

Jan. 11, 1944.

C. HERZOG ET AL

2,339,072

METHOD OF PRODUCING GETTER AND FORMED METAL RIBBON

Filed Dec. 29, 1942

2 Sheets-Sheet 1

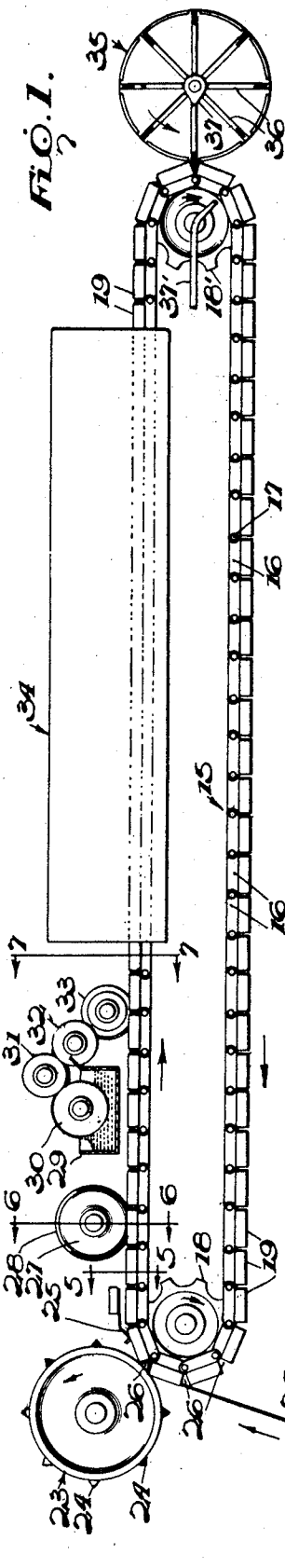
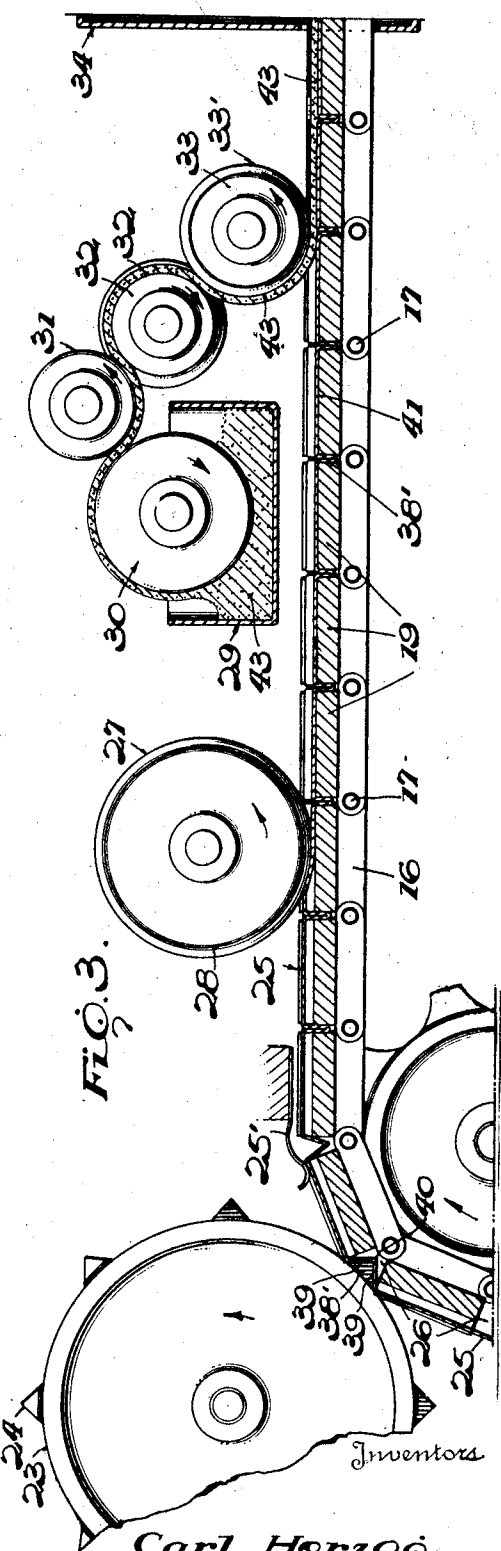
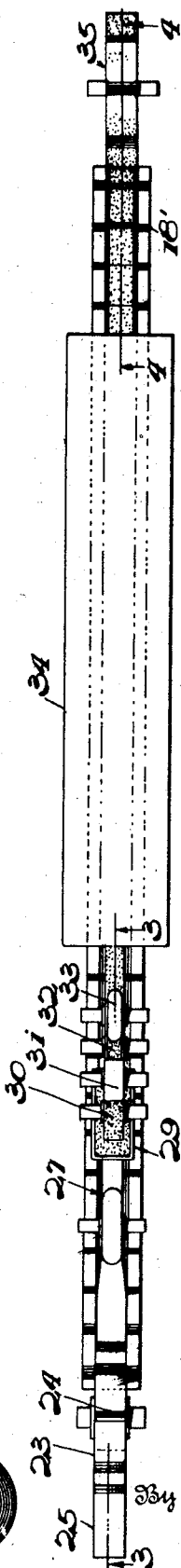


FIG. 2.



Carl Herzog.
Paul A. Hauck.

Attorney

Jan. 11, 1944.

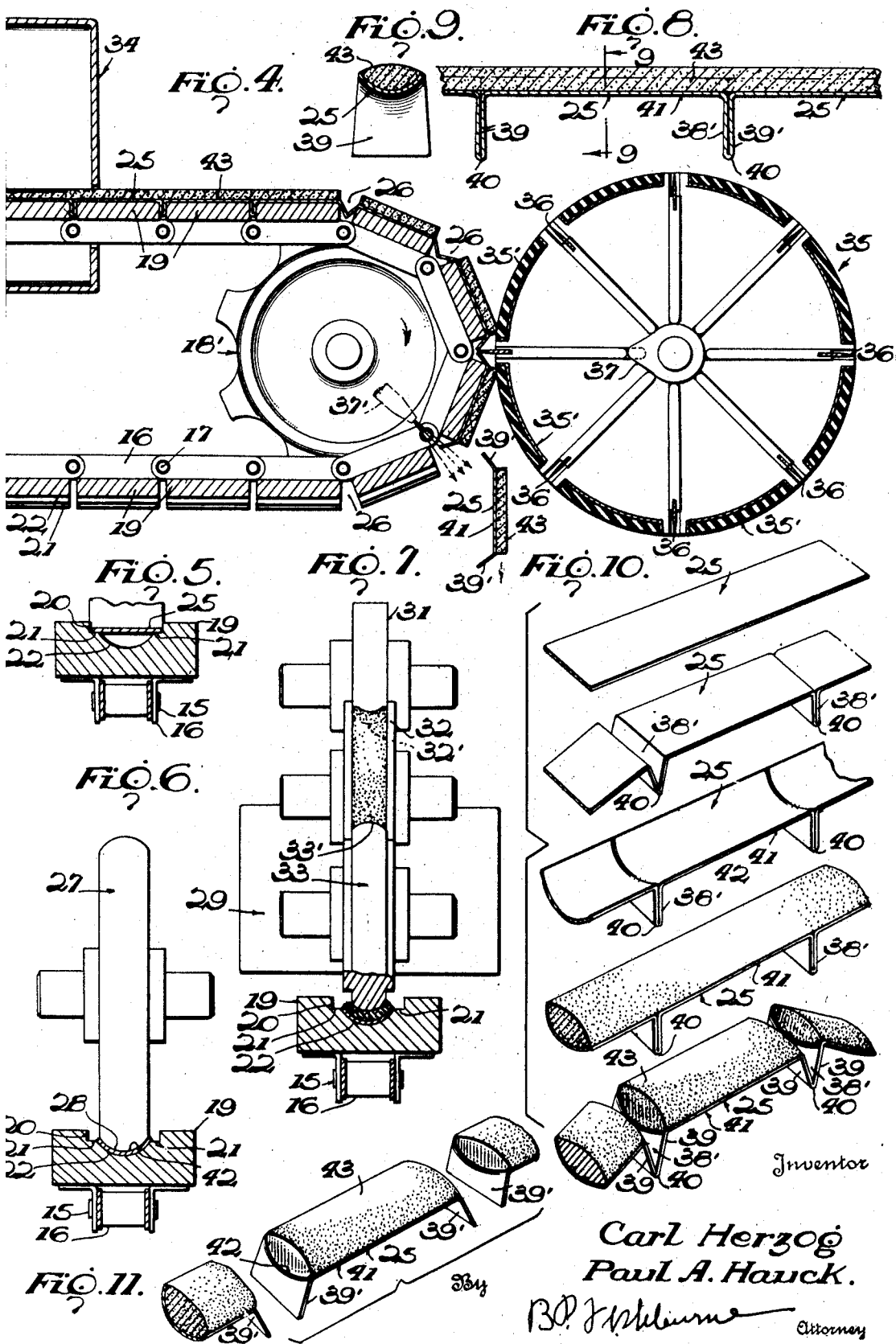
C. HERZOG ET AL

2,339,072

METHOD OF PRODUCING GETTER AND FORMED METAL RIBBON

Filed Dec. 29, 1942

2 Sheets-Sheet 2



Inventor

Carl Herzog
Paul A. Hauck.

B. P. Milburn
Attorney

UNITED STATES PATENT OFFICE

2,339,072

METHOD OF PRODUCING GETTER AND FORMED METAL RIBBON

Carl Herzog, Belleville, and Paul A. Hauck, Union, N. J., assignors, by mesne assignments, to themselves, as joint tenants

Application December 29, 1942, Serial No. 470,514

8 Claims. (Cl. 29—25.13)

Our invention relates to a method of producing getters having tabs and to a formed metal ribbon.

An important object of the invention is to apply the getter material to the cores of the getters without applying the same to the tabs.

A further object of the invention is to fold the metal ribbon for producing spaced loops and retain the continuity of the ribbon.

A further object of the invention is to form channels in the cores and produce in effect a continuous channel.

A further object of the invention is to continuously apply the getter material to the substantially continuous channel.

A further object of the invention is to form open loops in the metal ribbon, and close the open loops to prevent the getter material contacting with the sides of the loops.

A further object of the invention is to again open the closed loops to break the hard getter material.

A further object of the invention is to exert a cutting action through the open end of the loop to sever its inner closed end.

A further object of the invention is to define cores and cause them to travel in the curved path and produce open loops between the spaced ends of the cores, to then cause the cores to travel in a substantially straight path to close the loops, and again cause the cores to travel in a curved path to open the loops.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation, partly diagrammatic, of apparatus employed in the practice of the method,

Figure 2 is a plan view of the same,

Figure 3 is a longitudinal section taken on line 3—3 of Figure 2,

Figure 4 is a similar view taken on line 4—4 of Figure 2,

Figure 5 is a transverse section taken on line 5—5 of Figure 1,

Figure 6 is a similar view taken on line 6—6 of Figure 1,

Figure 7 is a similar view taken on line 7—7 of Figure 1,

Figure 8 is a central vertical longitudinal sec-

tion taken through a plurality of cores and associated elements, parts broken away,

Figure 9 is a transverse section taken on line 9—9 of Figure 8,

Figure 10 is a perspective view of sections of the ribbon illustrating the steps of the method, and

Figure 11 is a perspective view illustrating the final step of the method and showing the completed getter.

In the drawings, wherein for the purpose of illustration is shown an apparatus for the practice of the method, the numeral 15 designates an endless sprocket chain including links 16, pivotally connected at 17. This sprocket chain is passed about sprocket wheels 18 and 18' which are driven continuously in the direction of the arrows. Rigidly mounted upon each link 16 is a block 19, having a length which determines the length of the core of the getter. The blocks are all of the same length, and each block is provided upon its outer face with a main groove or channel 20, having bottom walls 21 which are transversely and longitudinally straight. The walls 21 lead to a groove or channel 22, which is transversely curved but longitudinally straight.

Arranged adjacent to the sprocket wheel 18 and outwardly of the blocks 19, is a folding wheel 23, rotating in the direction of the arrow and having outwardly tapering spaced folding teeth 24. The wheel 23 is of a width to enter and substantially fill the groove or channel 20 and press or clamp a refractory metal ribbon 25 against the walls 21. This metal ribbon is preferably formed of molybdenum, although other metals or alloys may be employed. When the blocks 19 travel about the outer vertical side of the sprocket wheel 18 they travel in a curved path and become angularly disposed with relation to each other, and their ends separate, affording outwardly flaring spaces 26 between the ends of the blocks, and the teeth 24 enter these spaces.

Arranged near and forwardly of the folding wheel and above the blocks 19 is a spring 25', which serves to press the cores downwardly against the blocks as they pass in succession beneath the spring.

Disposed above the upper horizontal run of the sprocket chain 15 and the blocks 19, in advance of the spring 25', is a forming wheel or roll 27, rotating in the direction of the arrow and having a transversely curved convex periphery 28, to enter the channel 22.

Arranged in advance of the forming roll 27 is

means for continuously supplying the getter material to the channel of the formed cores. This means includes a tank 29 to hold the getter material, having the consistency of a light paste, such as molasses. We may employ any of the well known getter materials available upon the market, or we may use the getter materials recited in Patent No. 2,208,692, granted to D. H. Wamsley, under date of July 23, 1940. This getter material usually contains a binder. Operating within the tank 29 in contact with the getter material is a take-up roll 30, supplying the getter material to a transfer roll 31, which supplies it to a transfer roll 32, provided with a groove 32' in its periphery, which in turn transfers it to a feed roll 33, having a convex periphery 33'. The discharge roll 33 is arranged to supply the getter material to the ribbon. These various rolls are adjusted so that the desired amount of the getter material is supplied. Other means may be employed to continuously supply the getter material, such as a spout leading to the tank.

Arranged in advance of the applying means is an oven 34, through which the upper run of the endless sprocket chain travels.

The wheel 18' has a rotatable cutter drum 35 disposed outwardly of and adjacent to the same, which turns in the direction of the arrow. This drum is provided with clamping blocks 35', preferably formed of rubber. The drum 35 carries radial blades or cutters 36, retracted by any suitable means, and projected outwardly by a stationary cam 37. The numeral 37' designates a nozzle for supplying compressed air or the like to blow the leading completed severed getter from its block.

In the practice of the method, the metal ribbon 25 is carried by a spool 38 or the like, which pays it out and this ribbon is passed between blocks 19 engaging the sprocket wheel 18, and the folding wheel 23. The ribbon enters the channel 20 and is clamped to the walls 21, by the wheel 23. The blocks 19 passing about the sprocket wheel 18 travel in a curved path and the ends of the blocks 19 separate and diverge outwardly, forming the passages 26 for the folding teeth 24. These folding teeth engage the metal ribbon and fold it transversely and produce tab producing open loops 38', having sides 39, and inner closed ends 40, and outer open ends. When these loops are formed and are traveling in a curved path they are open and V-shaped in cross-section and their sides 39 are spaced and diverge outwardly. When the loops travel to the horizontal run of the sprocket chain they then travel in a substantially straight path and they are closed by the ends of the blocks which engage the sides 39 and move them inwardly to a closed contacting position. Closed spaced loops are therefore provided and the length of the blocks 19 define the lengths of the getter bases 41 between the closed loops. The closed loops extend inwardly from the bases 41 and are disposed at substantially a right angle thereto. The loops 38' preserve the continuity of the ribbon and the ribbon and the loops are fed continuously as a unit. The ribbon thus treated and travelling in a straight path then passes beneath the forming roll 27 and the convex periphery of this roll will form the successive bases 41 to provide an upper channel 42 for each base, and these upper channels form in effect a continuous channel. The ribbon thus treated continues to travel with the upper run in a straight path, with the loops closed, and passes beneath the discharge roll 33, 75

which continuously supplies the pasty getter material 43 to the same, providing a continuous layer of the getter material within the substantially continuous channel. This continuous layer of getter material extends throughout the entire length of each getter base and extends across the closed loops but cannot enter the closed loops since their sides are in contact. The getter material is therefore prevented from being improperly applied to the tabs which are produced from the loops. The ribbon continues to travel with the upper run and in a straight path and is fed through the oven 34 wherein the pasty getter material is baked and rendered hard. When the blocks 19 pass out of the oven, and travel about the outer side of the sprocket wheel 18', they travel in a curved path and become angularly arranged with relation to each other, and their ends separate, providing the outwardly diverging spaces 26. This causes the loops 38' to again open and the getter bases become angularly disposed, whereby the solid getter material is transversely broken at the loops. The loops continue to open, and when each loop reaches the vertical position, the adjacent bases are clamped by the pads 35', while the cutter 36 is projected radially and outwardly and enters the open loop from its outer end and severs the inner closed end 40 of the loop. The leading getter is then removed from its block by an air blast from the nozzle 37'.

It is thus seen that the metal ribbon is first caused to travel in a curved path so that the ends of the bases are spaced and open loops formed between such ends, and then caused to travel in a straight path to close the loops, and again caused to travel in a curved path to open the loops. The getter material is applied to the ribbon while it is travelling in a straight path, and the getter material and the loops are severed while the loops are again open.

In Figures 4 and 11, we have shown the getter, including the core 41, and the getter material 43 within the channel of the core. The core 41 carries tabs 39', which are formed by the severed loops. These tabs 39' are ordinarily bent upwardly further after they are formed. By the method, the tabs 39' are free from the getter material. These tabs are to be welded to parts of electronic tubes or the like or to supporting elements.

It is to be understood that the form of our invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the order of the steps of the method, may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described our invention, what we claim is:

1. The method of producing getters, comprising folding a metal ribbon for producing spaced loops and getter bases between the loops, forming the bases to produce channels, feeding a plastic getter material into the channels, causing the plastic getter material to harden, and severing the loops at points spaced from the bases to separate the getters and form tabs upon the getters.

2. The method of producing getters, comprising folding a metal ribbon for providing spaced loops and getter bases between the loops, forming the ribbon to produce a channel which is in effect continuous, introducing a continuous mass of plastic getter material into the channel, causing the plastic getter material to harden, severing the hard getter material, and severing the loops

at points spaced from the bases to separate the getters.

3. The method of producing getters, comprising feeding a metal ribbon longitudinally, folding during the feeding action the metal ribbon for providing spaced substantially closed loops and getter bases between the loops, forming the bases during the feeding action to provide a substantially continuous channel, feeding plastic getter material during the feeding action into the channel for producing a continuous layer, causing the plastic getter material to harden, severing the getter material adjacent to the ends of the bases and severing the loops at points spaced from the bases.

4. In the method of producing getters, the steps of folding a metal ribbon for providing spaced loops, holding the loops closed and feeding the ribbon longitudinally, forming the ribbon between the loops to produce a substantially continuous channel, continuously introducing getter material into the channel while the loops are closed, severing the getter material, and severing the loops at points spaced from the metal ribbon.

5. The method of producing getters, comprising feeding a metal ribbon longitudinally, folding the ribbon in succession for producing spaced open loops and getter bases between the loops, closing the loops so that the getter material cannot enter the same, forming the bases to provide a channel which is in effect continuous, continuously feeding a plastic getter material into the channel for providing a layer extending over the closed loops, causing the getter material to harden, severing the getter material in succession adjacent to the bases, and severing the loops in succession adjacent to the closed ends of the loops spaced from the getter bases.

6. The method of producing getters, comprising supporting and longitudinally feeding a metal ribbon, folding the ribbon in succession for providing spaced open loops having inner closed ends and getter bases between the loops, moving the sides of the loops together to close the loops so that the getter material cannot enter the loops,

forming the bases to provide a channel which is continuous in effect, continuously feeding a pasty getter material into the channel to form a continuous layer extending over the closed loops, causing the getter material to harden, opening the closed loops in succession to break the hard getter material adjacent to the loops, and effecting a cutting action in succession through the open ends of the loops to sever the inner closed ends of the loops which are spaced from the bases.

7. The method of producing getters, comprising longitudinally feeding a metal ribbon and supporting in succession a section of the ribbon for producing getter bases, spacing the ends of the getter bases thus produced, folding the ribbon in succession between the spaced ends of the bases to provide open loops, closing the loops so that their sides contact, forming the bases to provide a channel which is continuous in effect, feeding a plastic getter material in the channel to produce a continuous layer, causing the getter material to harden, opening the closed loops to break the hard getter material adjacent to the bases, and severing the loops at points spaced from the bases.

8. The method of producing getters, comprising supporting sections of a metal ribbon to form getter bases and causing the sections to travel in the curved path so that their ends are spaced, folding the ribbon between the sections to provide open loops extending laterally from the bases, causing the loops and bases to travel in a substantially straight path and closing the loops, forming the bases while travelling in a straight path to provide a channel which is continuous in effect, continuously feeding a plastic getter material to the channel, causing the getter material to harden, causing the bases to again travel in a curved path and opening the closed loops to break the hard getter material, and severing the loops at points spaced from the bases.

CARL HERZOG.
PAUL A. HAUCK.