

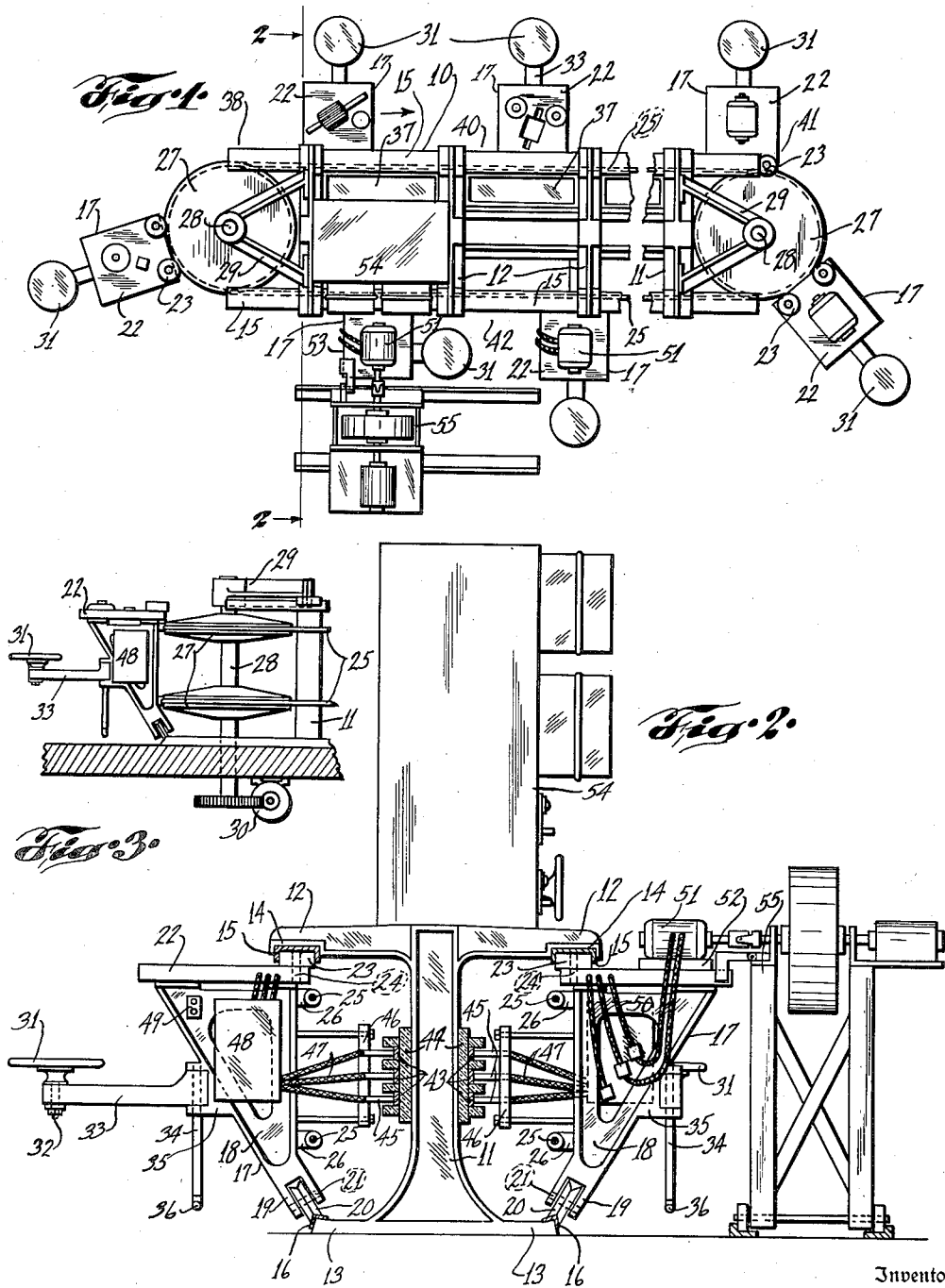
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CONVEYER FOR PRODUCTION LINES

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CONVEYER FOR PRODUCTION LINES

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This invention relates to improvements in conveyers for production lines, and more particularly to an improved assembly and test line for electric machines.

5 An object of the present invention is to provide an improved conveyer for production lines, which includes a plurality of assembly tables arranged in spaced relation and adapted as supports for the apparatus carried by the conveyer, drive cables disposed in spaced relation and operatively connected to each table and means for actuating the cables for moving the conveyer in a closed path.

15 A further object is to provide an improved conveyer for production lines which includes a plurality of individually spaced work-carrying tables adapted to be moved in a closed path around a stationary supporting frame which is arranged to support test and assembly equipment at fixed stations, and means for transporting an operator carried by the conveyer within ready reach of the test and assembly equipment.

20 An additional object is to provide an improved conveyer for motor production lines which includes a plurality of individually spaced work-carrying tables which are moved in a closed path about a stationary support therefor, guide members for establishing spaced rectilinear portions of the path, assembly equipment disposed along the one portion adapted for effecting assembly operations during movement of the conveyer therethrough, the other of the portions being arranged for effecting testing operations of an assembled motor carried by the conveyer.

25 Further objects and advantages will appear from the following detailed description of parts and the accompanying drawing, in which:

30 Fig. 1 is a fragmentary plan view of a preferred form of conveyer for production lines to which the present improvements are applied; Fig. 2 is an enlarged sectional elevation taken along the line 2—2 in Fig. 1, and Fig. 3 is a fragmentary side elevation of an end portion of the conveyer.

45 Referring by numerals to the drawing, 10 designates, generally, a preferred form of conveyer for use in production lines for electric machines. A plurality of I shaped frame members 11 are arranged in spaced relation along and supported vertically upon any suitable floor line or base support. Each frame member 11 is provided with horizontally disposed arm portions 12 and 13, the arm portions 13 being securely fastened to the base support. The arm portion 12 of each of the frame members is provided near its

outer extremity with a downwardly depending inverted U shaped recessed portion 14 in which is securely fastened and received a downwardly depending channel shaped member 15, which serves to form a substantially rigid frame or conveyer supporting structure. These channel members form spaced rectilinear guide portions for the conveyer. An angle rail 16 is securely attached to the arm portions 13 of each of the frame members 11, the rail being extended along the opposite sides and about the ends of the conveyer support to form a continuous guide rail entirely around the conveyer for a purpose hereinafter appearing. A plurality of individual conveyer units 17 are arranged in equally spaced relation about the conveyer 10, each unit includes a triangular support 18 which is provided with a vertically disposed leg portion 19 having a grooved roller 20 mounted thereon by means of a pin 21 which is arranged to engage the rail member 16. The grooved roller 20 is positively maintained on the rail 16 by means of the co-operating action between the lateral sides of the rail and roller. Upon the upper portion of the support 18, there is securely attached a horizontal work-carrying table or plate 22 which provides sufficient working area to accommodate adequately several machine parts at the same time. A pair of rollers 23 are mounted on the upper portion of each table by means of pins 24. These rollers are seated within the channel member 15 to guide and maintain the conveyer units 17 in positive vertical alignment in respect to the conveyer support for a purpose hereinafter appearing.

35 The conveyer units 17 are moved in a closed path by means of a pair of conveyer cables 25 which are secured in spaced relation on the supports 18 of each unit by means of cable clamps 26. A pair of cogwheels or sheaves 27 are suitably keyed to a vertical shaft 28 which is journaled in horizontally disposed V shaped bearing arms 29 securely attached to the frame 11. A driving mechanism 30 is operatively connected to one of the drive shafts 28 which carries a pair of the driven cogwheels 27. These cogwheels are arranged to engage the cable clamps 26 to actuate the conveyer units. The driving mechanism may be operatively connected to a variable speed changing device (not shown) for changing the linear speed of the conveyer. Obviously, the guide members 15 are not extended around the cogwheels 27, but are terminated at a point approximately tangentially to the cogwheels. It will be readily seen that as a table 22 is moved along

a rectilinear portion of the conveyer path to a point tangential to the cogwheel, the rollers 23 must be disengaged from the guide members 15 before the table may be carried around the cogwheel. During the movement of the conveyer units around the cogwheels 27, the rail 16, which guidingly engages the roller 29 serves to maintain the unit in the path of travel. By the above described arrangement the guide rails 15 and 16 serve to establish spaced rectilinear portions of the path, and the rail 16 serves to maintain the conveyer in a closed path of travel.

Each conveyer unit 17 is provided with an operator's seat or chair 31 which is rotatably journaled on a pin 32 mounted on an arm 33 which is pivotally secured by means of a pin 34 to a projecting lug portion 35 on the support 18. The pivot pin 34 is, by preference, extended downwardly from the lug portion 35 to provide a foot rest 36 for the operator's feet when seated on the operator's chair. Obviously, the operator's seat is disposed, by preference, a convenient distance below the plane of the table, to facilitate assembly operations upon the table while the operator is being transported by the conveyer and moved therewith. Assembly equipment is disposed at spaced locations or stations along the path of the conveyer. The equipment is supported in suitable bins or trays 37 which are supported between adjacent frame supports 11. Each bin is supplied with the proper assembly equipment, such as assembly tools and parts, to facilitate assembly operations at the proper time.

The assembly of the electric machine is started at approximately point 38 of the conveyer, the parts of the machine being placed on an assembly table as it is being moved around the cogwheel. An operator seated on the chair 31 is transported along with the conveyer a sufficient length of time to permit a portion of the machine assembly, the time limit for his assembly operation being controlled in part by the linear speed of the conveyer. It will be seen that an operator is transported by the conveyer perhaps for only a short distance after which time he dismounts and seats himself upon next assembly table which is being brought around the cogwheel or along the line. By this arrangement several operators may be positioned along the assembly side of the conveyer, each operator performing a certain portion of the entire machine assembly. It will, of course, be apparent that the horizontal distance between adjacent conveyer units and the linear speed of the conveyer determines the area within which each operator works. It will, of course, be understood that the linear speed of the conveyer and the space relation between adjacent working tables is so selected as to permit assembly operations on a particular table to be completed in advance of the arrival of a second assembly table into the operator's working area. The number of operators employed is dependent upon the length of the assembling line, and the extent of the assembling process.

In the present example, the entire motor or electric machine is assembled along side 40 of the production line, so that when any one of the conveyer units arrived at approximately point 41 of the conveyer, it carries an assembled machine, which is then moved around the cogwheels 27 at this end and into side 42 of the conveyer. Provision is made for supplying power to the electric machine as it passes down the side 42 of the conveyer. A plurality of bus bars 43 are secured to an insulating member 44 which is secured to

the leg portion of the stands 11. These bus bars are suitably insulated from each other and the frame by means of the member 44, the bus bars being suitably electrically connected to a source of power (not shown). These bus bars are, by preference, extended over substantially the full length of the opposite sides of the conveyer. A plurality of flexible contact brushes 45 are securely attached to an insulating block 46 which is securely attached to the support 18, each brush being arranged to slidably contact with its associated bus bar. These brushes are provided on each of the conveyer units 17. Leads 47 are electrically connected to each brush 45 and to a switch which is suitably mounted in a convenient box assembly 48 carried by the support 18. A switch push-button 49 controls the opening and closing of the switch which is electrically connected to conductors 50 terminating in spring contact clips for attachment to the leads from the electric machine, which is being carried by the assembly table 22. It will be readily seen that when an assembled machine 51 is carried on a working table which is being moved along the side 42 of the conveyer the flexible brushes slidably engage the bus bars, and that when the control switch is in closed position, power is being supplied to the electric machine 51. These machines are mounted upon suitable insulating pads 52 which are disposed upon the table. By the above arrangement the electric machines 51 are being energized for their running in period during their movement along this side of the conveyer. It will be noted that the distance between adjacent conveyer units is ample to permit the operator's chair 31 to be swung out of the way and between adjacent conveyer units.

When the electric machine arrives at approximately position 53 it is ready for test. A suitable testing panelboard 54 with its associated meters and testing circuits is supported on the stand 11. A suitable movable load applying means 55 is arranged to be coupled to the machine 51 carried by the conveyer unit, the machine being suitably electrically connected to the panelboard for test purposes. The machine and the load applying means are moved together by the conveyer, so that test data is recorded on the panelboard meters as the machine travels under influence of the conveyer. The above described means and method of testing a movable electric machine is described and claimed in detail in Letters Patent 1,980,614, Gordon R. Anderson, granted May 29, 1934. When the testing operation for the electric machine is completed, the tested motor is removed from the assembly table as it is about to be moved around the cogwheel 27 toward the point 38, during which time the parts for another machine are being placed thereon to repeat the above assembly process.

It will be readily understood that the present improved motor building production line consists of a plurality of traveling assembly tables upon which a motor is being assembled by an operator traveling with the conveyer. In the present example, each conveyer table is supported by means of a pair of rollers which travel in the channel guide members 15 and by a grooved roller which travels along the rail 16. The channel members 15 serve to cooperate with the rollers 23 to maintain its associated unit in upright position while carrying the weight of the machine parts and the operator. It will, of course, be understood that the bus bars 43 may be extended along both sides of the conveyer, and that suitable electrical

connections may be made from the leads 50 to power driven tools (not shown) for use during assembly operations. Each conveyer unit 17 is equipped with the operator's chair, switch box and flexible brush assembly so that they are all identical in construction.

It will, of course, be understood that the present detailed description of parts and the accompanying drawing relate to only a single preferred executive embodiment of the invention and that changes may be made in the described construction and arrangement of parts without departing from the spirit and full intended scope of the invention.

I claim:

1. In a production and assembly line for electric machines, a conveyer including a plurality of tables adapted for supporting machines to be subjected to assembly operations, means for continuously moving said conveyer in a closed path, guides for said conveyer establishing spaced rectilinear portions of said path, electrical bus elements disposed adjacent one of said rectilinear portions, electrical pick-up elements movable with the conveyer and adapted to engage the bus elements, means, including said pick-up elements, for electrically connecting said bus elements to the assembled machine, the other of said portions arranged to permit effecting assembly operations during movement of the conveyer therethrough, and means constituting a plurality of movable operators' stations carried by said conveyer.

2. A conveyer for use in assembly and test lines, including a plurality of tables adapted as supports for the apparatus carried by the conveyer, triangular supports for the said tables, an inverted channel constituting a guide rail for the tops of said supports and disposed inwardly of the tables, rollers on the upper portions of the supports, operable within said channel, a track below and spaced inwardly of the supports and arranged to receive a lateral thrust and to take the weight of the supports, rollers on the supports engaging the said track, drive cables disposed in vertically spaced relation at one side of said supports, means securing said table supports to said cables, in spaced relation therealong, and means for actuating said drive cables for moving the conveyer.

3. In an assembly line for electric machines, a conveyer including a plurality of relatively spaced assembly tables, each adapted to support a machine during assembly operations, a plurality of stationary supports, a channel member carried by said supports, a plurality of rollers carried by said tables, said rollers adapted to enter said channel member, and means for actuating said conveyer.

4. In an assembly line for electric machines, a conveyer including a series of spaced work tables, a stationary frame, a plurality of sheaves journaled at opposite ends of said frame, a plurality of conveyer cables operatively associated with said sheaves and work tables, means for driving said sheaves and cable, guide members secured to opposite sides of said frame, a plurality of rollers carried by said tables and adapted to ride within said guide members, said guide members having end portions tangential to said sheave, and means carried by said frame for guiding said tables about the ends of said frame.

5. In a production and assembly line for electric machines, a conveyer including a plurality of tables adapted for supporting machines to be subjected to assembly operations, each table including a supporting vertical frame structure, track and track-rollers near the upper and lower portions of each frame structure, a pair of brackets carried by and projecting from opposite sides of said frame, a plurality of brush elements carried by one of said brackets, an operator's seat carried by the other bracket, a plurality of bus bars adapted to be slidably engaged by said brush elements, said bus bars being connected to a source of power, means, including said brush elements, for electrically connecting said bus bars and the assembled machine, and individual switching units carried by the several table frame structures, and electrically associated with said last named means.

6. A conveyer for use in production lines for electric machines including spaced frame members, each having a substantially vertical leg, a guide rail disposed to be engaged by the upper portions of said legs, a guide rail disposed for engagement by the lower portions thereof, guide wheels carried by the leg and adapted to engage said guide rails, an arm divergently disposed with respect to the vertical leg of each frame member, a horizontal table portion carried by the arm and leg of each frame member, and adapted as a moving support for the machine under test, and an operator's seat carried by each of the frame members.

7. A conveyer for use in production lines for electric machines, spaced frame members, each having substantially vertical legs and divergent arm portions, a depending channel member carried by one of said arm portions, a guide rail carried by the other arm portion, a plurality of tables, supports for said tables, a plurality of rollers mounted on said table and adapted to fit within said channel member, a roller carried by said support and adapted to engage said rail, and means for moving said conveyer.

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