Feb. 4, 1958 W. M. TERRY, JR 2,822,527

SLIDING GUIDE ASSEMBLY HAVING A MOVABLE SEGMENT

Filed Sept. 17, 1954

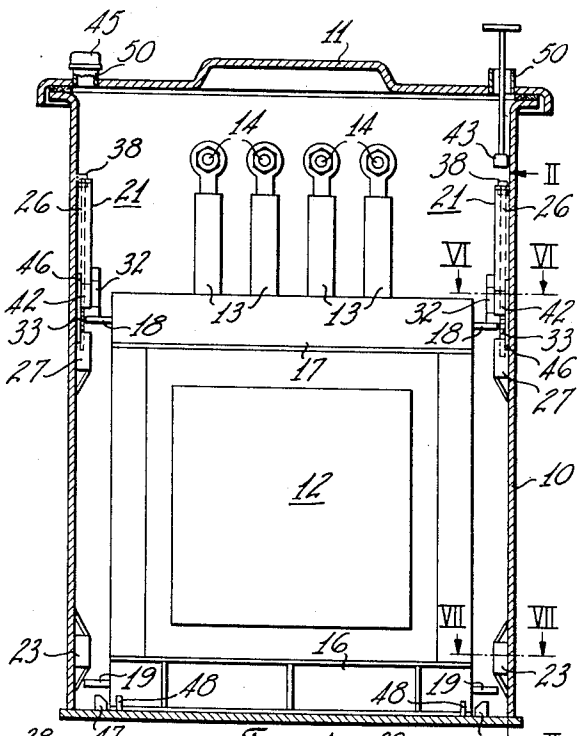


Fig. 1

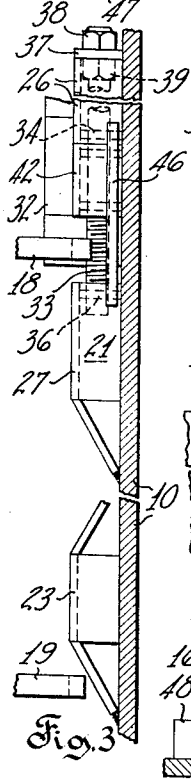


Fig. 3

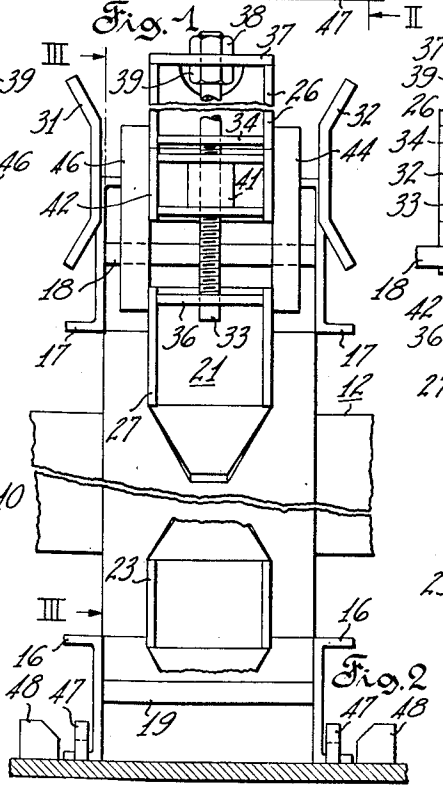


Fig. 2

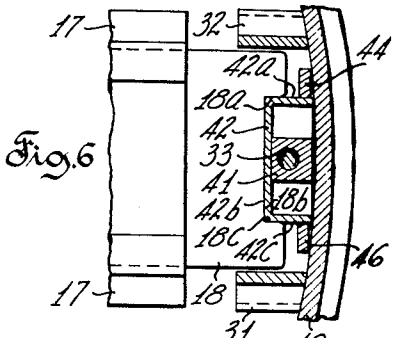


Fig. 6

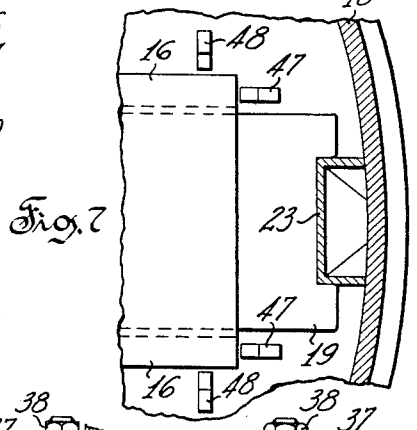


Fig. 7

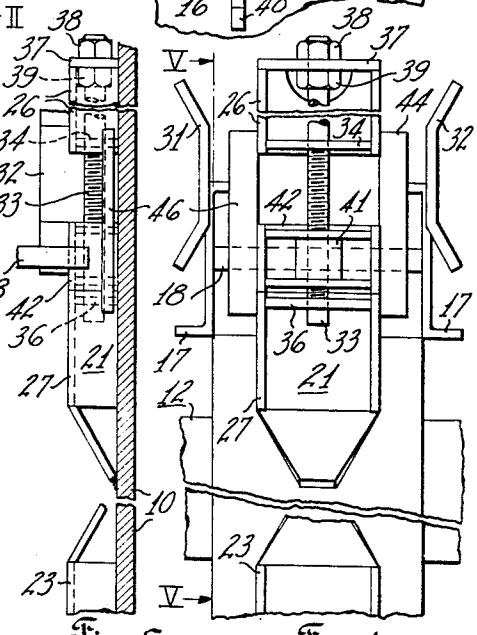


Fig. 5

Fig. 4

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2,822,527

Patented Feb. 4, 1958

2,822,527

SLIDING GUIDE ASSEMBLY HAVING A MOVABLE SEGMENT

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Application September 17, 1954, Serial No. 456,660

4 Claims. (Cl. 336—92)

This invention relates to induction devices having sliding guide assemblies and particularly to means for preventing vibrations of such induction devices inside a container from reaching the walls of the container through the sliding guide assembly. An application of the invention is, for example, in a tanked transformer for preventing the vibrations of the transformer from reaching the tank wall by transmission through the sliding guide assembly attached to the tank wall.

In conventional transformer construction the guide rails of a sliding guide assembly are continuous. This presents a disadvantage because of the difficulty of disengaging the transformer guide members from the continuous guide rail so that vibrations of the transformer will not be transmitted through the guide members to the tank wall.

Further, in shipping a transformer it is desirable to have the guide members, affixed to the transformer and useful for tanking and untanking the transformer, engage the tank guide rail to keep the transformer from shifting with respect to the tank. Yet, when the transformer is ready for operation it is desirable to disengage those members. For when the guide members are disengaged from the guide rail, vibrations of the transformer will not be transmitted through the guide members to the guide rail and from the guide rail to the tank wall. If these vibrations were transmitted to the tank wall, that wall would vibrate and thus increase the noise level.

It is an object of this invention to provide an induction device with an improved sliding guide assembly having means therein whereby engagement or disengagement of that induction device from a guide rail is easily and speedily accomplished.

A further object of this invention is to utilize guide means to firmly position an induction device with respect to the containing tank to prevent shifting of that device with respect to the tank.

Another object of this invention is to reduce the noise level of an induction device due to vibrations of that device by isolating the containing tank wall from that device through means provided by an improved sliding guide assembly.

Objects and advantages other than those set forth above will be apparent in the following description when read in connection with the accompanying drawing in which:

Fig. 1 is a view in elevation of a transformer with its tank broken away to show an embodiment of this invention;

Fig. 2 is an enlarged sectional view taken on the line II—II of Fig. 1 showing the guide member in an unengaged position with the guide rail;

Fig. 3 is a sectional view taken on line III—III of the guide assembly shown by Fig. 2;

Fig. 4 is a view showing the guide member of Fig. 2 in an engaged position with the guide rail;

Fig. 5 is a sectional view taken on line V—V of the parts of Fig. 4;

Fig. 6 is an enlarged sectional view taken on line VI—VI of the parts of Fig. 1; and

Fig. 7 is an enlarged sectional view taken on line VII—VII of the parts of Fig. 1.

Shown in Fig. 1 is a tank 10 having a cover 11 attached to the flanged upper edge of the tank. Inside the tank is an apparatus which may be any well known induction device and is represented as a transformer 12 having conductor cables 13 connected to bushing terminal members 14 of any suitable type. The core of the transformer is clamped by angle irons 17 and channel irons 16.

Suitable means for tanking and untanking the transformer is provided. This is a pair of sliding guide assemblies disposed on opposite sides of the transformer having parts affixed to the transformer and coacting parts affixed to the inside wall of the tank. These assemblies are identical to each other and therefore only one will be described.

One such assembly includes a first guide plate or member 18 rigidly attached to angle irons 17 at the top of the transformer and a second guide plate or member 19 rigidly attached to channel irons 16 at the bottom of the transformer. It also includes a suitably shaped guide rail 21 welded to the side wall of tank 10. This guide rail comprises four aligned parts 26, 27, 23 and 42 and has its longitudinal axis substantially parallel to the longitudinal axis of the tank. Guide members 18 and 19 are shaped to cooperate with guide rail 21 so that the transformer will be guided within the tank by those guide members sliding upon the guide rail. While the guide rails and members may be of various sizes and shapes, in the embodiment shown the guide rails are in the form of channels and the guide members in the form of grooved plates.

In high voltage transformers the sections of guide rails nearest the coil of the transformer may be omitted to provide additional clearance for the coil and core assembly. This is illustrated in Fig. 1 by the space between parts 23 and 27. However, in lower voltage transformers those sections of the guide rails normally need not be removed. Guide rail part 23, a small auxiliary guide rail, is welded to the tank wall a short distance above the bottom of tank 10 and engages with bottom guide member 19 for a predetermined distance during tanking and untanking operations to help guide transformer 12.

Sections 26 and 27, of guide rail 21 are aligned and separated to define a space therebetween with rail segment 42 occupying less than that entire space.

Means are provided for moving segment 42 lengthwise of the rail within the space between parts 26 and 27. Rod 33 extends longitudinally of guide rail 21 and its portion that lies within the space between aligned sections 26 and 27 is threaded. The rod is positioned with respect to guide rail 21 by spaced alignment members 34 and 36 affixed to the guide rail. These alignment members each have apertures through which the rod is inserted. The abutment of the outer surface of rod 33 against the edges of those apertures causes the rod to be aligned substantially parallel to the longitudinal axis of guide rail 21.

Rod supporting element 37 is rigidly affixed upon the guide rail and has an aperture therein through which the rod extends. In the embodiment shown element 37 is affixed to the upper portion of rail section 26 at a position nearest the top of the tank. The top end portion of rod 33 extends through the aperture in the element and defines suitable wrench engaging means, such as nut 38. And means is provided for holding the rod in a relatively fixed vertical position with respect to the guide rail. Positioning means or nut 39 provided on rod 33 along with nut 38 coacts with element 37 to prevent

movement of the rod in a vertical direction, that is, lengthwise of the rail. Nut **38** is rigidly affixed to the top portion of rod **33** and abuts the upper side of fixed element **37** preventing the rod from moving in a downward direction. Nut **39** is rigidly affixed to rod **33** and abuts the lower side of fixed element **37** preventing the rod from moving in an upward direction.

Segment **42** is threadedly mounted on the rod. While there are many ways of threadedly mounting segment **42** on the rod, in the embodiment shown this is accomplished by block **41** inserted within the segment. This block has a threaded aperture in its longitudinal direction and is threadedly mounted on the threaded portion of rod **33**. Guide elements **44** and **46** are disposed on opposite sides of segments **42** and carried on the wall of tank **10** in such position as to guide that segment within the space between aligned sections **26** and **27** as the segment is moved from a first lower portion to a second upper portion of that space. This is possible as the segment occupies less than that entire space.

Movement of segment **42** can be accomplished from outside the tank. Pipe cap **45** in cover **11** is removable for socket wrench **43** to be inserted through pipe **50** and brought into contact with nut **38**. When socket wrench **43** is rotated, nut **38** and rod **33** turn to move segment **42**, in a downward direction, for example. The segment, of course, is moved in the opposite direction when nut **38** is rotated in the opposite direction.

During tanking and untanking operations guide members **18** and **19** passing through the upper portion of the space between aligned sections **26** and **27** are guided by outer guides **31** and **32**. These outer guides are disposed adjacent the upper portion of that space. They are separated and extend out from the tank wall so that the guide members are directed in passing therebetween in tanking and untanking the transformer. Segment **42** is kept in the lower portion of that space during tanking and untanking operations and directs the guide members in passing the lower portion of that space.

When transformer **12** is resting on the bottom of tank **10**, upper guide member **18** is opposite the lower portion of the space between aligned sections **26** and **27**. Figs. 2 and 3 show segment **42** in the upper portion of the space between the two aligned sections. Therefore, while segment **42** is in this position, no contact is made with guide member **18** positioned in the lower portion of the space. Guide member **18** cannot therefore transfer vibrations from the transformer to guide rail **21** and from guide rail **21** to the tank walls.

Auxiliary guide rails **23** do not extend to the bottom of tank **10** for a specific reason. If they did, guide members **19** affixed to the transformer would engage them when the transformer rests on the bottom of the tank. This is not desired when the transformer is in operation because the vibrations of transformer **12** would then be transmitted to the tank wall. Auxiliary guide rails **23** are positioned so they will make no contact with bottom guide members **19** when the transformer is resting on the tank bottom. Yet, transformer **12**, being inserted into tank **10**, is guided to the bottom of tank **10** after bottom guide members **19** go beyond the auxiliary guide rails. This guiding is done by projections **47** and **48** which are affixed to the bottom of the tank. These projections cooperate with channel irons **16** to guide the transformer to the tank bottom.

It is important to keep transformer **12** from shifting whenever that transformer is being shipped. This shifting is prevented when segment **42** is in the lowermost portion of the space between aligned sections **26** and **27** and is contained by the groove in upper guide member **18**. The coaction of segment **42** with the groove and the coaction of corresponding guide assembly parts disposed on the opposite side of transformer **12** prevents the transformer from shifting with respect to tank **10**.

More specifically, side **18*b*** of the groove in guide member **18** and matching side **42*b*** of segment **42** are juxtapositioned and abut each other. This abutment plus the abutment of corresponding sides **18*b*** and **42*b*** of the similar assembly disposed on the opposite side of the transformer prevents the transformer from shifting in the longitudinal direction of guide plates **18**. Sides **18*a*** and **18*c*** of the groove in guide member **18** and matching sides **42*a*** and **42*c***, respectively, of segment **42**, are juxtapositioned and abut each other. Sides **18*a*** and **18*c*** are disposed parallel to each other and perpendicular to the side **18*b***, the base of the groove. The abutment of sides **18*a*** and **18*c*** of guide member **18** with matching sides **42*a*** and **42*c*** of segment **42** prevents transformer **12** from shifting in the direction transverse of guide member **18**. Thus, sides **18*a***, **18*b*** and **18*c*** of the groove in guide member **18** coact with matching sides **42*a***, **42*b*** and **42*c*** of segment **42** to prevent shifting of transformer **12** with respect to tank **10**.

The sliding guide channel assembly, whose structure was described above, has more than one function. The assembly acts not only as a guide for the lowering and raising of the transformer within the tank, but also as a device for preventing the transformer from shifting during shipment and as a device for isolating the transformer from the tank when the transformer is in operation.

When the assembly is acting as a guide during tanking and untanking operations, segment **42** is positioned in the lower portion of the space between sections **26** and **27**. Guide plates affixed to the transformer cooperate with and are guided by segment **26** of the guide rail, past the upper portion of the space between sections **26** and **27** by outer guides **31** and **32**, past the lower portion of the space by segment **42**, further guided by segment **27** of the guide rail and by auxiliary guide rail **23**. Projections **47** and **48** extending from the tank bottom engage channel **16** on the bottom of the transformer to guide the transformer from auxiliary guide rail **23** to the tank bottom.

During shipment it is desirable to prevent the transformer, resting on the tank bottom, from shifting around. This is accomplished by segment **42** being in the lower portion of the space between sections **26** and **27** and engaging guide member **18** which is adjacent the lower portion of that space. Matching sides of guide member **18** and segment **42** are juxtapositioned and abut each other. This abutment of segment **42** and guide member **18** in one assembly plus the abutment of corresponding sides of the similar assembly disposed on the opposite side of the transformer prevents the transformer from shifting in a direction perpendicular to the longitudinal axis of guide rail **21**.

While the transformer is in operation there is need for isolating the transformer from the tank wall to prevent vibrations of the transformer from reaching that wall. If those vibrations reach the wall, the wall will vibrate and increase the noise level of apparatus. The sliding guide assembly is so arranged that when the transformer abuts the tank bottom, guide plates **18** and **19** can be completely isolated from the tank wall. Auxiliary guide rail **23** is affixed to the tank wall in such a manner that no contact is made between it and lower guide plate **19** when the transformer rests on the tank bottom. Upper guide plate **18** is adjacent the lower portion of the space between sections **26** and **27**. After shipping and before operating the transformer, segment **42** is raised to the upper portion of the space by means of wrench engaging means cooperating with and rotating rod **33** upon which segment **42** is threadedly mounted. The rotation of the threaded portion of the rod causes that portion to coact with the threaded portion of the segment to move that segment within the space. With segment **42** in the upper portion of the space, guide plate **18** adjacent the lower portion is free from any contact with

guide rail **21**. Thus guide plates **18** and **19** can be completely isolated from guide rail **21** to prevent vibrations from going through them to guide rail **21** and from the guide rail to the tank wall.

Although but one embodiment of the present invention has been illustrated and described it will be apparent to those skilled in the art that changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. A stationary induction apparatus comprising in combination a magnetic core member, a tank member for enclosing said core member, and guide means for accurately positioning said core member in said tank member, said guide means comprising a vertical guide rail attached to one of said members, and first and second guide plates attached to the other of said members, said plates having surfaces for engaging said rail to guide said core member centrally of said tank member while being lowered to its final position within said tank member, said guide rail having a plurality of sections spaced vertically to prevent contact between said plates and said rail when said core member is in said final position, one of said sections being movable vertically into engagement with one of said plates to fix said core member with respect to said tank member during movement of said apparatus and movable out of engagement with said one plate when said apparatus is in place to thereby isolate said core member from the sides of said tank member.

2. A stationary induction apparatus comprising in combination, a magnetic core assembly, a tank for enclosing said assembly, and guide means for accurately positioning said assembly in said tank, said guide means comprising a vertical guide rail attached to the wall of said tank and extending inwardly thereof, first and second guide plates fixedly attached to said assembly, said plates having cooperating surfaces for engaging said rail to guide said assembly centrally of said tank while being lowered to its final position within said tank, said guide rail having a plurality of sections spaced vertically to prevent contact between said plates and said rail when said assembly is in said final position, one of said sections being movable vertically into engagement with one of said plates to fix said assembly with respect to said tank during movement of said apparatus, and movable out of engagement with said plate when said apparatus is in place to thereby isolate said assembly from the sides of said tank.

3. A transformer comprising a core and winding assembly, a circular tank surrounding said assembly, and

guide means to guide said core and winding assembly centrally of said tank while being lowered to its final position in said tank, said guide means comprising a pair of guide assemblies disposed at diametrically opposite points within said tank, each of said assemblies comprising a guide rail having a plurality of aligned sections disposed parallel to the axis of said tank, upper and lower guide plates fixedly attached to said core and winding assembly and extending transverse to said axis, said guide rail comprising an upper section and a lower section fixedly attached to the wall of said tank and spaced vertically with respect to the bottom of said tank to prevent contact between said guide plates and said sections when said core and winding assembly is in said final position, said guide rail further comprising a movable section disposed intermediate said upper and lower sections, said movable section being positionable in contact with said upper plate during movement of said transformer to brace said core and winding assembly and positionable out of contact with said upper plate when said transformer is in place.

4. A guide arrangement for guiding a transformer core assembly into its final position within an enclosing tank comprising in combination a guide rail having upper and lower vertically extending channel sections fixedly attached to the inside wall of said tank, upper and lower guide plates fixedly attached to said core assembly and extending horizontally outward therefrom to slidingly engage said rail, said upper and lower sections being spaced from the bottom of said tank to prevent said plates from contacting said rail when said assembly is in said final position, said guide rail further comprising a movable section disposed parallel to said upper and lower sections and intermediate thereof, and means for moving said segment vertically with respect to said upper guide plate to position said movable section in contact with said upper guide plate during shipment of said transformer and to position said movable section remote from said guide plate while said transformer is energized to thereby prevent vibrations of said core caused by energizing said transformer from being transmitted to the wall of said tank.

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