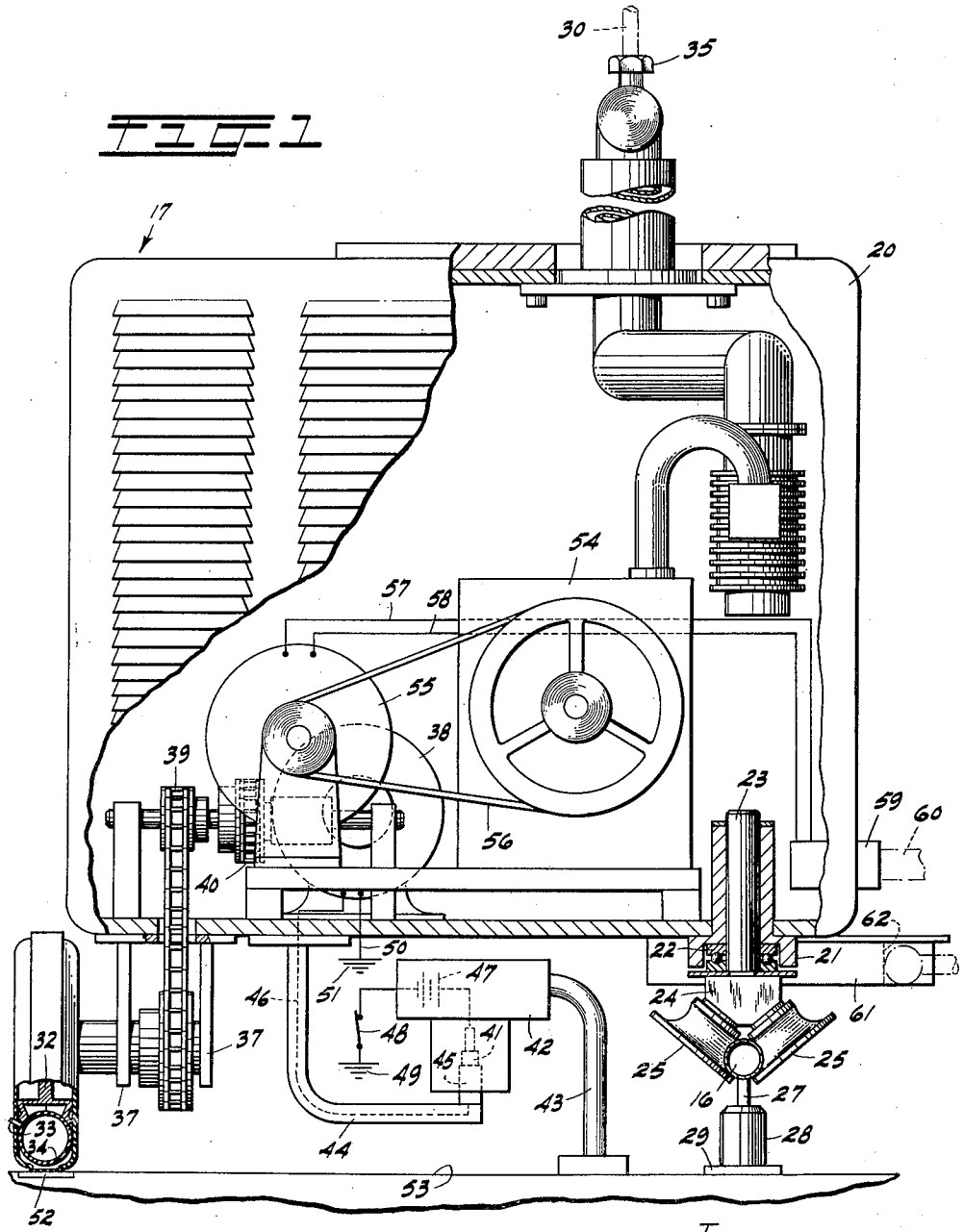
April 10, 1962 G. B. FLIEZAR ET AL 3,028,887

DOLLY FOR WAVE TUBE EXHAUST MACHINE

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FIG. 1



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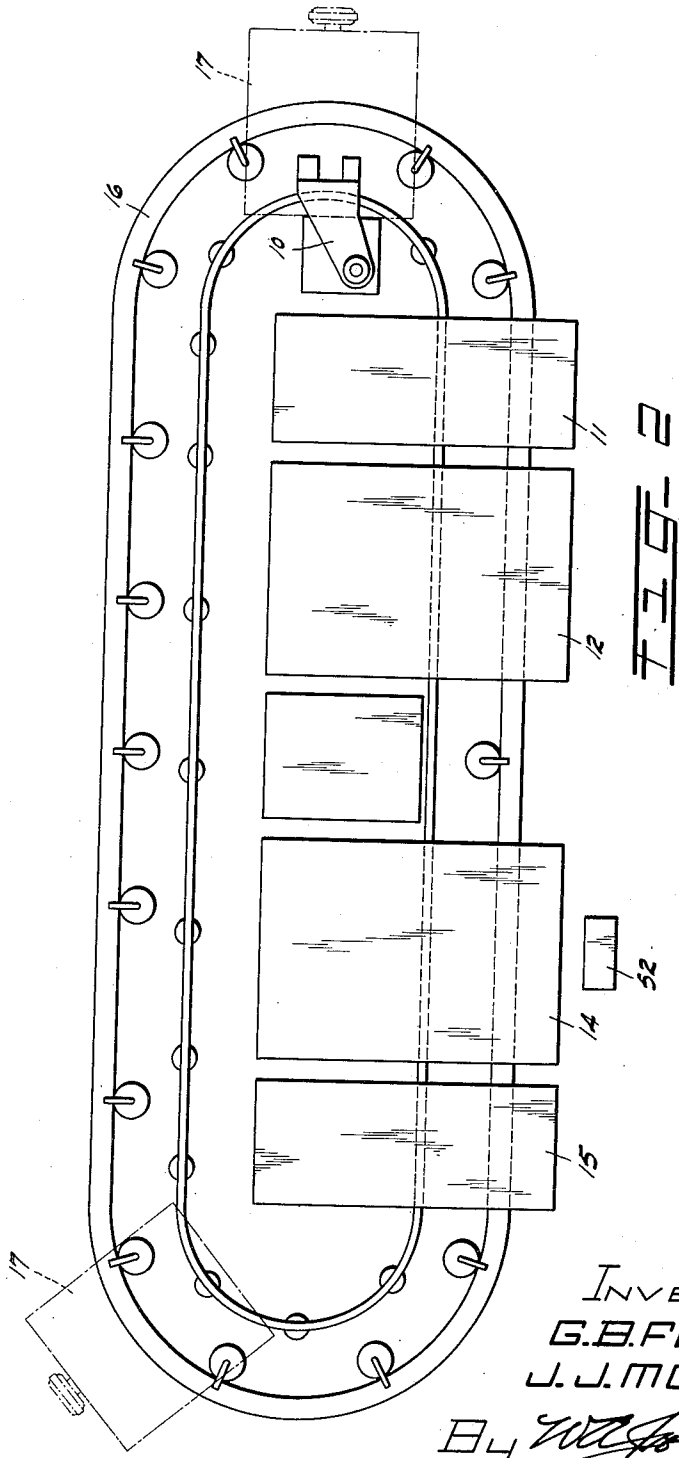


FIG. 2

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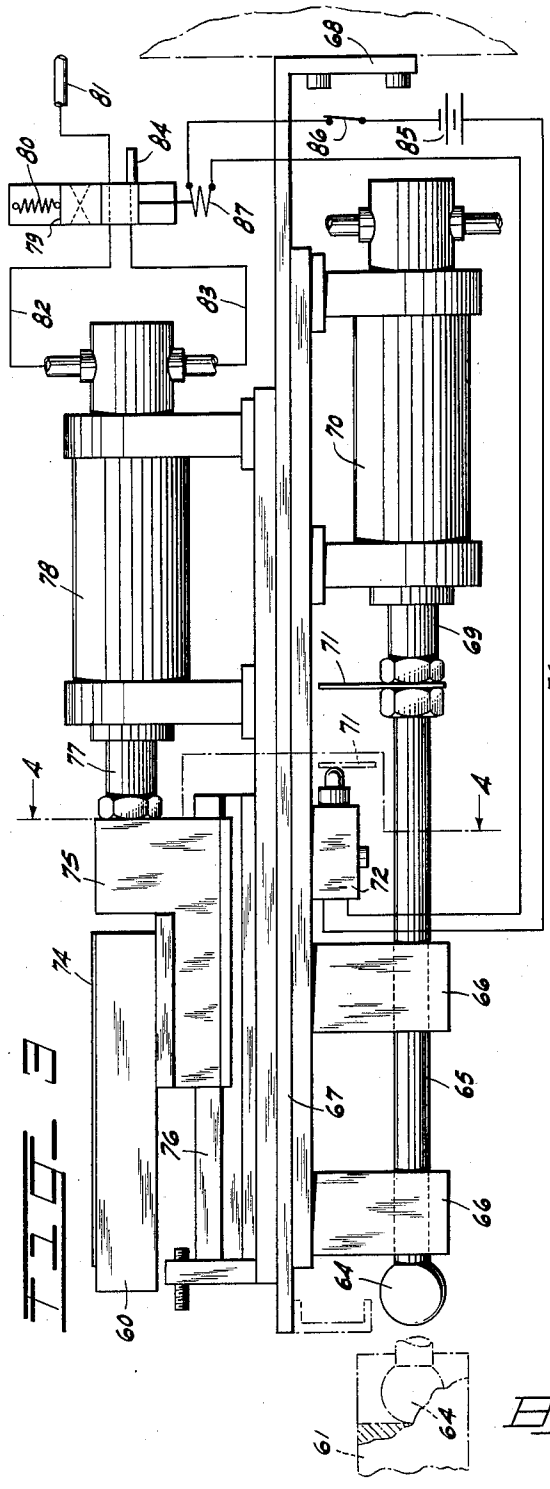


FIG. 3

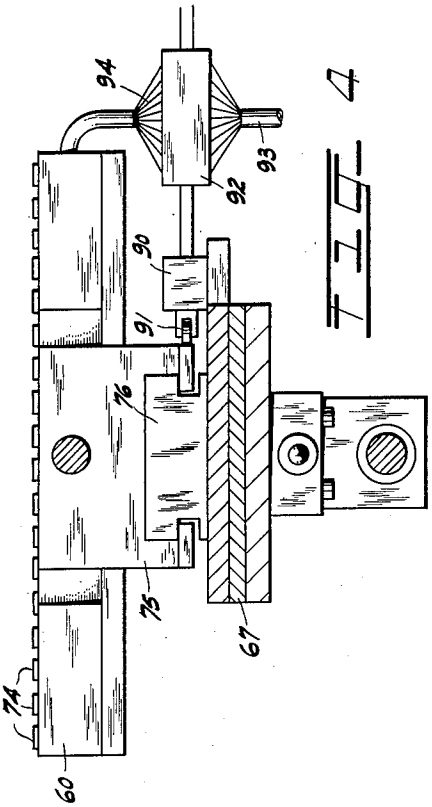


FIG. 4

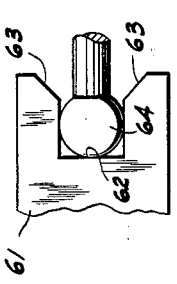


FIG. 5

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DOLLY FOR WAVE TUBE EXHAUST MACHINE

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7 Claims. (Cl. 141—65)

This invention relates to article treating apparatus particularly apparatus wherein articles are transferred successively to treating units.

In the present instance, the articles to be treated are traveling wave tubes which are elongated structures partially completed but requiring certain finishing operations performed at spaced treating stations. The treating stations are at fixed positions requiring successive presentation of the articles with their longitudinal center lines in perfect vertical positions to be received and acted upon by the treating means of the different treating units.

The object of the present invention is a highly efficient and practical article treating apparatus.

According to the object, the invention comprises an article treating apparatus having a track which is substantially circular in cross section on which grooved rollers of a dolly ride for movement of the dolly longitudinally of the track and for adjustable rocking movement of the dolly on the track. A holder, for an article to be treated, is mounted on the dolly with its center line positioned to be coincident with the longitudinal center line of the article, and a pneumatic tired wheel assisting the grooved rollers in supporting the dolly and containing air at variable pressure to rockably adjust the dolly on the track to assure location of the longitudinal center line of the article in a vertical position.

Other features of the apparatus include means at each treating unit to locate the dolly relative thereto and to hold it against displacement. Another feature includes a contact element for each treating unit responsive to the action of the locating and locking means to interengage a contact member of the dolly to condition circuits for energization of treating means at the treating stations.

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

FIG. 1 is a vertical sectional view of a portion of the apparatus showing the general structure of one of the dollies;

FIG. 2 is a schematic top plan view of the apparatus;

FIG. 3 is a side elevational view of one of the locating and locking means together with the contact element moving means;

FIG. 4 is a fragmentary vertical sectional view taken along the line 4—4 of FIG. 3; and

FIG. 5 is a fragmentary detailed view of portions of the locating and locking means.

The article treating apparatus, shown schematically in FIG. 2, includes an article loading unit 10 and article treating units 11, 12, 14, and 15 disposed at fixed positions. A track 16 is mounted with respect to the units 10, 11, 12, 14, and 15 to guide dollies 17 in a predetermined path relative thereto.

The dollies are identical in structure and a description of the dolly shown in FIG. 1 will apply to all. The dolly 17 has a housing 20 with a pair of spaced bushings 21 (only one being shown) in the lower portion thereof to receive bearings 22 and spindles 23. The spindles 23 are fixed at their lower ends to heads 24 which support diagonally positioned spindles, not shown, for grooved wheels or rollers 25. The wheels 25 ride upon the track 16 which is substantially circular in cross section and is supported at spaced positions by threaded shanks 27 adjustable vertically in threaded bases 28 mounted at 29. This adjustable feature of the track is to permit initial setting of the track to assure positioning of articles 30 to be treated at preferred elevations with respect to their treating units. The contours of the wheels 25 and also the track 16 permit rocking movement of the dolly 17 on the track about the longitudinal center line of the track to bring about true vertical positioning of the center lines of the articles 30.

This rocking adjustment of the dolly about the track 16 is brought about through a pneumatic tired wheel 32 having a valve 33 for causing variation of the pressure of air in the tire 34 of the wheel until the center line of the holder 35 for the article 30 is in a vertical position. The wheel 32 rotatably supported at 37 is driven by a motor 38 through the intermediate drive means 39 and 40 to propel the dolly along the track to advance the articles 30 from the loading station 10 to the successive treating stations and back to the loading station.

The motor 38 receives its electrical energy from a conductive bar 41 partially housed in a unit 42 extending parallel with the track and supported at intervals by brackets 43. A hollow arm 44 carried by the dolly and mounted adjacent the motor 38 supports a brush 45 for forming electrical contact between the motor through line 46 and the bar 41. Schematically the electrical circuit is completed through a source of electrical energy such as a battery 47, a control switch 48 to ground 49. The other line 50 from the motor 38 extends to ground 51. This is one illustration for controlling the energization of the motor 38 to drive the dolly on the track 16. Suitable plates 52 are mounted in the floor 53 at the various units with their upper surfaces lying in a given plane to assure effective positioning of the articles 30 at the units.

In the present instance, the articles are of the tubular type requiring evacuation prior to sealing and, for this reason, there are two like holders 35 disposed at known spaced positions and connected jointly to an exhaust unit 54 mounted in the housing 20 of the dolly. In the present instance, the holders 35 are in general alignment with each other and only one is shown in FIG. 1.

The exhaust unit 54 is driven by a motor 55 through connecting drive means 56. In the present illustration, the motor 55 is disposed in a circuit with lines 57 and 58 extending to the motor from a contact member 59. The contact member 59 is to receive any one of a plurality of contact elements 60 mounted at the treating stations to complete at some or all of the stations, the circuit to the motor 55 and to complete other circuits for these treating stations. A projection 61, mounted on the dolly, has a recess 62 of the contour shown in FIG. 5 with outwardly extending entrance surfaces 63 to guide a spherical member 64 into the recess 62.

The spherical member 64 is a part of the locating and holding means for the dolly at each processing unit to assure accurate positioning of the articles carried by the dolly with respect to the treating portions of the units. The spherical member 64 is mounted on the end of a rod 65 which is movable in a fixed path through apertures of guides 66 mounted on the undersurface of a bracket 67 which is mounted fixedly at 68. The rod 65 is fixed to a piston rod 69 of an air cylinder 70 which is also supported by the bracket 67.

Suitable means, not shown, is selectively operable to control the air cylinder 70 such as through a valve normally active to hold the rod 65 to the left, FIG. 3, and selectively actuable to force the rod under pressure to the right when the dolly is approximately in the position adjacent the unit to force the spherical member 64 toward the recess 62 and cause it to adjust the position of the dolly on the track by engagement with one of the

surfaces 63 and to lock the dolly against movement in the given position when entering the recess 62.

An actuator 71, mounted on the rod 65, is positioned to engage a normally open switch 72 and close it when the spherical member 64 enters the recess 62. In the present illustration, the switch 72, when closed, causes movement of the contact element 60 into the engagement with the contact member 59 of the dolly. The contact element 60, with all of its contact bars 74, is mounted on a slide 75 supported for movement in a given path on a guide 76. The slide 75 is fixed to a piston rod 77 of an air cylinder 78 which is supported with the guide 76 on the bracket 67. A solenoid valve, shown schematically at 79 held in the normal position shown by a spring 80, connects a supply line 81 with air under a predetermined pressure to line 82 to hold the slide 75 with the element 60 in the normal position shown while, at the same time, connecting line 83 to an exhaust line 84. When switch 72 is closed by actuator 71, a circuit, including a source of electrical energy such as a battery 85 and a normally closed switch 86, will energize a winding 87 of the solenoid valve 79 to move the valve to connect line 83 with the supply line 81 and line 82 with the exhaust 84, to move the slide 75, to move the element 60 into engagement with the contact member 59.

A switch 90, mounted on the bracket 67 and normally open, has its roller actuator 91 positioned to be actuated closed by the slide 75 when moving the contact element into engagement with the contact member, to complete an activating circuit for a control unit 92, which includes time control switching means, to set in motion the operating means rendered effective electrically through lines 93, completed through the unit 92 from lines 94, completed through the interengagement of the contact element with the contact member.

Operation

With the present apparatus, the articles are supported by and transported to the different loading and processing or treating stations by successive dollies 17 movable on the track 16 and individually adjustable relative to the track to assure vertical positioning of the articles. The dollies are driven through their individual power means driving the single pneumatic tired wheel for each dolly and containing their individual exhaust units cooperating with the treating units in finishing the articles. In actual practice, the power means for driving the dollies are deenergized automatically as they enter the different stations or reach the different units.

At this time, each dolly is located adjacent the position desired at which time the air cylinders 70 are operated to force the spherical members 64 toward their recesses 62 to position the dollies on the track, to align the articles with the features of the treating units and to lock the dollies against movement until these treating operations, in each instance, are completed. Furthermore, the treating units are inactive by themselves. They depend upon the presence of a dolly with the articles to be treated and the locating and locking of the dolly before the circuits at the different treating units can be completed through the automatic actuation of the moving means for the contact elements and the controlling of the switches to condition the circuits for operation through the timing unit 92 in each instance.

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 article treating apparatus having a plurality of spaced units and comprising a track having a cross sectional arcuate upper surface, a dolly, said track guiding the dolly to said units successively, grooved wheels carried by the dolly to support the dolly for movement longitudinally of the track and for adjustable rocking movement on the track, a holder mounted on the dolly to receive and support an article to be treated having a longitudinal centerline coincident with a centerline of the holder, means to support the track relative to the spaced units, a main wheel spaced from and assisting the grooved wheels in supporting the dolly, a pneumatic tire mounted on the main wheel and inflatable through a valve of the tire with different pressures to rock the dolly on the track to locate the centerline of the holder and article in a predetermined vertical position relative to the units when moved into registration therewith, a socket of a given size with outwardly tapered entrance surfaces disposed at a given position adjacent one side of the dolly, a plunger supported for movement adjacent one of the units, and means operable to move the plunger between a normal position away from the track and a locating position toward the track to force the plunger into the socket to locate the dolly on the track to locate the centerlines of the holder and article at a given position relative to the unit.

2. An article treating apparatus according to claim 1 in which a contact member is mounted at a fixed position on the dolly relative to the socket, and a contact element aligned with the contact member and movable into engagement therewith when the plunger is in the socket.

3. An article treating apparatus according to claim 2 in which means is responsive to movement of the plunger into the socket to move the contact element from a normal position into engagement with the contact member.

4. An article treating apparatus according to claim 3 in which the last named means is responsive to movement of the plunger out of the socket to disengage the contact element from the contact member and move the contact element to its normal position.

5. An article treating apparatus according to claim 3 in which a timing unit controls a plurality of circuits completed by the engagement of the contact element with the contact member, and a switch closed by movement of the contact element in engagement with the contact member to render the timing unit effective.

6. An article treating apparatus according to claim 1 in which supporting plates for the main wheel are mounted in a given plane adjacent each apparatus unit to assure accurate positioning of the article relative to said units.

7. An article treating apparatus according to claim 2 in which the article is of a tubular structure, an operable exhaust unit supported by the dolly and connected to the holder to exhaust the article, and a motor energizable by the engagement of the contact element with the contact member to drive the exhaust unit.

References Cited in the file of this patent

UNITED STATES PATENTS

1,445,612	Dobbins	Feb. 13, 1923
1,816,543	Michelin	July 28, 1931
1,922,738	Kelley	Aug. 15, 1933
2,324,559	Cooke	July 20, 1943
2,532,315	Johnson et al.	Dec. 5, 1950
2,656,964	Detrez	Oct. 27, 1953
2,733,931	Reid et al.	Feb. 7, 1956
2,761,601	Van Vooren	Sept. 4, 1956
2,886,165	Eger	May 12, 1959