May 21, 1957 E. F. WALTS 2,792,855

FLUID TREATING APPARATUS

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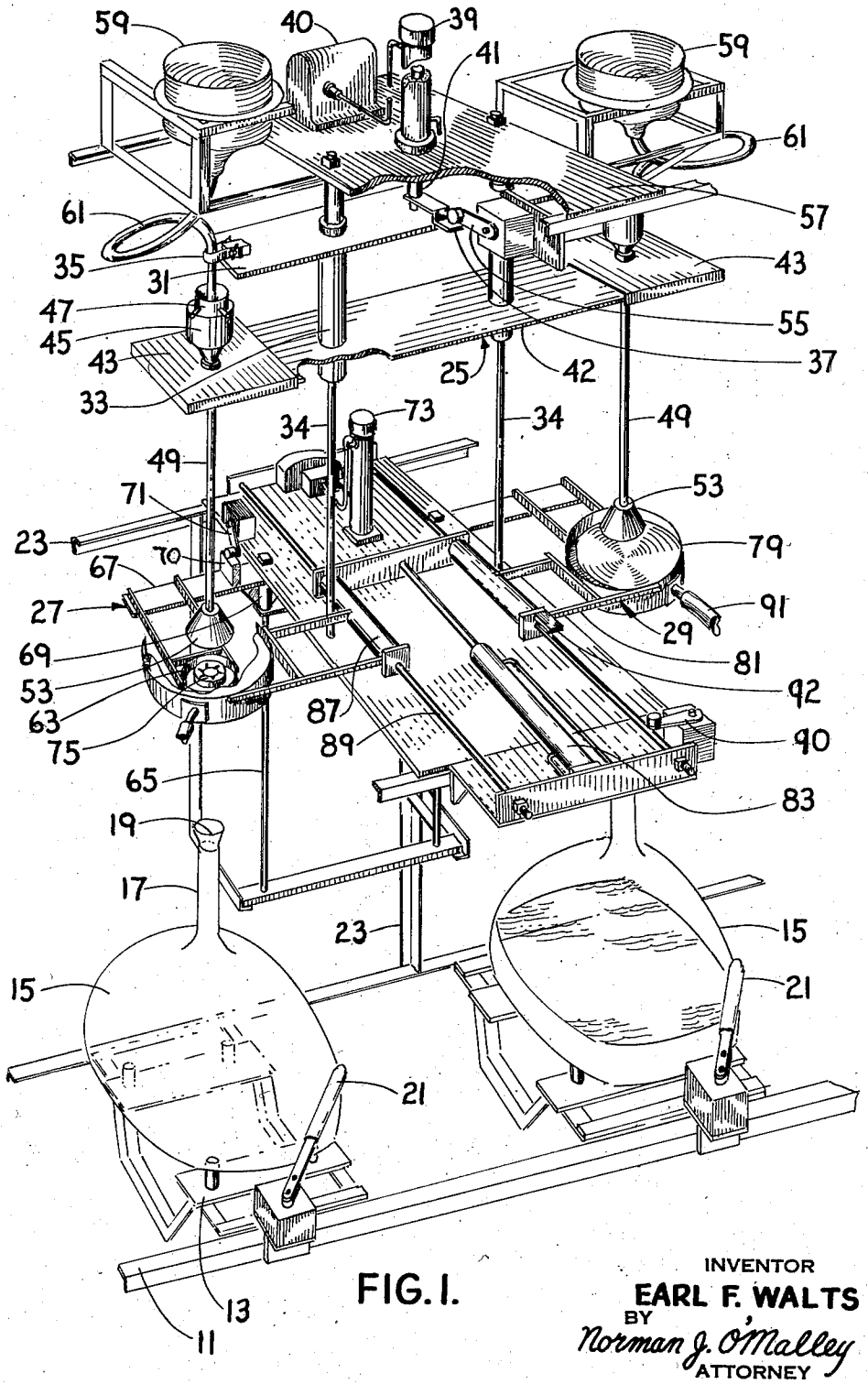


FIG. 1.

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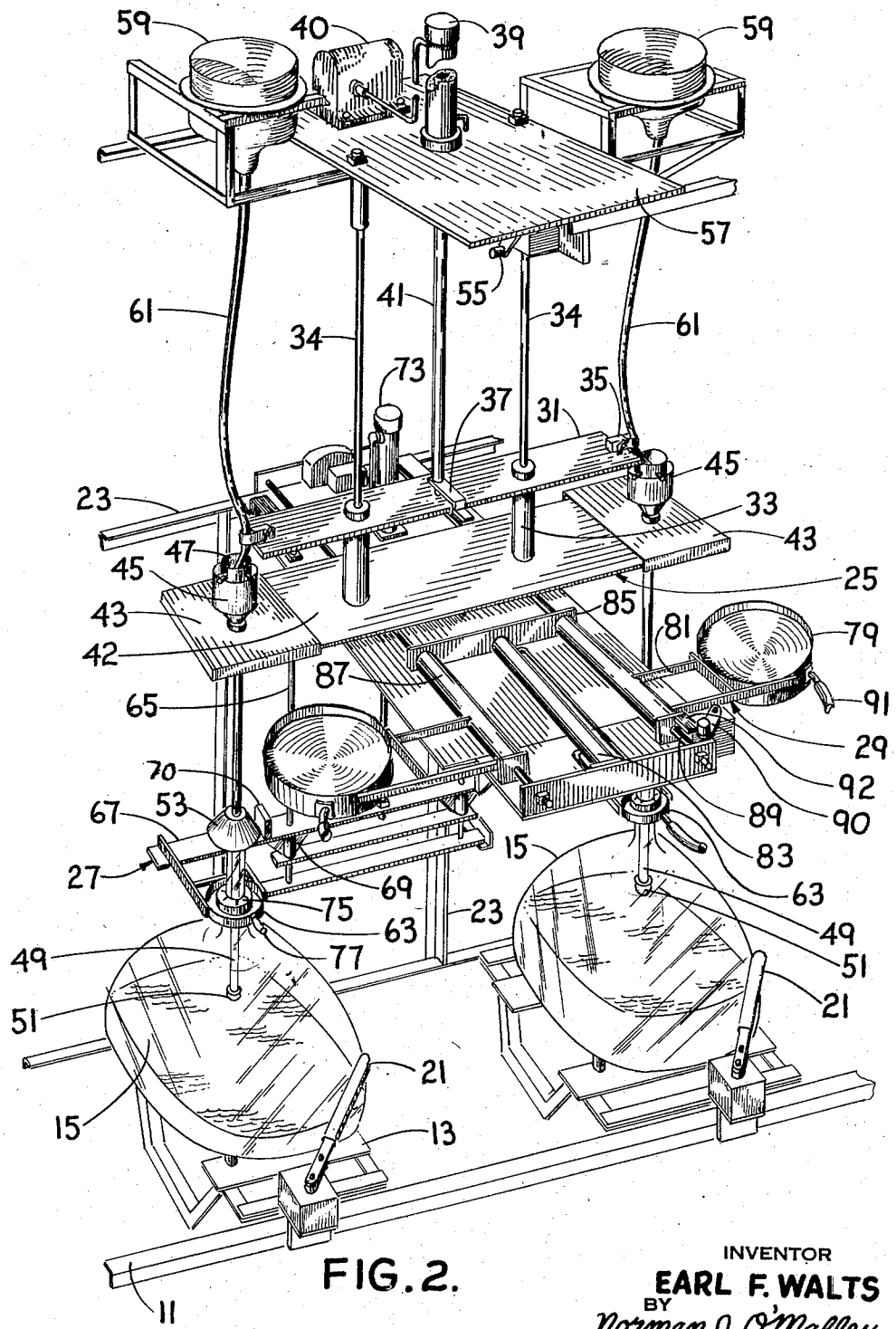


FIG. 2.

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FLUID TREATING APPARATUS

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3 Claims. (Cl. 141—87)

This invention relates to an apparatus for internally treating an envelope and more particularly to an apparatus for dispensing phosphor materials into the envelope of a television picture tube.

Phosphor screens for picture tubes are generally formed by dispensing a solution of screen forming phosphors into a picture tube envelope containing a cushioning fluid. The phosphor then settles through the fluid and onto the inner face plate of the envelope. The complete dispensing operation requires at least two work stations and two operators.

Thus, the inverted picture tube envelopes approach a first dispensing operator's station on a continuously moving screen settling belt, the operator manually inserts a dispensing funnel through the neck of the envelope and starts gravity flow of a predetermined amount of a first solution into the envelope. After completion of the first dispensing operation, the dispensing funnel is then manually removed while the envelope progresses to a second dispensing operator, who, in the same manner as the first operator, dispenses into the envelope a predetermined amount of a second solution containing phosphor material. This phosphor settles on the envelope face plate to form the phosphor screen.

Although screens formed by this manual process are satisfactory, many envelope and screen rejects result from operator caused screen contamination and broken envelope necks. When the gravity flow of the dispensing solution is slow, broken envelope necks are an increasing production problem since the operator must keep the dispensing funnel inserted in the continuously moving envelope until all of the solution has been dispensed, and a hurried withdrawal of the funnel chips the envelope necks. In addition, hurried action by the operator often causes some of the dispensing fluid to splash onto the envelope exterior. Since the solution contains a silicate, the glass envelope is marked and a considerable amount of work is involved in removing this mark.

It is therefore an object of the invention to reduce the aforementioned difficulties, and to provide an automatic machine for fluid treating an envelope.

Another object is to provide an automatic machine for dispensing screen phosphor solutions into the envelope of a picture tube.

A further object is the provision of an automatic machine for fluid treating an envelope which will operate only when all conditions of envelope position and machine component movements are in accordance with operative requirements.

A still further object is the provision of a dispensing machine which has means assuring proper dispensing conduit insertion and removal from the envelope so that the number of chipped envelope neck rejects are substantially reduced.

A still further object is the provision of a dispensing machine having means for protecting the envelope exterior from dispensing fluid drippings.

A still further object is the provision of a single automatic machine for dispensing phosphor screen materials into an envelope which replaces a manual operation using two operators.

The aforementioned objects, in addition to other objects which will be apparent after reading the following description, are achieved in one aspect of the invention by providing a two-position picture tube phosphor solution dispensing machine having a conduit which reciprocates between a rest position and dispensing position, means for aligning the conduit with the envelope, means for protecting the envelope surfaces from excess fluid overflow and drippings, and means for automatically actuating the machine component movements in accordance with predetermined envelope positions and a timed cyclic operative sequence.

For a better understanding of the invention, together with other and further objects, advantages, and capabilities thereof, reference is made to the following description and appended claims in connection with the accompanying drawings in which:

Figure 1 is a partially sectioned perspective view of one embodiment of the invention at rest position. The conveyor carried envelopes are shown at the instant they have reached their work stations; and

Figure 2 is a partially sectioned perspective view of the embodiment shown in Figure 1 in work position.

Referring to the drawings, a conveyor **11** having carriers **13** moves the picture tube envelopes **15** in a direction from left to right through the machine work stations. The envelopes **15** have a conventional neck portion **17** with a neck opening **19** therein through which phosphor solution will be dispensed. Limit switches or sensing mechanisms **21** are mounted on conveyor **11** so that they cooperate with the envelopes **15** to start the machine operation when the envelopes have reached their work stations beneath the machine proper.

The machine is supported by a frame **23**, which is not shown in detail for reasons of simplification. The major operating mechanisms of the machine consist of a dispensing and aligning assembly **25**, a neck pan assembly **27**, and a drip pan assembly **29**. For clarity these assemblies will be described separately and in detail.

Dispensing and aligning assembly

The dispensing and aligning assembly comprises a trolley **31** supporting sleeves **33**, clamps **35**, and a switch block **37**. Trolley **31** is guided through a periodic reciprocating motion from an up position shown in Figure 1 to a down or work position shown in Figure 2 by virtue of the slidable cooperation of sleeves **33** with guide rods **34**. This reciprocating motion is provided by a double acting air pressure actuated cylinder **39** which is supplied by a pressure system through valve **40**. The piston rod **41** of cylinder **39** is connected to trolley **31**. The lower ends of sleeves **33** are attached to a bracket **42**, which reciprocates with the trolley. A movable plate **43** is flexibly mounted upon each end of the bracket, and supported on the plates are dispensing funnels **45** having contamination screens **47** positioned therein. Plates **43** have a limited movement in all directions with relation to bracket **42**, which may be attained by any conventional means such as by the provision of ball bearings intermediate the plate and bracket surfaces in conjunction with a spring which will maintain the plate at a central position when no external force is applied to the plate. Dispensing tubes or conduits **49** are integral with cup-shaped funnels **45** and are thereby mounted for vertical reciprocation in addition to being capable of lateral movement. Raised portions **51** on the lower extremities of conduits **49** serve as a limit block for the movement of slidably mounted inverted cup-shaped centering or aligning devices **53**.

A switch 55 is attached to the underside of bracket 57 vertically in line with switch block 37 so that when trolley 31 is in an up or rest position, switch 55 is tripped by the block. Also attached to bracket 57 by means of supports are dispensing fluid bowls 59, which are fed from a tank (not shown) during each period when trolley 31 is down. Flexible hoses 61 convey the dispensing fluid from bowls 59 into funnels 45 and then to conduits 49.

Neck pan assembly

Neck pans 63 are mounted for vertical reciprocating motion along rods 65 by means of bracket 67 and guides 69. The neck pans serve as a shield for the envelope by catching drippings from conduits 49 as the conduits are approaching and leaving the envelope necks 17. This is necessary since the silicate composition used in the dispensing solution will mark the bulb exterior. Mounted upon bracket 67 is a neck pan switch block 70 which cooperates with neck pan switch arm 71 when the bracket is in an up position. The reciprocating motion is provided by an air pressure system supplying double acting pressure actuated cylinder 73. Referring to the rest and work positions shown by Figures 1 and 2 respectively, the vertical travel distance of the neck pan 63 is from a position above the envelope tube necks 17 to a down position over the tube necks. The neck pans 63 have split resilient membranes 75 with central apertures. As neck pans 63 move down, the envelope necks slip through the apertures and resilient membranes 75 form themselves around envelope necks 17. The neck pans also have overflow tubes 77 which take off any excess fluid material.

Drip pan assembly

Drip pans 79 are mounted upon brackets 81 for horizontal reciprocating movement. The drip pans move into the vertical path of conduits 49 when they are in an up position and horizontally forward and clear of the conduit when the neck pans begin to lower. The reciprocating movement is provided by double acting pressure cylinder 83, which operates on brace 85 to move the brace attached tubes 87 along cooperating rods 89. Switch 90 is mounted for contacting block 92 to electrically sense the drip pan positions when it is clear of the vertically reciprocating mechanisms. Tube drip pans 79 have overflow outlet tubes 91 to remove excess liquids since they serve as shields for envelopes 15 so that fluid drippings from conduits 49 do not drop on the envelopes while the machine is at its rest position and while envelopes 15 are moving into their work stations on conveyor 11.

Referring to Figure 1, envelopes 15 move along conveyor 11 from left to right, and as they approach their work stations beneath the machine, the envelope exterior walls contact sensing mechanisms 21 which in turn stop the conveyor and start the machine in operation by energization of cylinder 83. Drip pans 79 which were positioned under the raised conduits 49 while the envelopes were coming into work position, are moved by piston 83 horizontally forward and clear of the path of conduits 49. At the end of the drip pan travel, switch block 92 operates switch arm 90 which in turn actuates air pressure cylinder 73. This cylinder forces neck pans 63 down so that drip pan membranes 75 surround the necks of envelopes 15. As the neck pan assembly leaves the up position, switch arm 71 operates to energize air pressure cylinder 39. This cylinder acts on rod 41 and trolley 31 to lower conduits 49 into the envelopes and during the downward motion of the conduits, aligning devices 53 are held in position at the ends of the conduits by means of raised portions 51. The internal surfaces of conical aligning devices 53 contact the edges of envelope necks 17, thereby forcing the cones and attached conduits 49 to become axially aligned with neck openings 19 by means of its mounting on movable plates 43.

As trolley 31 begins to descend, switch 55 is actuated, thereby starting the flow of the dispensing fluid from bowls 59 into envelopes 15 through conduits 49. The machine components at this time are in the position shown in Figure 2.

After a predetermined amount of fluid has been dispensed, a production line timing mechanism (not shown) causes air pressure cylinder 39 to move trolley carried conduits 49 to proceed to an up or rest position. As soon as block 37 contacts switch 55, cylinder 73 causes neck pans 63 to move vertically up to the rest positions where neck pan switch block 69 contacts switch 70. This switch causes cylinder 83 to force drip pans 79 horizontally backward until they assume a position between the upwardly disposed conduits 49 and envelopes 15. After this sequence of movements has been completed, the machine components are back again in the position shown in Figure 1 and the conveyor is ready to move the envelopes into the next position.

A machine made in accordance with the invention provides completely automatic operation replacing manual dispensing equipment. In addition, the number of picture tube rejects from coating contamination and broken envelope necks is considerably reduced.

While there has been shown and described what at present is considered the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the scope of the invention as defined by the appended claims.

What is claimed:

1. An apparatus for internally treating an envelope having an open neck portion with a composition comprising means for sensing the treating position of the envelope, a fluid conduit mounted for reciprocating motion between a rest position and a work position whereby said conduit extends into the envelope, means for imparting the reciprocating motion to said conduit, means for shielding the envelope exterior from composition contamination, and means for aligning said conduit with the envelope opening comprising a conduit carried centering device and a conduit support plate mounted for free movement in all directions.

2. An apparatus for internally treating an envelope having an open neck portion with a composition comprising means for sensing the treating position of the envelope, a fluid conduit mounted for reciprocating motion between a rest position and a work position whereby said conduit extends into the envelope, means for imparting the reciprocating motion to said conduit, means for shielding the envelope exterior from composition contamination while said conduit is in rest position, means for shielding the envelope exterior from composition contamination while said conduit is reciprocating, and means for aligning said conduit with the envelope opening comprising a movable conduit support plate and a conduit carried centering device.

3. An apparatus for internally treating an envelope having an open neck portion with a composition comprising means for sensing the treating position of the envelope, a fluid conduit mounted for vertical reciprocating motion between a rest position and a work position whereby said conduit extends into the envelope, means for imparting the reciprocating motion to said conduit, horizontally reciprocating containers for shielding the envelope exterior from composition contamination while said conduit is in rest position, vertically reciprocating pans for shielding the envelope exterior from composition contamination while said conduit is reciprocating, and means for aligning said conduit with the envelope opening comprising a movable conduit support plate and a conduit carried centering device.

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