March 21, 1950 C. E. McKINSEY 2,501,403

CHUTE WITH SLOT MEANS FOR SORTING IN-LEADS

Filed March 7, 1947 2 Sheets-Sheet 1

Fig. 5

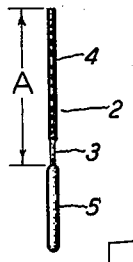


Fig. 1

Fig. 2

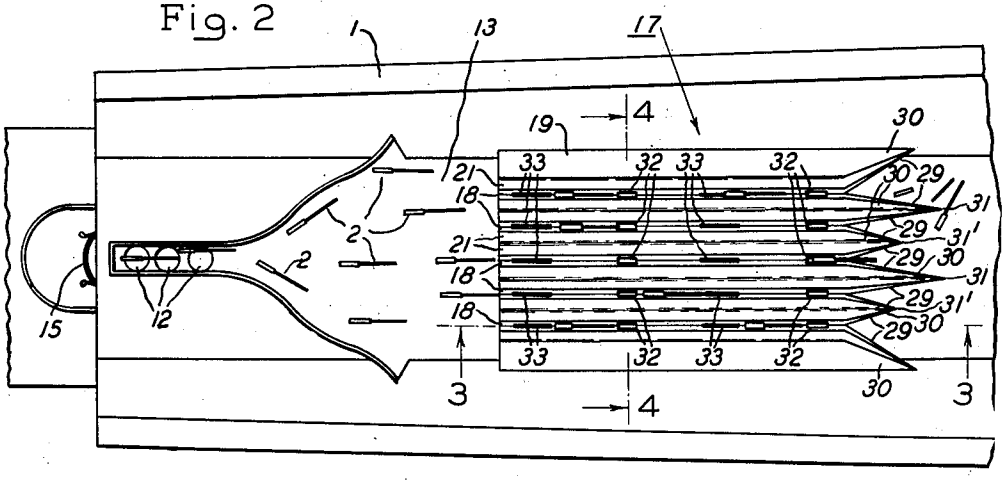
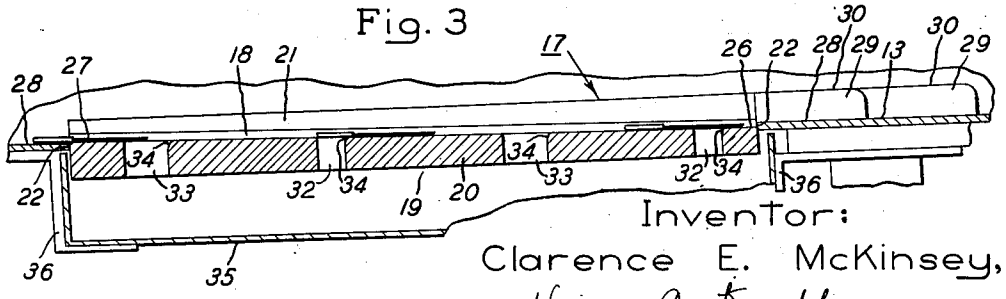


Fig. 3



Inventor:
Clarence E. McKinsey,
by Vernet C. Hauffman
His Attorney.

March 21, 1950 C. E. McKINSEY 2,501,403

CHUTE WITH SLOT MEANS FOR SORTING IN-LEADS

Filed March 7, 1947 2 Sheets-Sheet 2

Fig. 4

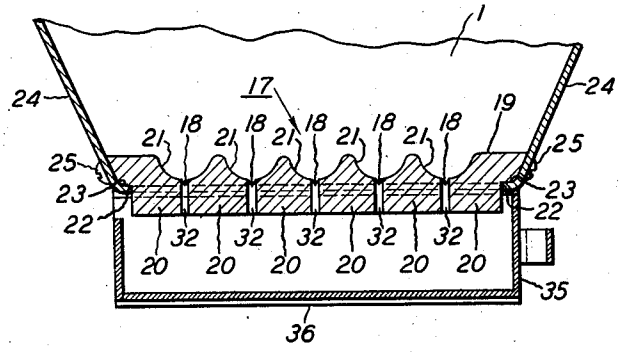


Fig. 6

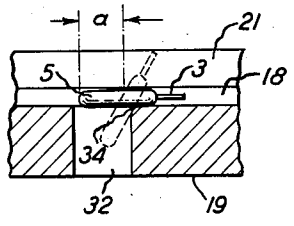


Fig. 7

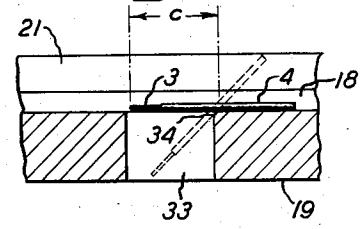


Fig. 8

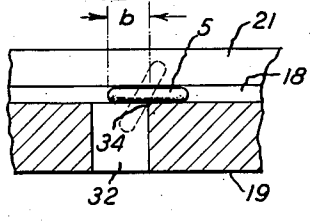


Fig. 9

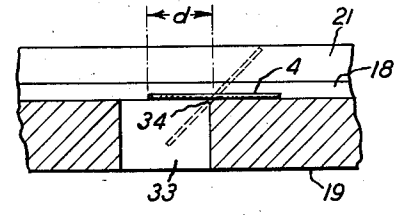


Fig. 10

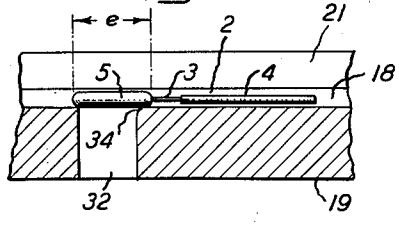


Fig. 11

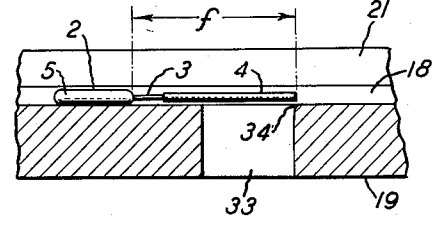
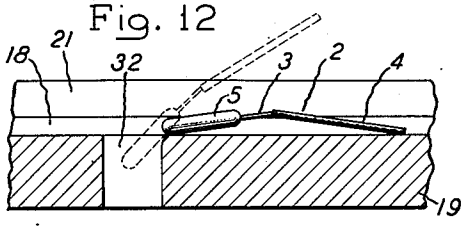


Fig. 12



Inventor:
Clarence E. McKinsey,
by Vernet C. Hauffman
His Attorney

Patented Mar. 21, 1950

2,501,403

UNITED STATES PATENT OFFICE

2,501,403

CHUTE WITH SLOT MEANS FOR SORTING IN-LEADS

Clarence E. McKinsey, Painesville, Ohio, assignor to General Electric Company, a corporation of New York

Application March 7, 1947, Serial No. 733,046

3 Claims. (Cl. 209—85)

1

My invention relates, in general, to apparatus for automatically packaging in-leads for electric incandescent lamps, electronic tubes and similar devices, and more particularly to a sorting arrangement for such apparatus which will sort out and discard incompletely and imperfectly formed in-leads. The present application is a continuation-in-part of my copending application Serial No. 610,153, filed August 10, 1945, and assigned to the same assignee as the present application.

In my said copending application I have disclosed and claimed apparatus for automatically loading endwise into cartridges multi-section in-leads of the type having a weighted end. However, in addition to loading perfectly formed in-leads into the cartridges, the disclosed apparatus will also load into the cartridges such imperfect in-leads as may be formed from time to time by the wire-welding machine on which these in-leads are customarily manufactured. Obviously, the packaging of only perfectly formed in-leads is highly desirable since otherwise an imperfect in-lead would result in the subsequent formation of a defective lamp or radio tube stem.

It is one object of my invention, therefore, to provide apparatus of the character described which will automatically load only completely and perfectly formed in-leads into packing cartridges.

Another object of my invention is to provide, in apparatus for automatically loading in-leads endwise into packing cartridges, sorting means for discarding incompletely and imperfectly formed in-leads.

Further objects and advantages of my invention will appear from the following detailed description of a species thereof and from the accompanying drawings in which:

Fig. 1 is a front elevation of apparatus comprising my invention; Fig. 2 is a fragmentary plan view thereof; Fig. 3 is a vertical section on the line 3—3 of Fig. 2; Fig. 4 is a transverse section on the line 4—4 of Fig. 2; Fig. 5 is an elevation, on an enlarged scale, of a typical form of in-lead which the apparatus according to the invention is adapted to load into cartridges; Figs. 6–12 are fragmentary longitudinal sections through the different tray sorting apertures of the apparatus and showing the operation of these apertures in sorting out and removing from the tray the various types of incompletely formed in-leads and individual sections thereof which are apt to pass through the tray from time to time.

Referring to the drawings, the apparatus there

2

illustrated is of the type shown in my said copending application Serial No. 610,153 and comprising a slightly inclined vibrating pan or tray 1 which is adapted to receive in-leads 2 as they are formed by a wire-welding machine, for example, such as that described and illustrated in U. S. Patent 2,034,560, W. D. Bumstead, dated March 17, 1936. In the particular case illustrated, the in-leads 2 are of the multi-section type comprising a short central or seal portion 3 butt-welded to inner and outer lead portions 4 and 5, respectively. The inner lead portion 4 and the seal portion 3 are of smaller diameter than the outer lead portion or pin 5, and together constitute the small diameter section A of the in-lead. The outer lead or pin 5, while of shorter length than the small diameter section A of the composite in-lead, is of comparatively larger diameter and of greater weight than the section A so as to provide a weighted end to the composite in-lead 2, the balance point or center of gravity of the particular in-lead 2 illustrated being located approximately at the juncture between the pin 5 and the seal portion 3 of the in-lead. The portions 3, 4 and 5 of the in-lead are electrically welded together while held in proper welding relation in vertically disposed wire-holding drums 6 of the welding machine. Upon completion, the in-leads 2 are carried by the subsequent rotational index of the spaced drums 6 to a discharge position where they drop out of the transverse retaining grooves in the periphery of the drums and fall into a chute 7 which delivers them into the elevated end of the slightly inclined tray 1. The chute 7 is supported on a bracket 8 fastened to the table portion 9 of the welding machine.

The tray 1 is mounted on the bed 10 of the welding machine in such a manner as to be capable of a limited amount of vibrating movement which may be imparted thereto by suitable means such as a commercial type electro-magnetic vibrator 11, all as shown and described in my said copending application. The in-leads 2 gradually travel or slide down the tray 1, by reason of the vibration thereof, to the lowermost or discharge end of the tray where they drop through apertures 12 in the tray bottom 13 and are guided by a collector chute 14 on the tray into a packing cartridge 15 which is positioned beneath the discharge end of the chute in a holder 16. Like the tray 1, the holder 16 is also mounted on the bed 10 of the machine in such a way as to be capable of at least a limited amount of vibrating movement which may be imparted thereto by the same electro-magnetic vibrator 11 which is

used to vibrate the tray, all as shown and described in my copending application. The vibration of the cartridge holder 16 serves to shake the in-leads 2 all the way down into the cartridge 15 so as to be properly positioned therein.

In the manufacture of the multi-section in-leads 2 on butt-welding machines in general use at present, defective welds are apt to be formed from time to time between the individual parts of the in-leads as a result of which incomplete or defective in-leads are discharged into the tray 1. Thus, there may be cases where only two of the three parts of the in-lead 2 are welded together, and there are even instances where none of the parts are welded together.

In accordance with the invention, sorting means 17 are provided on the tray 1 for intercepting and discarding incompletely and imperfectly formed in-leads and individual parts thereof, whereby only perfect in-leads 2 pass through the tray and are loaded into the packing cartridges 15. As shown, the said sorting means 17 comprises a series of side-by-side V-shaped channelways or grooves 18 extending longitudinally of the tray 1 throughout an intermediate portion of its length, through which channelways the in-leads pass as they travel down the tray towards its lowered end. While the channelways 18 may be formed in the tray bottom 13 itself, they are preferably formed by a built-up insert member 19 comprising a number of sections 20 (Fig. 4) of hard steel bolted together and having their abutting faces properly grooved or cut away to form, in combination, the channelways 18. As shown in Fig. 4, the small V-channelways 18 are located at the bottoms of larger grooves 21 of more or less semi-cylindrical cross sections which serve to direct back into the V-channelways 18 any in-leads which may be jarred out of the same. After the sections 20 have been bolted together, the grooved surfaces of the insert member 19 are buffed to a high polish and then chrome plated so as to be free of any rough spots along the line of juncture of the individual sections 20 such as might otherwise catch the in-leads 2 and interrupt their travel through the channelways.

The channeled insert member 19 is mounted within an opening 22 (Figs. 3 and 4) in the tray bottom 13 and it rests at each side on the portions 23 of the tray bottom which border the sides of the opening 22 as well as on the flaring sides 24 of the tray. The insert member 19 is suitably secured in place on the tray, as by screws 25. As shown in Fig. 3, the channeled insert member 19 is positioned within the opening 22 in the tray bottom with its V-channelways 18 inclined in the same direction as but to a lesser degree than the tray bottom 13 and with the forward ends 26 of the V-channelways offset downwardly and the rear ends 27 offset upwardly with respect to the upper surface 28 of the tray bottom so as not to present any obstructing shoulders at the entrances and exits of the channelways which would be apt to interfere with the free passage of the in-leads 2 into and out of the channelways 18.

The in-leads 2 are guided into the several V-channelways 18 by cooperating pairs of guide walls 29 (Fig. 2) which converge towards the respective channelways. These guide walls 29 are formed by the side walls of extensions or fingers 30 which are provided on the insert member 19 and which project from the forward end thereof in over-lying relation to and in engagement with the upper surface 28 of the tray bottom 13. The two guide walls 29 of each finger 30 converge forwardly and intersect to form pointed ends. To prevent an in-lead 2 from becoming positioned across and bridging the pointed ends of adjacent fingers 30 so as to block the path of entry into one of the channelways 18, alternate fingers 30 are made of greater length than the intermediate fingers so as to locate their pointed ends 31 further forwardly of the tray than the pointed ends 31' of the intermediate fingers. In addition, the advanced pointed ends 31 must be spaced laterally of the tray a distance slightly greater than the length of a perfect in-lead 2 so as to permit passage between the said pointed ends 31 of a crosswise positioned in-lead. With such a construction, should an in-lead strike broadside against one of the advanced pointed ends 31, it will be turned around and directed more or less lengthwise of the tray into the channelway 18 at either side of the said pointed end. Alternatively, if an in-lead 2 should pass between adjacent advanced pointed ends 31 in a position more or less crosswise of the tray, one of its ends will strike against one or the other of the facing guide walls 29 and, because of its weighted end, turn around into a position more or less lengthwise of the tray whence it is then directed by the guide walls 29 into one or the other of the channelways 18.

The channeled insert member 19, which in effect constitutes a part of the tray bottom 13, is provided with a plurality of spaced elongated sorting apertures or slots 32, 33 aligned longitudinally within each of the V-channelways 18, into which apertures the defective in-leads and parts thereof drop during their passage through the channelways. These apertures 32, 33 are of different widths and lengths so correlated to the dimensions of the individual parts 3, 4 and 5 of the in-leads as to cause the incompletely and imperfectly formed in-leads to drop into one or the other of the apertures without causing the perfectly formed in-leads to drop thereinto. To accomplish this object where the in-leads 2 are of the particular type illustrated having a short section 5 of larger diameter and a long section A of smaller diameter composed of a short seal lead 3 and a long inner lead 4, at least two different sized apertures 32, 33 must be provided within each channelway. One of these apertures (32) must have a width greater than the diameter of the large diameter section 5 of the in-lead, and a length greater than the shortest balance arm *a* (Fig. 6) of the large diameter and seal section 5, 3 combined but less than the shortest balance arm *e* (Fig. 10) of a perfect lead which would cause over-balancing thereof into the said aperture as it passes thereover. The other aperture 33 must have a width less than the diameter of the large diameter section 5 but greater than the diameter of the small diameter section A of the in-lead, and a length greater than half the length of said small diameter section A but less than the longest balance arm *f* (Fig. 11) of a perfect in-lead which would cause over-balancing thereof into the aperture 33, small diameter end first. As shown in Fig. 3, the forward ends of the upper edges of the apertures or slots 32, 33 are slightly rounded off, as indicated at 34, to facilitate the over-balancing thereinto of the defective in-leads and parts thereof.

To more effectively assure the elimination of the defective in-leads and parts thereof, it is preferable to provide two sorting apertures of

each size within each of the channelways 18, spaced apart longitudinally within the channelway in alternate positions therein. In this way, if a defective in-lead should for any reason fail to drop into the first sorting aperture provided therefor, it would in any event drop through the second one of said apertures. The defective in-leads and parts thereof which drop into and through the sorting apertures 32, 33 are collected in a suitable receptacle 35 which may be in the form of a removable drawer slidably mounted underneath the tray 1 in support brackets 36 fastened to the underside of the tray bottom.

The operation of the sorting apertures 32, 33 in removing the defective in-leads and parts thereof from the tray 1 is clearly illustrated in Figs. 6–12. Where an outer pin 5 alone (Fig. 8) or with only the seal portion 3 welded thereto (Fig. 6) enters one of the channelways 18, it overbalances and drops into one or the other of the shorter apertures 32 since this size aperture 32 is wide enough to accommodate the large diameter pin section 5 and, in addition, it is longer than the shortest balance arm *a* of the defective in-lead 3, 5 (Fig. 6) or the balance arm *b* of the pin 5 alone (Fig. 8). Where a seal portion 3 alone enters one of the channelways 18, such seal portion, being of shorter length and of smaller diameter than the outer pin 5, over-balances and drops either into one of the short apertures 32 or into one of the long apertures 33. Where an inner lead 4 alone (Fig. 9) or with only the seal portion 3 welded thereto (Fig. 7) enters one of the channelways 18, it will overbalance and drop into one or the other of the long apertures 33 since this size aperture 33 is wide enough to accommodate the inner lead 4 and seal portion 3 and, in addition, is longer than either the balance arm *c* of the defective in-lead 3, 4 (Fig. 7) or the balance arm *d* of the inner lead 4 alone (Fig. 9). However, where a perfect or complete in-lead 2 enters one of the channelways 18, it cannot over-balance into the shorter apertures 32 (Fig. 10) for the reason that the length of such apertures 32 is less than that of the shortest balance arm *e* which would cause over-balancing of such a perfect in-lead into the said apertures 32. Likewise, such a perfect in-lead 2 will not overbalance into the longer apertures 33, Fig. 11. It cannot over-balance heavy or pin end first into the apertures 33 because these apertures are of less width than the diameter of the pin end 5 of the in-lead and therefore will not accommodate such end of the in-lead. On the other hand, a perfect in-lead cannot overbalance small end first into the apertures 33 (Fig. 11) for the reason that the length of these apertures is less than the longer balance arm *f* of the small diameter end of a perfect lead.

In addition to removing incompletely formed in-leads and parts thereof from the tray 1, the sorting means 17 according to the invention also serves to remove in-leads 2 that may have become bent at the seal portions 3 thereof. The force of gravity acting on such bent in-leads, while the latter are being shaken by the vibrating tray 1, causes the bent in-lead to travel through the channelway 18 in a position resting on its opposite ends, i. e., with its mid-section elevated, as shown in Fig. 12. As a result, when such a bent in-lead travelling in such position through one of the channelways 18 reaches the aperture 32, the down-turned forward supporting end of the in-lead drops into the aperture thus causing the entire in-lead to drop therethrough.

Because of the elimination of the incompletely and imperfectly formed in-leads by the sorting means 17, there is no need for any visual inspection of the in-leads as they pass through the tray 1. The packaging apparatus according to the invention therefore assures the automatic loading of cartridges 15 with perfect in-leads only. The only remaining operation required of the operator is to periodically remove the filled packing catridges 15 from the holder 16 and position an empty cartridge beneath the loading chute 14.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. Article sorting apparatus for sorting completely formed multi-section in-leads, one end section of which is relatively short and of relatively large diameter and the other end section of which is relatively long and of relatively small diameter, from imperfectly formed in-leads and individual sections thereof, said apparatus comprising an inclined elongated tray adapted to receive the articles at its raised end and vibratable to cause the articles to travel therealong towards its lowermost end, and sorting means on said tray for removing therefrom imperfectly formed in-leads and individual sections thereof, said sorting means comprising a channelway extending longitudinally of the tray through which the articles are guided in a position lengthwise of the tray during their passage therealong, said tray having a plurality of elongated sorting apertures in its bottom extending lengthwise of and aligned within said channelway and across which the articles are guided during their passage through the channelway, one of said apertures having a width greater than the diameter of the large diameter section of the in-lead and a length greater than half the length of said large diameter section but less than the shortest balance arm of a perfect in-lead, and another of said apertures having a width less than the diameter of said large diameter section but greater than the diameter of the small diameter section of the in-lead and a length greater than half the length of said small diameter section but less than the longest balance arm of a perfect in-lead.

2. Article sorting apparatus for sorting completely formed multi-section in-leads, one section of which is relatively short and of large diameter and the other section of which is relatively long and of small diameter, from imperfectly formed in-leads and individual sections thereof, said apparatus comprising an inclined elongated tray adapted to receive the articles at its raised end and vibratable to cause the articles to travel therealong toward its lowermost end, said tray having a plurality of side-by-side channelways extending longitudinally of the tray on its upper side through which the articles are guided in a position lengthwise of the tray and in predetermined paths during their passage therealong, said tray further having a plurality of elongated apertures in its bottom located within each of said channelways and extending lengthwise of and aligned within the respective channelways and across which the articles are guided during their passage through the channelways, at least one of said apertures in each channelway having a width greater than the diameter of the large diameter section of the in-lead and a length greater than half the length of said large diameter section but less than the shortest balance arm of a perfect in-lead, and at least another of said apertures in each channelway having a width less than the diameter of said large diameter section but great-

er than the diameter of the small diameter section of the in-lead and a length greater than half the length of said small diameter section but less than the longest balance arm of a perfect in-lead, and guide walls on said tray for guiding the articles into the channelways, the adjacent guide walls of adjacent channelways, converging towards the elevated end of the tray and intersecting to form pointed ends, alternate ones of said pointed ends being located closer to the elevated end of the tray than the intermediate pointed ends and being spaced laterally of the tray a distance slightly greater than the length of said in-leads.

3. Article sorting apparatus for sorting completely formed multi-section in-leads, one end section of which is relatively short and of relatively large diameter and the other end section of which is relatively long and of relatively small diameter, from imperfectly formed in-leads and individual sections thereof, said apparatus comprising an inclined elongated tray adapted to receive the articles at its raised end and vibratable to cause the articles to travel therealong toward its lowermost end, a plurality of side-by-side channelways extending longitudinally of the tray on its upper side through which the articles are guided in a position lengthwise of the tray and in predetermined paths during their passage therealong, said tray having a plurality of elongated sorting apertures in its bottom located within each of said channelways and extending lengthwise of and aligned within the respective channelways and across which the articles are guided during their passage through the channelways, at least one of said apertures in each channelway having a width greater than the diameter of the large diameter section of the in-lead and a length greater than half the length of said large diameter section but less than the shortest balance arm of a perfect in-lead whereby individual large diameter sections of the in-leads overbalance into said one aperture while completely formed in-leads pass freely thereacross, and at least another of said apertures in each channelway having a width less than the diameter of said large diameter section but greater than the diameter of the small diameter section of the in-lead and a length greater than half the length of said small diameter section but less than the longest balance arm of a perfect in-lead whereby individual small diameter sections of the in-leads overbalance into said other aperture while completely formed in-leads pass freely thereacross.

CLARENCE E. McKINSEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
348,128	Keeney	Aug. 24, 1886
1,197,697	Weller	Sept. 12, 1910
1,056,369	Ritchie	Mar. 18, 1913
1,189,167	Parker	June 27, 1916
1,381,240	Pope	June 14, 1921
1,647,356	Hendry	Nov. 1, 1927
1,657,630	Lund	Jan. 31, 1928
2,186,652	Orth	Jan. 9, 1940
2,356,295	Yost	Aug. 22, 1944