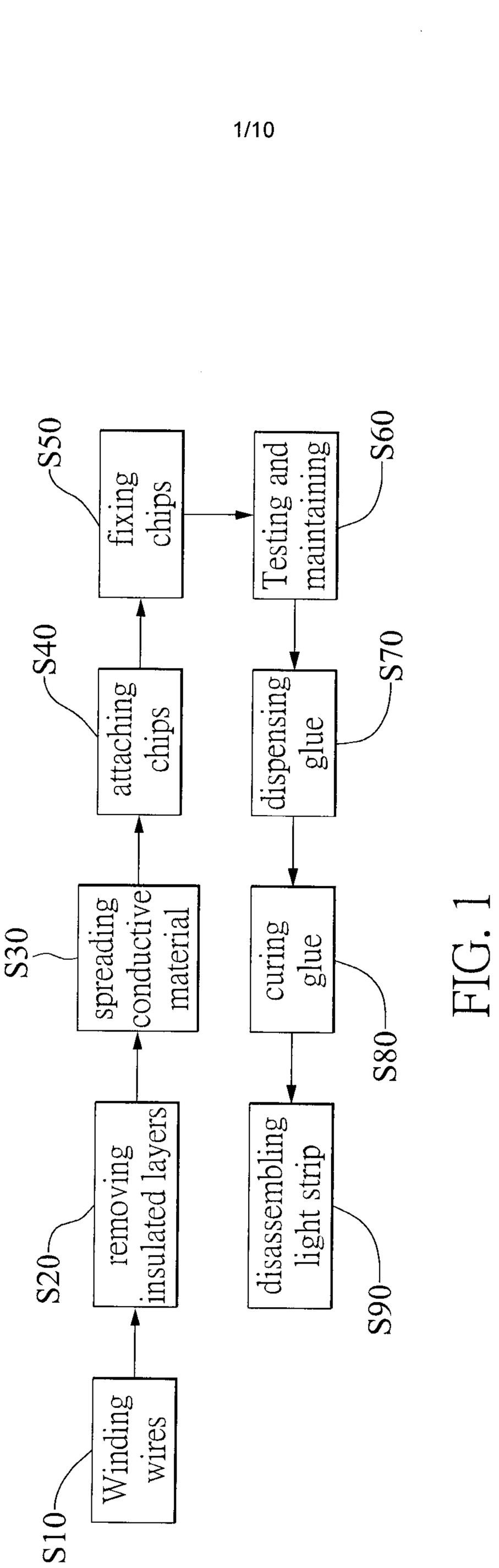

Winding wires
S10
removing insulated layers
S20
spreading conductive material
S30
attaching chips
S40
fixing chips
S50
Testing and maintaining
S60
dispensing glue
S70
curing glue
S80
disassembling light strip
S90

FIG. 1

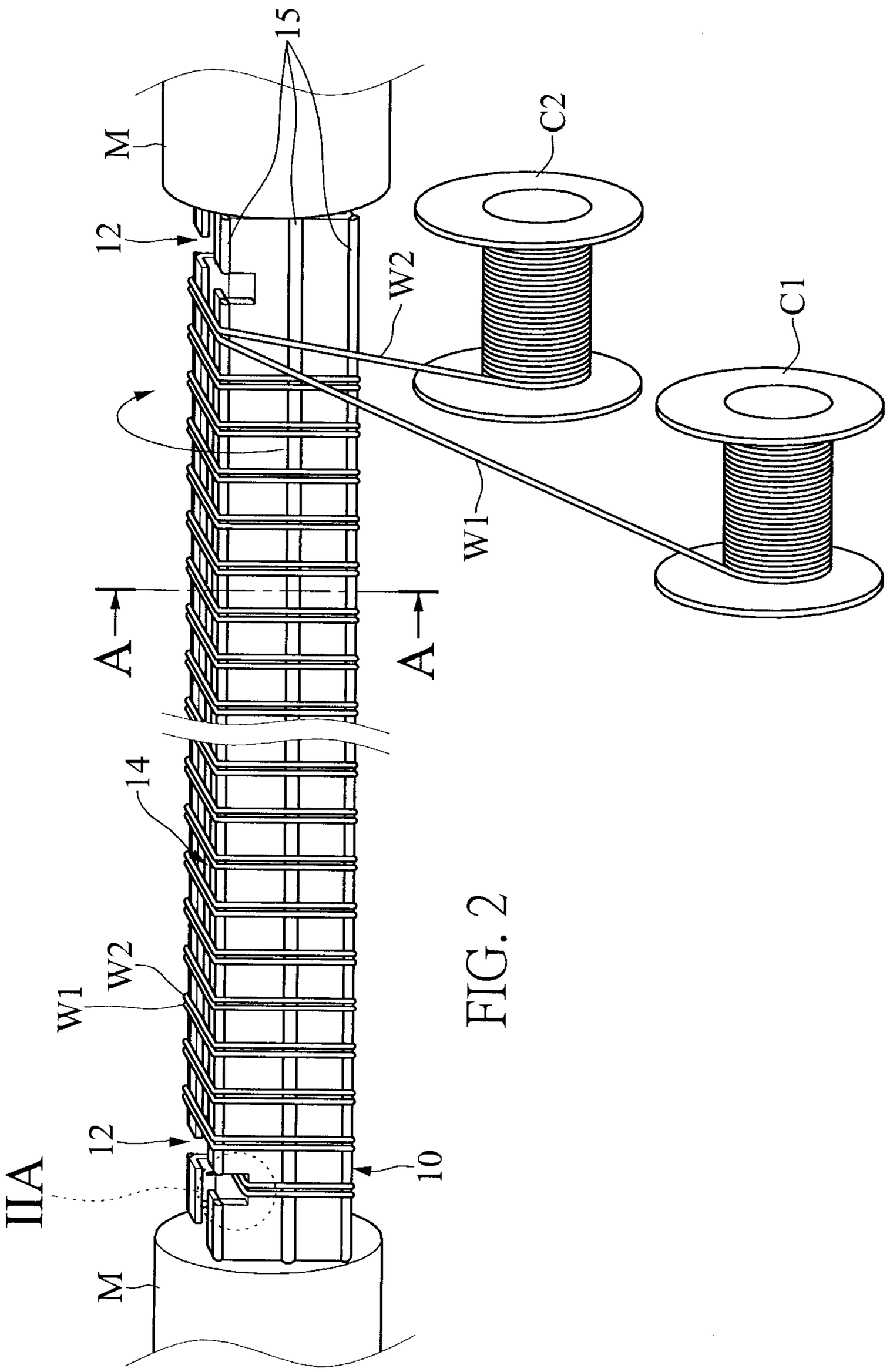


FIG. 2

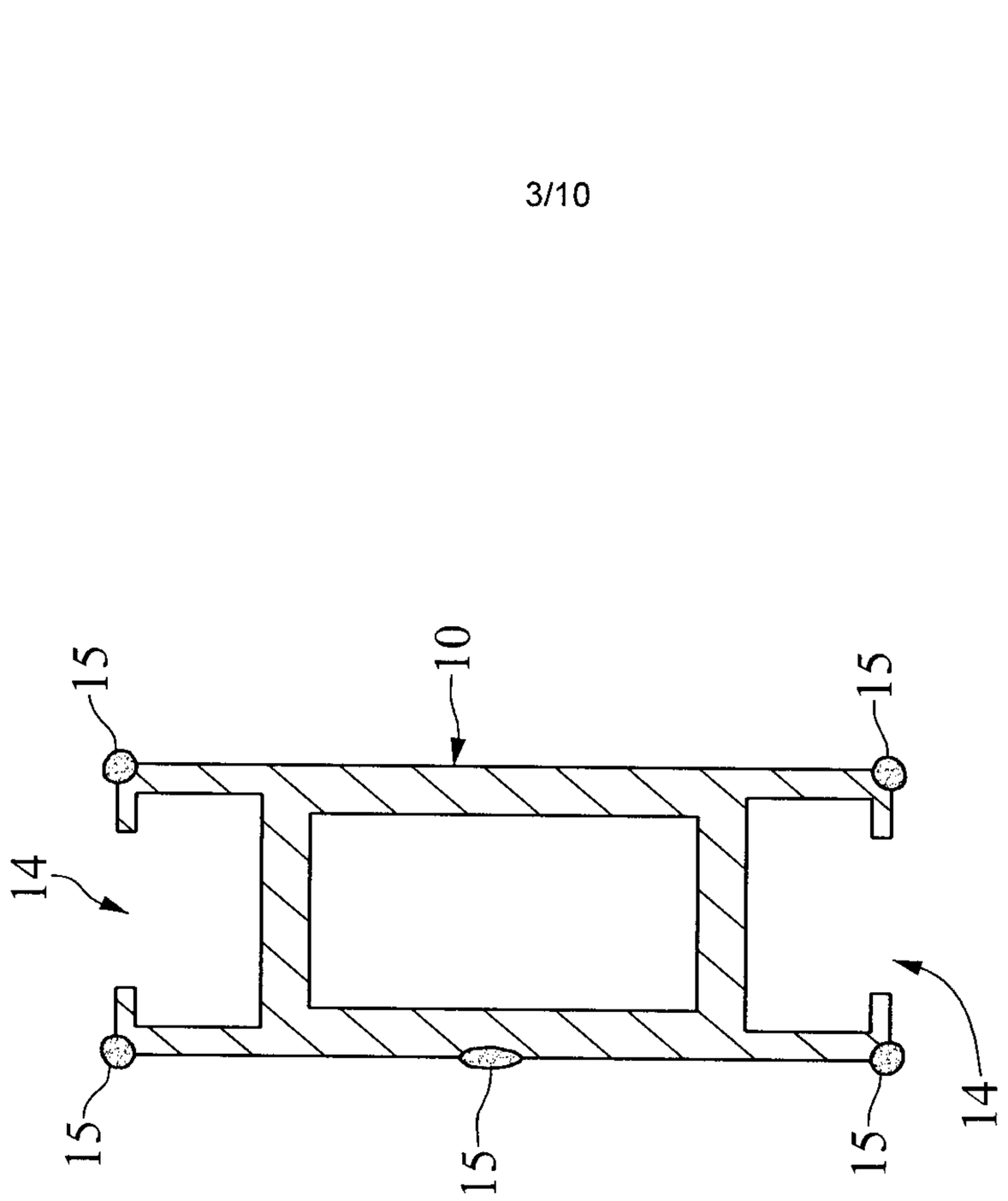


FIG. 2B

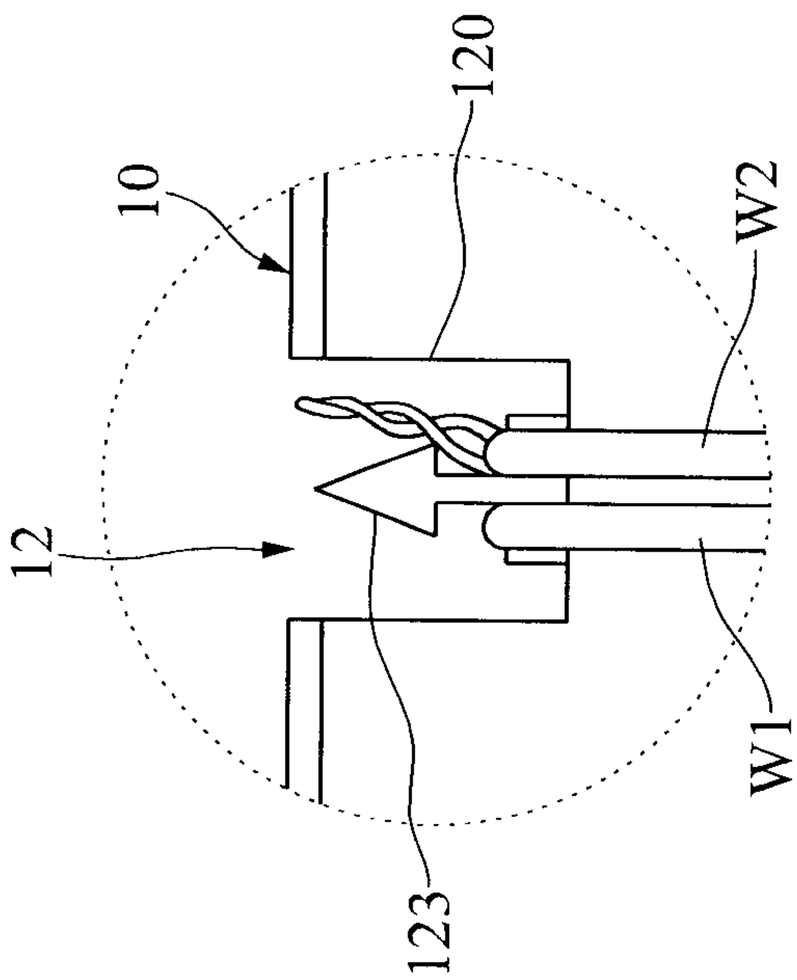


FIG. 2A

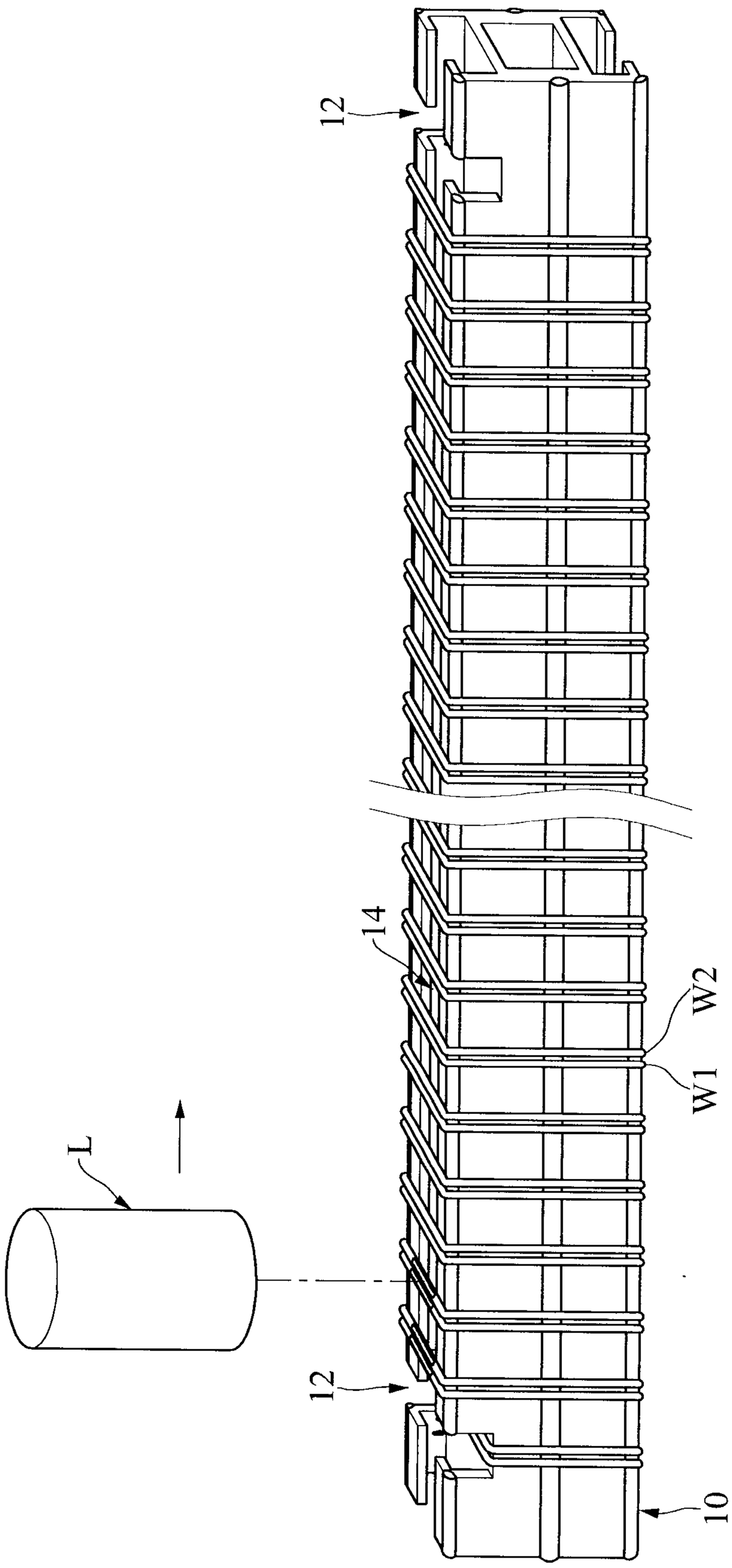


FIG. 3

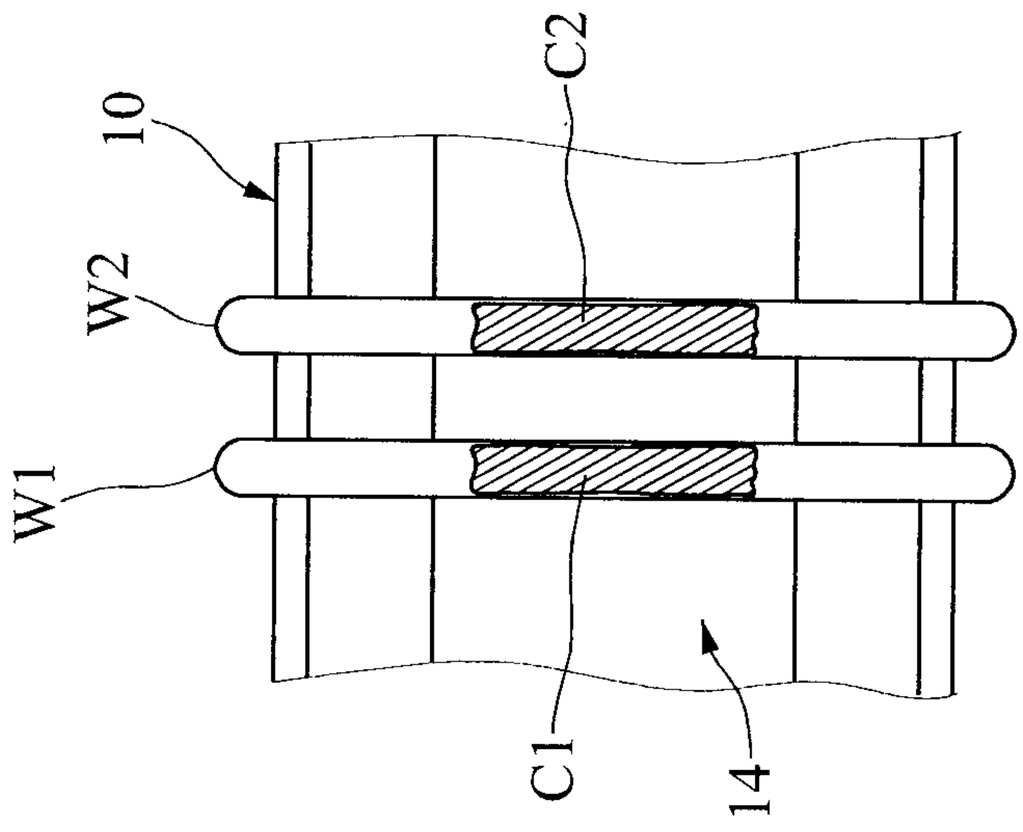


FIG. 4

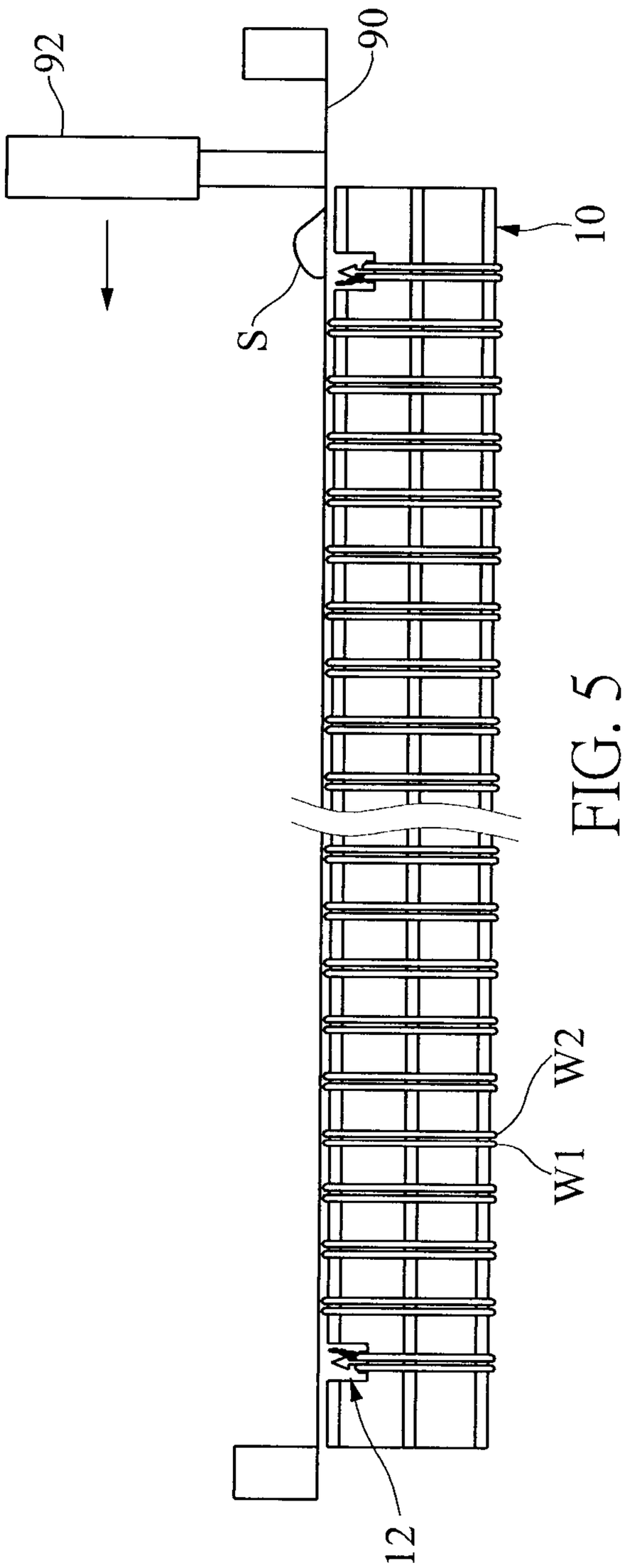


FIG. 5

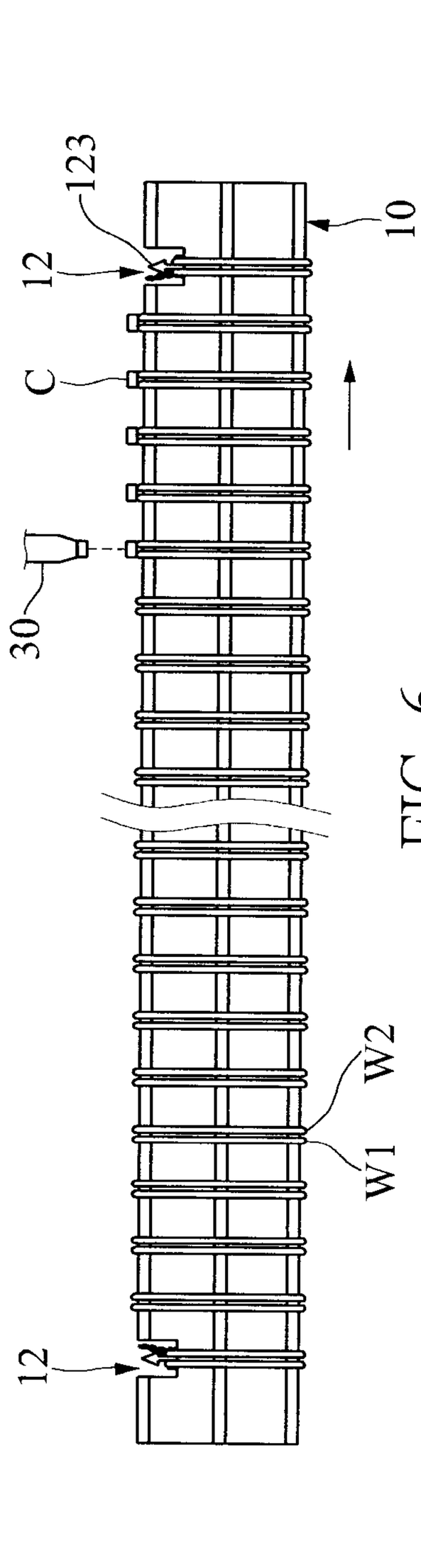


FIG. 6

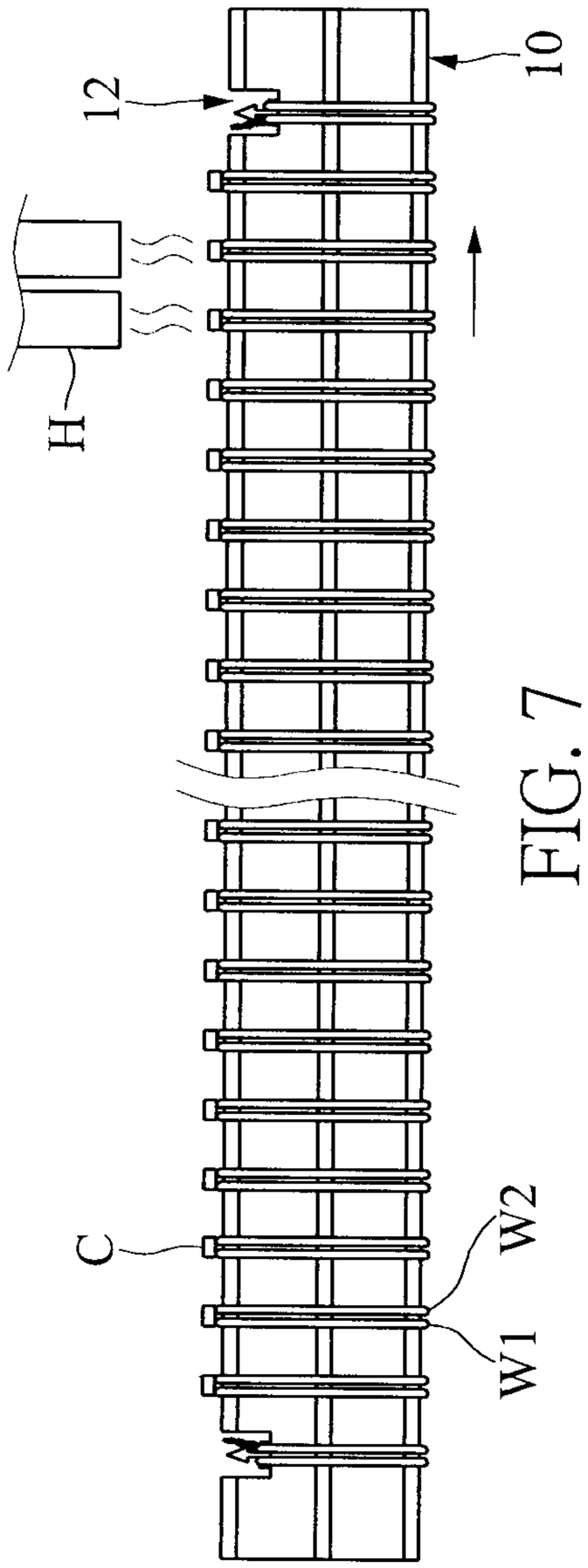


FIG. 7

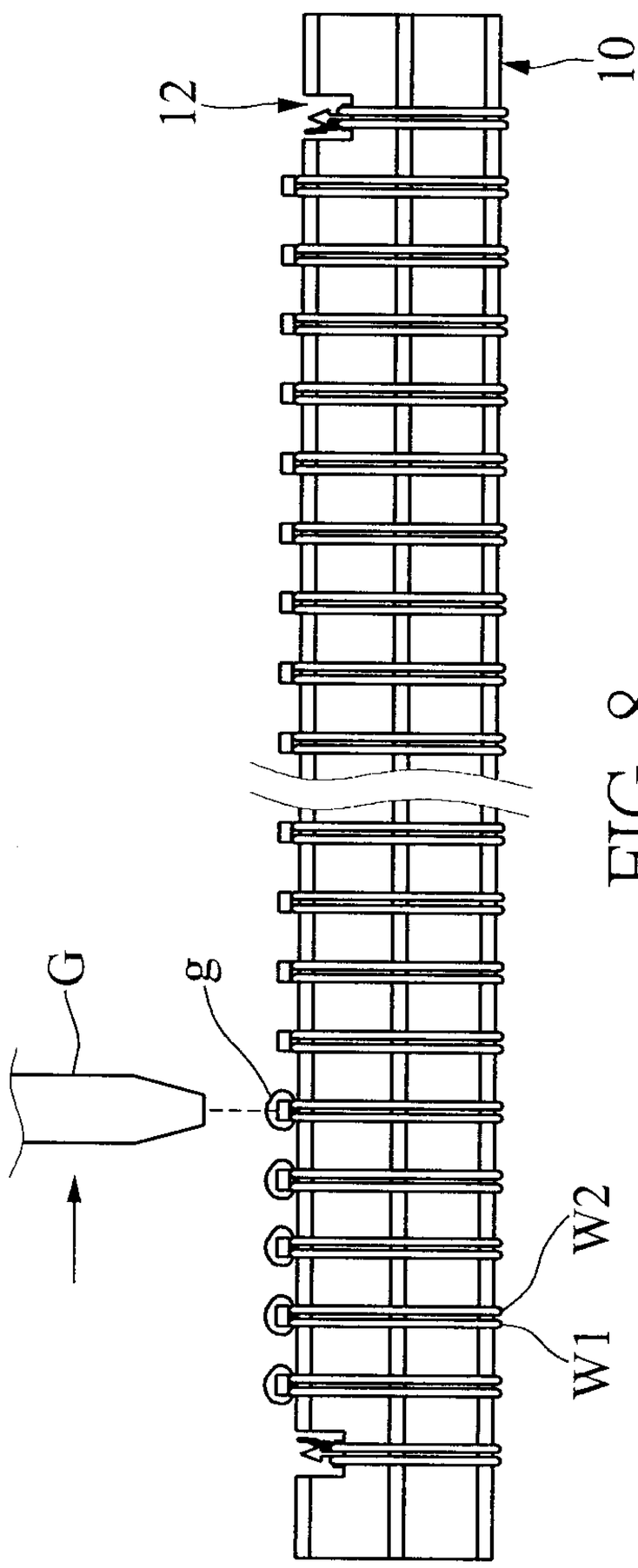


FIG. 8

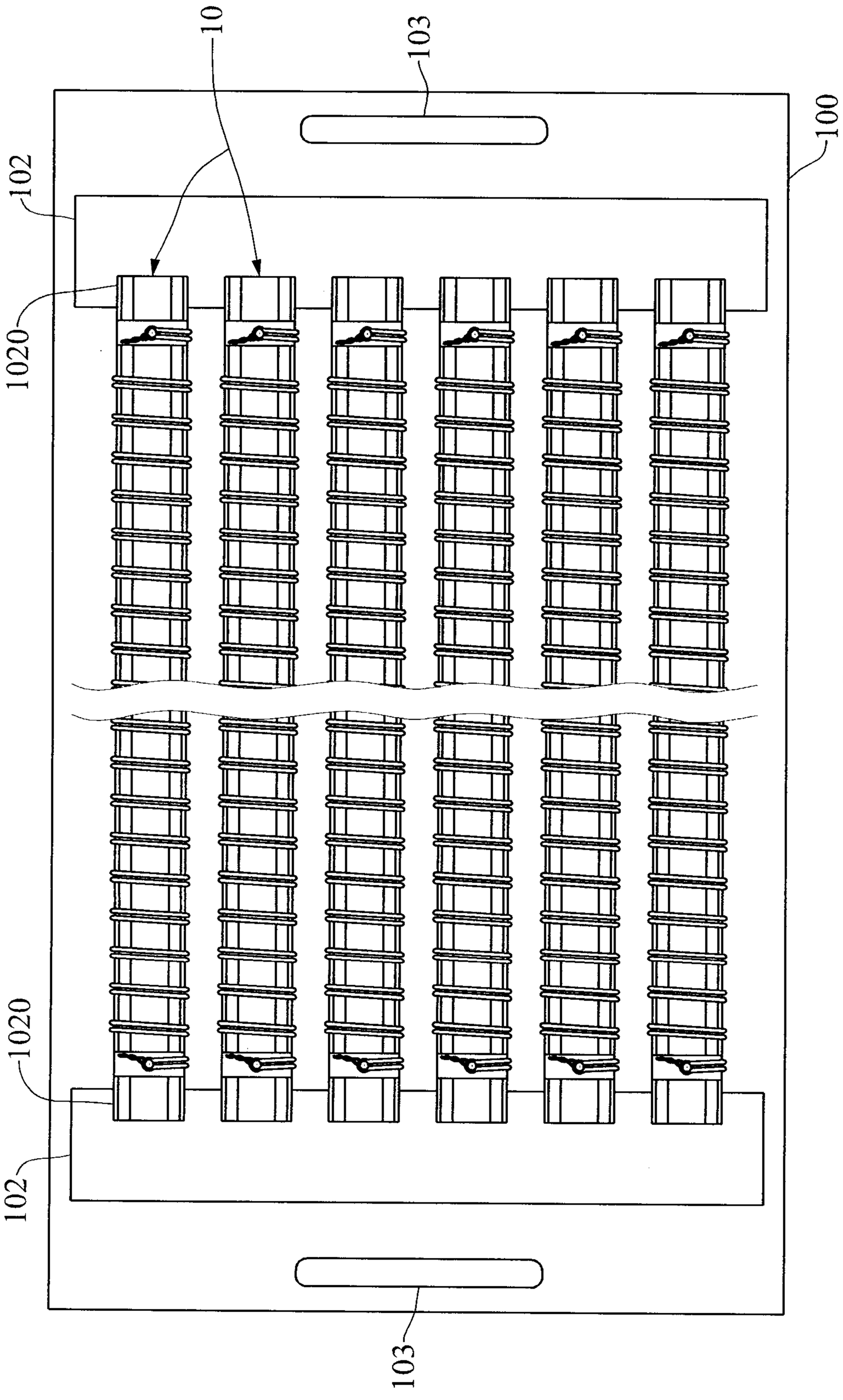


FIG. 9

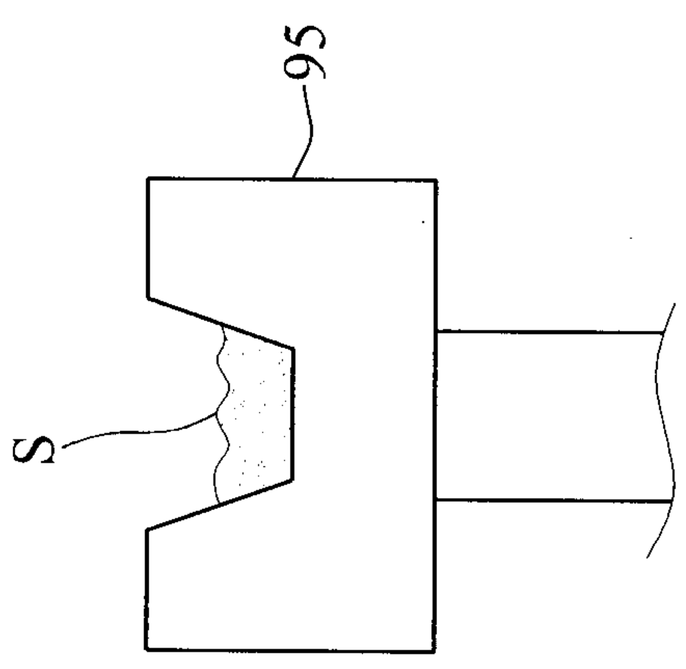


FIG. 11

FIG. 10

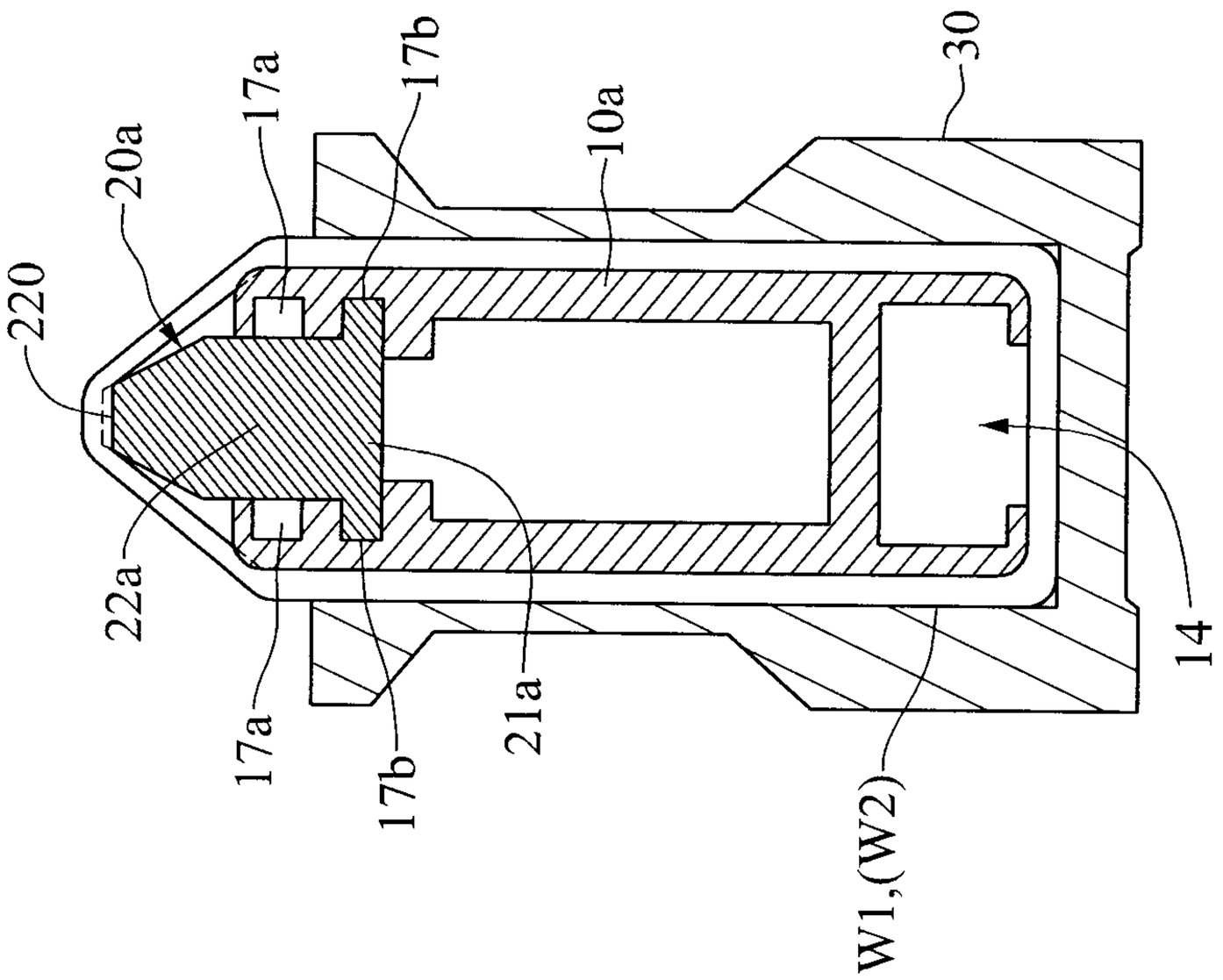
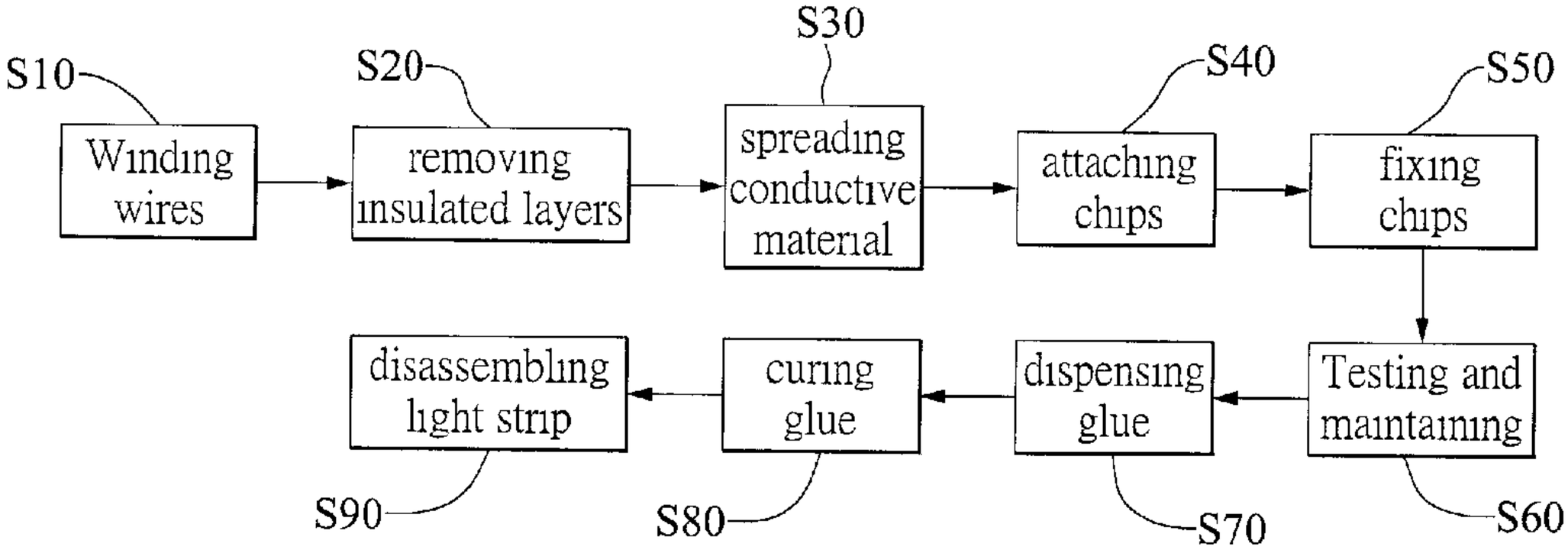


FIG. 12


S10
Winding wires
S20
removing insulated layers
S30
spreading conductive material
S40
attaching chips
S50
fixing chips
Testing and maintaining
S60
dispensing glue
S70
curing glue
S80
disassembling light strip
S90