

Dec. 23, 1952

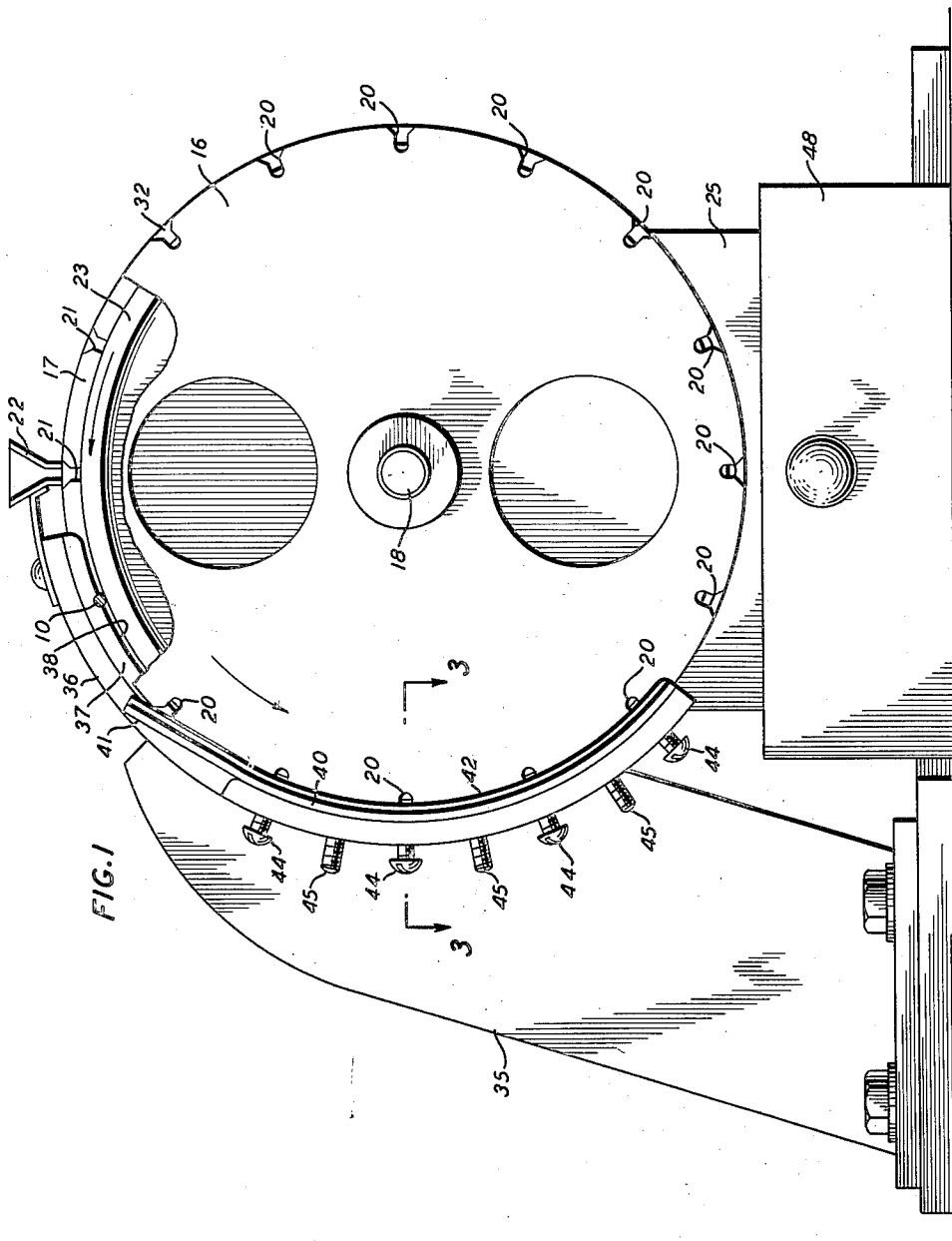
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2,622,654

ARTICLE STRAIGHTENING MACHINE

Filed Nov. 13, 1950

3 Sheets-Sheet 1



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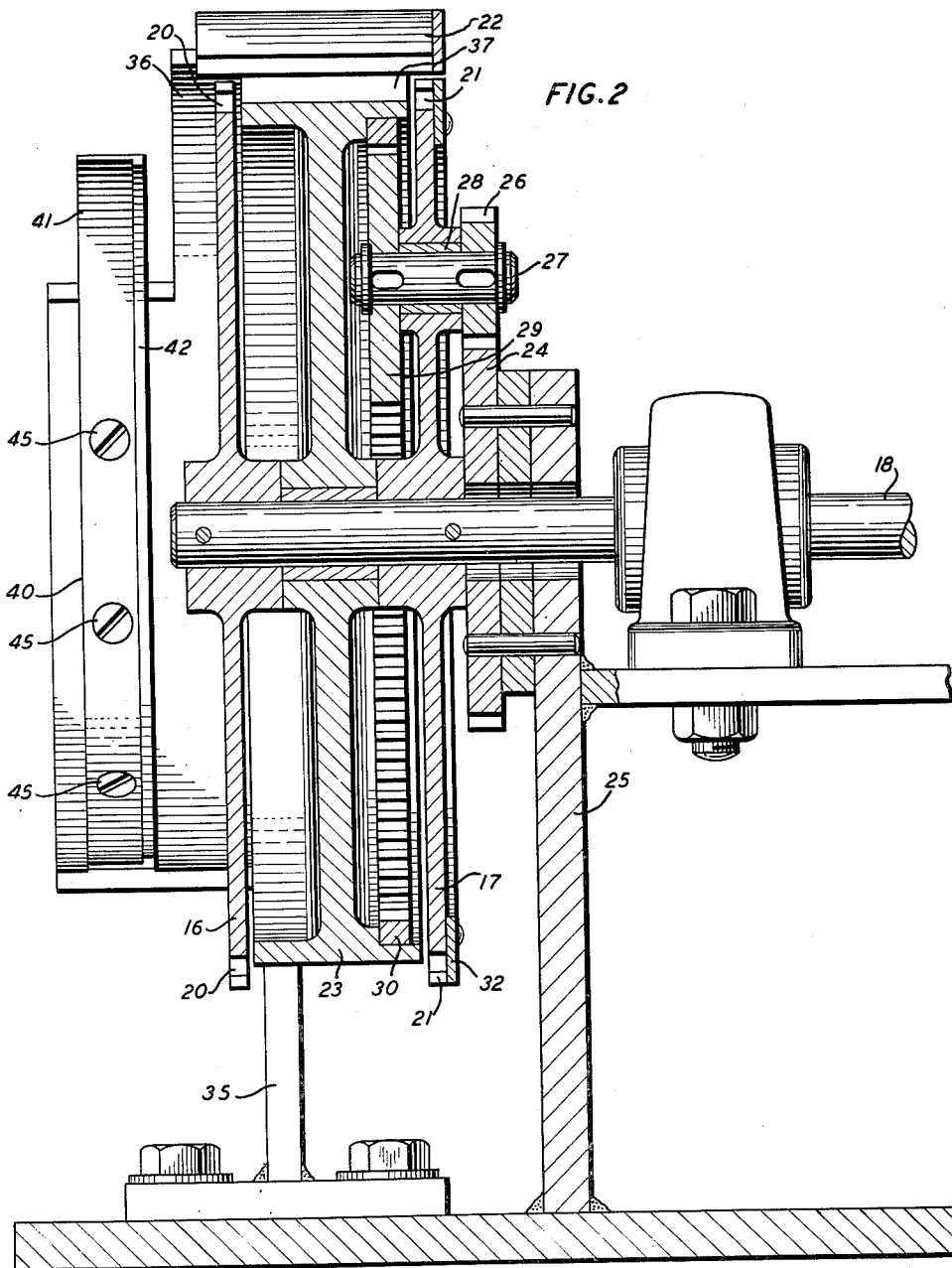
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3 Sheets-Sheet 2



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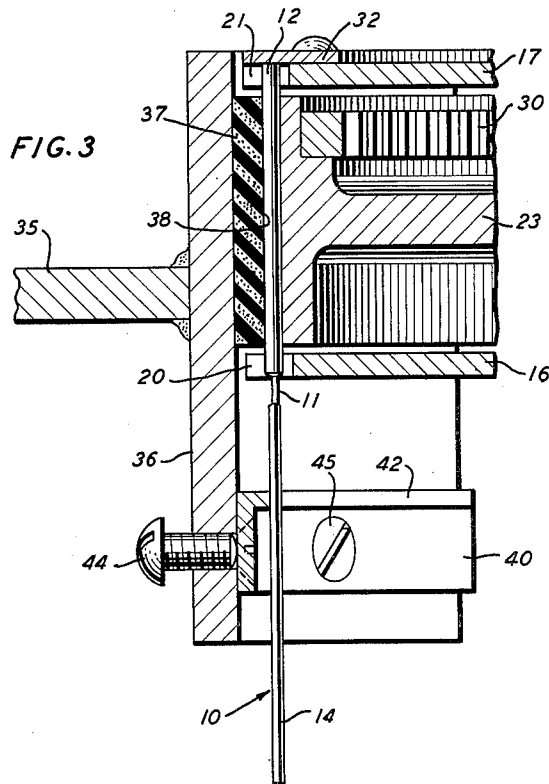
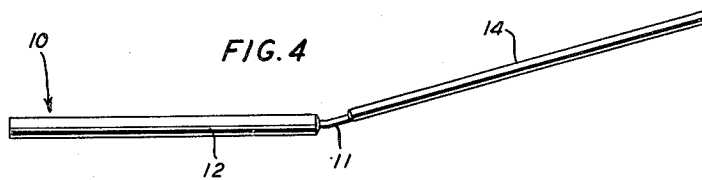
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ARTICLE STRAIGHTENING MACHINE

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2,622,654

ARTICLE STRAIGHTENING MACHINE

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Application November 13, 1950, Serial No. 195,345

4 Claims. (Cl. 153—32)

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This invention relates to apparatus for straightening bent cylindrical articles and more particularly to apparatus for straightening lead wire assemblies for vacuum tube stems.

In certain types of vacuum tube structures, lead assemblies are composed of short lengths of small diameter wires interposed between and butt-welded to longer lengths of wires of larger diameters. Frequently, these leads or wire assemblies become bent during handling, and the bends in the leads almost invariably occur in the wire of the smallest diameter. It is therefore necessary that these leads be straightened before they are assembled in the vacuum tube structure.

An object of the invention is to provide an apparatus which is simple in structure yet highly efficient in straightening bent cylindrical articles such as vacuum tube leads.

With this and other objects in view, the invention comprises an apparatus for straightening bent cylindrical articles including a means to cause rotation of a straight portion of a cylindrical article about its axis and an aligning member disposed at a given position relative to the axis of the straight portion of the article to be engaged by a bent portion thereof to bend it into axial alignment with the straight portion.

In the present embodiment of the invention, spaced wheels are provided with aligned notches to loosely receive the ends of the straight portion of the article and cause it to move in a given path relative to a fixed resilient element so that a drum interposed between the wheels and driven at a faster speed will cause the straight portion of the article to rotate about its axis. The intermediate and outer portions of the cylindrical article or lead extend free of the wheels and are caused to move in a somewhat conical path, depending upon the degree of bend in the intermediate portion. An arcuate aligning member is adjustably positioned relative to the wheels and drum so that the outer portion of the article will engage the member to effectively straighten the article moving the outer portions thereof into axial alignment with the straight portion carried by the wheels.

Other objects and advantages will be apparent from the following detailed description taken in conjunction with the accompanying drawings wherein:

Fig. 1 is a front elevational view of the apparatus;

Fig. 2 is a vertical sectional view of the apparatus;

Fig. 3 is a fragmentary sectional view taken along the line 3—3 of Fig. 1; and

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Fig. 4 is a plan view of one of the articles illustrating how they may be bent.

Referring now to the drawings, attention is first directed to Fig. 4, illustrating an article 10 which in the present embodiment of the invention is composed of a central wire member 11 of a small diameter interposed between longer wire members 12 and 14 of larger diameters. It is apparent that during handling of the articles of this type any tendency to bend the articles would result in the bend occurring at the weakest portion which obviously is in the central portion or wire 11.

The apparatus for straightening this cylindrical article or wire assembly includes spaced wheels 16 and 17 fixedly mounted on a drive shaft 18 and spaced a given distance apart, depending upon the length of the portion 12 of the article. The wheels 16 and 17 have aligned notches 20 and 21 disposed at spaced positions about their periphery to receive the articles 10 successively from a hopper 22. The shaft 18 is driven at a given speed in a counterclockwise direction (Fig. 1) to drive the wheels 16 and 17 in the same direction. A drum 23 is interposed between the wheels 16 and 17 and supported for rotation upon the shaft 18. Means is provided to drive the drum at a faster rate of speed than the wheels, this means including a gear 24 mounted upon a frame 25 and interengaging a pinion 26 supported by and fixed to the outer end of a shaft 27. The shaft is journaled in a bearing 28 formed in the wheel 17 and has a larger pinion 29 fixedly mounted on the inner end thereof. The pinion 29 interengages a ring gear 30 secured to the drum 23 and disposed concentric with the axis of the shaft 18. A locating ring 32 fixed to the wheel 17 serves as a stop for the articles 10 locating them within their respective notches 20 and 21.

A bracket 35 has an arcuate portion 36 partially conforming to the wheels 16 and 17 and the drum 23 to extend partially around these elements of the apparatus. A stationary element 37 fixed to the inner surface of the portion 36 is formed of a resilient material such as sponge rubber with its inner surface 38 partially conforming to but spaced from the periphery of the drum 23. An aligning member 40 is arcuate in general contour with the exception of its upper end 41 which is straight and may be described as the entrance end of the aligning member. The member 40 is L-shaped in cross section providing a smaller edge 42 to be engaged by the outer or bent portions of the articles during the straightening operation. The member 40 is adjustably supported by the arcuate portion 36 of the bracket

35 by sets of screws 44 and 45. The screws 45 extend through the member 40 and into threaded apertures in the portion 35, providing a positive connection between the member and the portion of the bracket 35 while the screws 44 are disposed in threaded apertures in the arcuate portion 36 and arranged to abut against the inner surface of the member 40 to hold the member either against the portion 36 or at a selected distance from the portion of the bracket to adjust the position of the arcuate edge 42 relative to the controlling or gripping surface of the drum and the stationary element 37. A tray 48 or any suitable receptacle may be positioned beneath the wheels 16 and 17 and the drum 23 to receive the straightened articles.

Considering now the operation of the apparatus, let it be assumed that the power means for driving the shaft 18 is energized and that the articles 10 are fed to the hopper 22 so that they will drop singly into the notches 20 and 21 of the wheels 16 and 17 as these notches are advanced beneath the arbor. The wheels 16 and 17, including their notches, serve as positive means for moving the cylindrical articles in a given circular path. The resilient or stationary element 37 forces the adjacent portion of each article into close engagement with the periphery of the drum 23 so that the articles will be caused to rotate about the axes of their straight portions 12. The drum therefore assures accurate positioning of the axes of the portions 12 of each article with respect to the straightening member 40.

While the wheels 16 and 17 are rotated at a given speed in a counterclockwise direction (Fig. 1), the pinion 25 travels around the gear 24 and is caused to rotate at a certain speed to rotate the shaft 27 and the larger pinion 29 at the same speed so that the ring gear 30 and the drum 23 are driven counterclockwise (Fig. 1) at twice the speed that the wheels 16 and 17 are travelling. This results in rotation of the articles as they move relative to the aligning element 40. Rotation of the straight portion 12 of each article about its axis will cause the other portions 11 and 14 to move in a conical path depending upon the degree of bend in each article, and for this reason, the portion 41 of the straightening member extends beyond the peripheries of the wheels so that regardless of the bend in each article, the portions 14 thereof will engage the member and be straightened thereby during rotation of the articles as they move by the straightening member. After the articles pass the straightening member and the end of the stationary element 37, they are released and allowed to drop into the tray 48.

It is to be understood that the above described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. An apparatus for straightening bent cylindrical articles comprising a stationary element having an article engaging surface, a movable element having an article engaging surface positioned a given distance from the surface of the stationary element depending upon the di-

ameters of given portions of the articles fed therebetween, means to feed like portions of cylindrical articles singly between the surfaces of the elements, means to move the movable element relative to the stationary element to cause the portions of the articles to rotation about their axis while they roll in a given path, and a member having a surface disposed in substantial alignment with the surface of one of the elements to be engaged by outwardly projecting portions of the articles to cause straightening of the articles as the gripped portions roll between the surfaces of the elements.

2. An apparatus for straightening bent cylindrical articles comprising spaced wheels having aligned notches to receive straight portions of cylindrical articles, a drum interposed between the wheels and having an outer surface to engage the straight portions of the articles, means to rotate the wheels simultaneously to move the articles in a given path, a stationary element to hold the straight portions of the articles against the surface of the drum, means to rotate the drum at a speed different than the speed of the wheels to cause rotation of the straight portions of the articles about their axes, and an aligning member disposed at a given position relative to the surface of the drum to be engaged by bent portions of the articles to bend them into axial alignment with the straight portions thereof.

3. An apparatus for straightening bent cylindrical articles comprising a member having an aligning surface disposed at a given position, means to move a straight portion of a cylindrical article in a given path parallel with and adjacent the aligning surface, and relatively movable elements to receive the straight portion of the article therebetween and cause rotation of that portion of the article about its axis whereby a bent portion of the article will engage the aligning surface and be bent thereby into alignment with the straight portion.

4. An apparatus for straightening bent cylindrical articles comprising a member having an aligning surface disposed at a given position, means to move a straight portion of a cylindrical article in a given path parallel with and adjacent to the aligning surface, a first element having a surface to be engaged by a straight portion of a cylindrical article and locate its axis in the path relative to the aligning member, and a resilient element to hold the straight portion of the article in close engagement with the first element to cause rotation of that portion of the article about its axis whereby a bent portion of the article will engage the aligning surface and be bent thereby into alignment with the straight portion.

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