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C. HERZOG

2,334,004

WIRE LOADER

Original Filed March 29, 1941

Fig. 5.

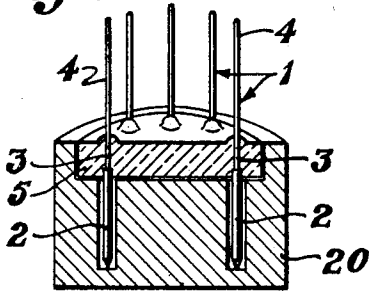


Fig. 1.

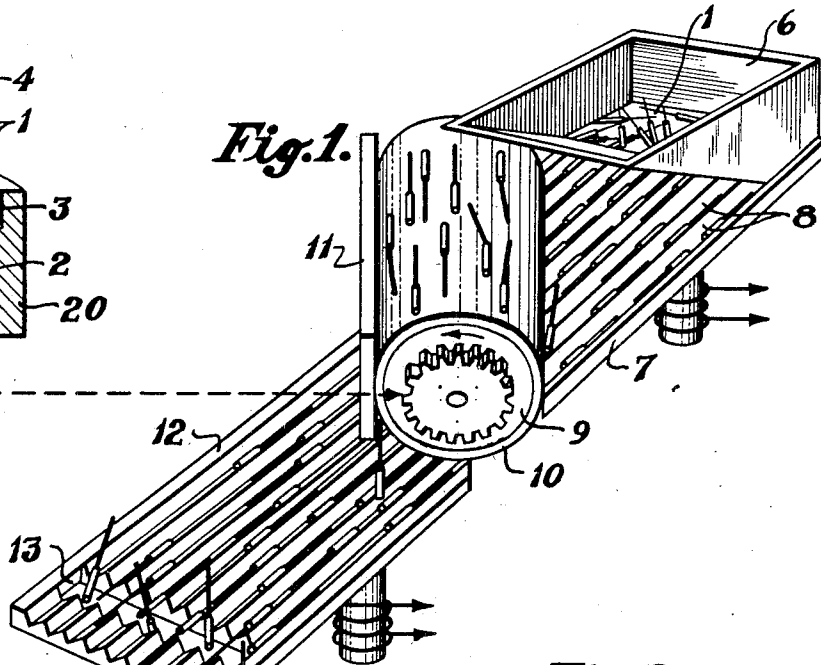


Fig. 2.

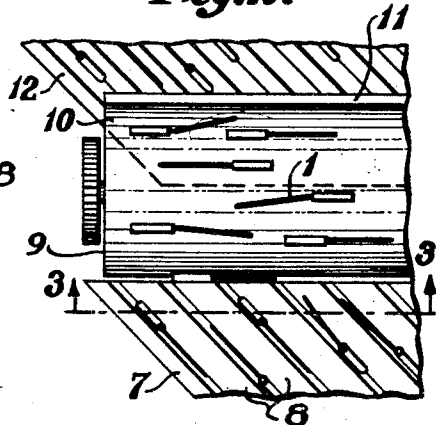


Fig. 4.

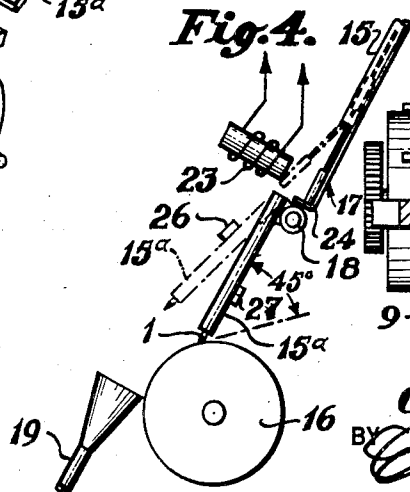
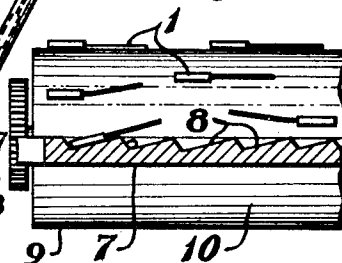


Fig. 3.



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To Machine

UNITED STATES PATENT OFFICE

2,334,004

WIRE LOADER

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Original application March 29, 1941, Serial No. 385,810. Divided and this application February 17, 1942, Serial No. 431,230

3 Claims. (Cl. 153—54)

My invention relates to wire feeding apparatus, particularly to apparatus for separating short lengths of wires from a pile or from a hopper full of wires and depositing each wire in a predetermined place and position. This application is a division of the copending application, Serial No. 385,810, filed by me March 29, 1941, and assigned to the assignee of this application.

Short lengths of wires used in the manufacture of articles of commerce are often supplied in piles, the wires being in random positions and often of bent and irregular shapes. These wires must be automatically selected, straightened and fed, right-end-to to the machine for further processing the wires. The lead-in conductors in envelopes of electron discharge devices, for example, are usually hermetically sealed in a header for the envelope and the speed with which the headers can be made is often limited by the rate at which the several wires may be placed in position in the header making machine. Where each wire is not of uniform size and composition throughout its length, it must be properly oriented, end-for-end, before feeding.

An object of my invention is an improved apparatus for feeding lengths of wires.

Another and more specific object of my invention is apparatus for straightening wires, arranging them in a predetermined end-for-end position, and feeding them to a machine.

The characteristic features of my invention are defined in the appended claims and one embodiment of my improved wire feeding apparatus is described in the following specification and shown in the accompanying drawing in which:

Figure 1 is a perspective view of representative parts of my improved wire feeding apparatus with the parts in cooperative relations with each other and with the machine to be loaded;

Figure 2 is a top plan view of the wire straightening means of my improved wire feeder;

Figure 3 is a detailed view of the wire straightener of Figure 2, sectioned along line 3—3 of Figure 2;

Figure 4 is a side elevational view of the wire pointing and triggering mechanism of my wire feeding apparatus; and

Figure 5 shows in section a radio tube with a header containing the wires handled by my improved wire feeding apparatus.

To facilitate the description of my improved wire feeding apparatus it is shown in cooperative relation with one type of machine with which it may conveniently be used, namely a machine for making headers for radio tubes.

The apparatus may, of course, be used for feeding wires to any equipment where large numbers of short lengths of wires must be handled, straightened, righted end-for-end and fed one at a time to the equipment. The lead-in conductor 1 of a radio tube is preferably composed of three short lengths of wires 2, 3 and 4 welded end-to-end and sealed in the glass header 5, as shown in Figure 5, and which is in turn sealed into the envelope of a radio tube. The lower end 2 of the wire is relatively heavy and large in diameter and is used as a contact pin of the tube. The short section of wire 3 is of a metal which readily seals with the glass of the header, and the third section of wire 4 is relatively long and thin compared to the contact pin portion 2, so that the center of gravity of the wire is displaced from the geometric center of the wire. Usually the composite lead-in wire is not straight and is supplied in piles with random orientation. The wires may be poured into the hopper 6, Figure 1, and allowed to fall through a slot in the bottom of the hopper onto the upper end of the inclined chute 7. Chute 7 is a plate with a plurality of parallel grooves 8, the number of grooves corresponding to the number of wires to be fed at any one time to the header making machine. The number of wires in the particular header shown is nine, so the number of grooves in the chute as is nine. By vibrating the chute with an electromagnet the wires travel along the grooves of the chute toward the side of the drum 9 of my novel wire straightening device. The drum is of metal and is magnetized to pick up the wires from the grooves of the chute. By magnetizing the drum with its ends of opposite polarity, the lines of electromagnetic force are parallel to the axis of the drum and the wires from the chute will cling to the sides of the drum and lie substantially parallel to the drum axis. The drum is preferably covered with a resilient jacket 10, such as a rubber sleeve, and is rotated with its side close to or lightly rubbing a stationary flat metal plate 11. The wires are rolled between the stationary plate and the resilient surface of the drum and are straightened. The plate is of iron or of other metal of high magnetic permeability which will in effect short circuit the magnetic lines along the delivery side of the drum and permit the straightened wires to drop free of the drum beneath the line of contact between the drum and the plate.

From the straightening drum the wires fall into the upper ends of grooves of a second inclined chute 12, which also may be vibrated as

with an electromagnet. To turn the lead wires to their proper end-for-end position, an opening 13 is provided across the lower end of the chute. Measured lengthwise of the grooves, the opening is shorter than the length of the lead wires but is slightly longer than the heavy section 2 of the lead wires. The heavy end of the lead wires will then first fall through the opening. If the wire approaches the opening with the light end 4 of the wire downward, it will pass over the opening until the heavy end 2 of the wire clears the opening and the wire falls through, heavy end first.

Beneath the opening and under each of the grooves in the chute 12 is positioned a funnel 14 communicating through a tube 15—15a with the abrasive surface of a rotating grinding cylinder or wheel 16. Triggering mechanism 17 for feeding one wire at a time through each tube to the grinding cylinder, is more fully hereinafter described. Tubes 15—15a are of such internal size as to freely pass wires 1 without permitting the wires to enter side-by-side. The position of the tube with respect to the grinding cylinder is such that the lower end of the wire will rest on the grinding surface of the cylinder with the wire inclined at a compound angle of about 45° from the plane tangent to the cylinder at the point of contact. That is, the lead wire is held at an angle of about 45° with respect to the tangent plane as well as at an angle of 45° with respect to a transverse plane perpendicular to the axis of the cylinder. It has been found that the wire will rotate slowly in the tube and will grind a symmetrical cone-shaped point on the end of the wire. The tubes may be hinged on shaft 18 so that their lower ends can be quickly shifted to a position over the upper end of the conduits 19 which receive the pointed wires and guide them downwardly and into their proper openings in the press mold 20. If desired, each of the nine conduits may be supported at their lower end in the stationary collar 21 with openings in alignment with the conduit openings and directly over the nine openings in the press mold 20. The nine leads are pointed at the same time on the grinding cylinder, are transferred to their conduits and are dropped simultaneously into the nine holes on the mold, whereupon the mold moves on from beneath the collar and a second mold moves into place for loading.

Several molds may conveniently be mounted on the periphery of a rotating dial or table 22 and from the loading position carried step-by-step into flames that melt the glass and into pressing devices that form the glass portion of the header 5. To simplify the drawing only two of tubes 15—15a, trigger mechanisms 17, and conduits 19 have been shown. Further simplification of the drawing has been effected by diagrammatically showing the mechanical driving mechanisms for the various parts of the machine. The dot-dash line represents the driving linkage between the roller 9, the switch cams 25a for trigger mechanism 17, the tilting shaft 18 for tube 15a, grinding wheel 16, and the indexing means for the mold carrying dial or table 22.

Trigger mechanism 17 may conveniently comprise an electromagnet 23 for pulling outwardly the lower end of the wire 1 resting on a stop shoulder 24 at the lower end of the tube 15. Stop shoulder 24 may simply be the end of the tube turned up at right angles to the axis of the tube, the tube being cut away above the stop for a distance slightly less than the length of one wire 1. The electromagnet for each trigger mechanism

is energized by the circuit through contacts 25 actuated by cam 25a driven in synchronism with the wire feeding machine. The upper ends of the tubes 15a are so disposed on their roller shaft 18 and beneath the end of wires 1 when held by electromagnet 23 that the wires will drop into the ends of tubes 15a when released by the electromagnets. Stop bars 26 and 27 limit the swing in both directions of the tubes 15a as they are moved, respectively, into wire dropping positions and into the wire grinding position. While means comprising tube 15a carried on shaft 18 has been shown for transferring the pointed wires from the grinding wheel to the conduits 19 by a fast or snap action, it is apparent that means may be employed for positively gripping the wires during the transfer of the wires from the grinding wheel to the unloading or dropping position.

While drum 9 may comprise a single solid cylinder of magnetized metal, it may, if desired, be made up of a plurality of small magnets arranged end-to-end and covered with the rubber jacket 10. The magnets may be of the permanent type or of the electromagnetic type. To further assist the orientation of the wires 1 in axial positions on the surface of the magnetized drum, it has been found expedient to incline the grooves 8 to the axis of the drum and to make the grooves with the unsymmetrical cross-section shown in Figure 3. As the wires slide down the grooves and contact the drum, the outer end of the wire is drawn to the right, in Figure 3, and upwardly along the gradual slope of the groove to the side of the drum. Chute 7 is preferably made with its grooves 8 from non-magnetic material, such as copper or brass.

According to one feature of my invention, the feeding of straightened wires through opening 13 to the funnel 14 and tubes 15—15a need not be synchronized with the triggering mechanism 17 and the loading cycles of the press molds 20. Funnels 14 are cut away at their junction with tubes 15 so that when tubes 15 become filled to their upper end with end-on wires, the wires dropping through opening 13 will tumble into the overflow box 28. Wire accumulating in the box 28 may be returned to the hopper 6.

Good results have been obtained in loading molds with nine lead wires 1 having heavy or pin sections 2 of .040 inch chrome-iron, .31 inch long, with commercial Dumet wire 3 about .010 inch in diameter, and nickel wire 4 .015 inch in diameter and .53 inch long. My improved wire feeding apparatus straightens the wires, points one end of the wire, arranges them in an end-to-end position and feeds them to a machine. My improved wire feeding apparatus is of simple construction and is easy and fast in operation.

I claim:

1. A wire straightener for a wire loader comprising in combination a rotatable cylindrical drum having a resilient surface, a stationary plate parallel to the axis of the drum and fixed in a position at the side of the drum less than the diameter of the wire to be straightened from the drum, means for depositing lengths of wires on the drum approximately parallel to the drum axis, and means to rotate the drum to roll said wires between said resilient cover and said plate.

2. In a wire loader, a wire straightener comprising in combination a rotatable drum, a resilient cover on the surface of said drum, a fixed plate parallel to the axis of the drum and positioned adjacent the side of the drum and spaced from the drum a distance less than the diameter

of the wires to be straightened, said drum being of metal and magnetized so as to produce electromagnetic lines of force along the surface of the drum parallel to planes through the drum axis, means for feeding said wires to the drum throughout the length of the drum, means to revolve the drum to roll said wires between said resilient cover and said plate, an inclined chute with a plurality of side-by-side grooves, the upper end of the chute underlying said plate and drum, and conduits communicating with the lower ends of the grooves and with the receptacle to be loaded.

3. A wire loader comprising in combination a

5 cylindrical drum, a resilient cover on the surface of said drum, said drum being magnetized with its ends of opposite magnetic polarity, a fixed plate parallel to the axis of the drum and closely spaced to the side of the drum, an inclined chute with its lower end terminating adjacent the surface of the drum, a plurality of parallel grooves in the surface of said chute inclined at an angle of less than 90° to the axis of said drum, said grooves 10 being triangular and asymmetrical in cross section, one side of said groove having a more gradual slope than the other side.

CARL HERZOG.