Dec. 14, 1954 A. A. LYNESS, JR 2,697,161

INDUCTION HEAT-TREATING MACHINE

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Fig. 1.

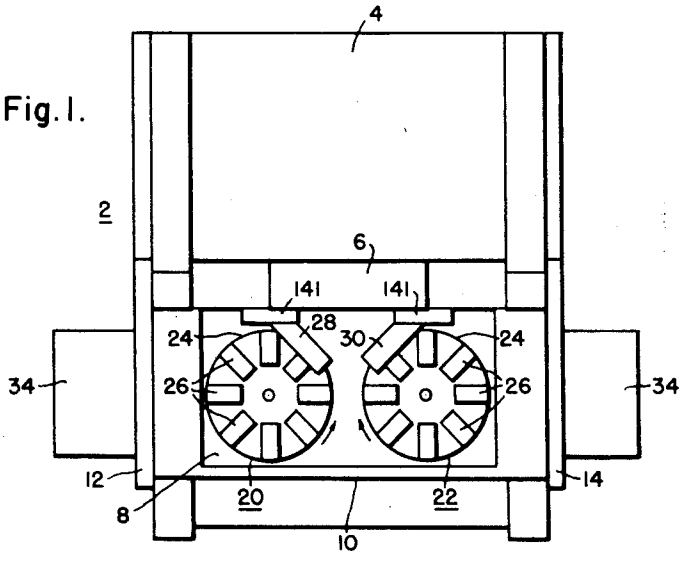
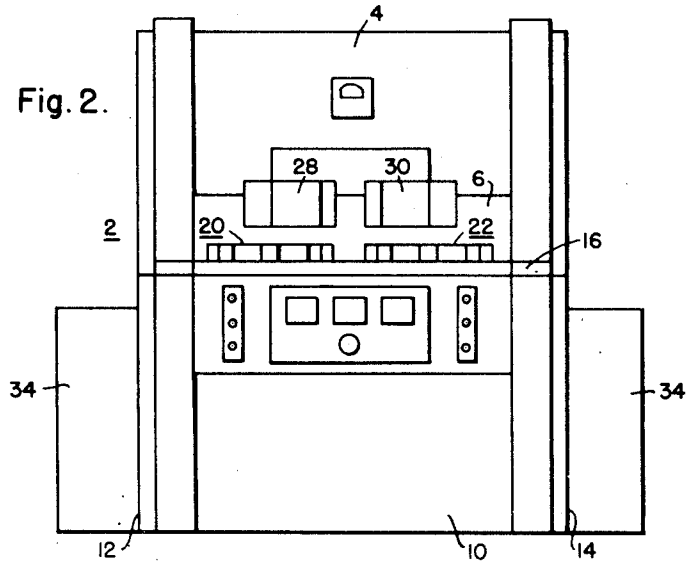


Fig. 2.



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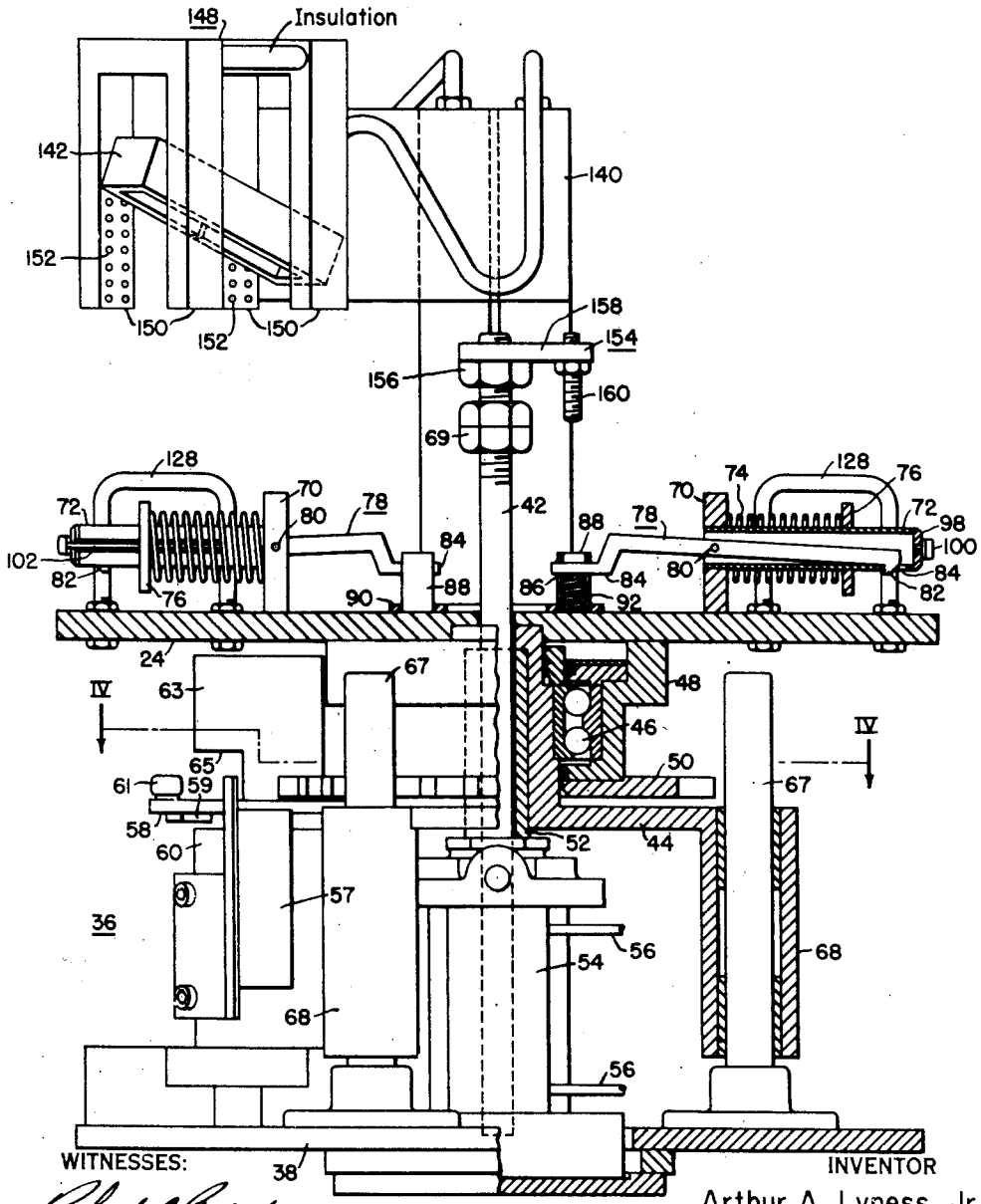
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INDUCTION HEAT-TREATING MACHINE

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Fig. 3.



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Fig. 4.

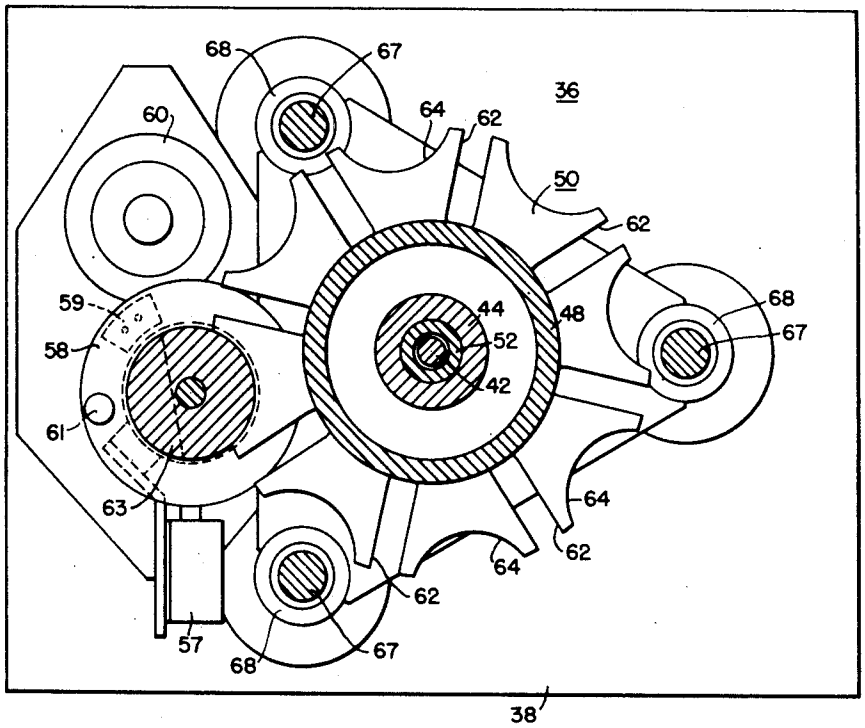


Fig. 8.

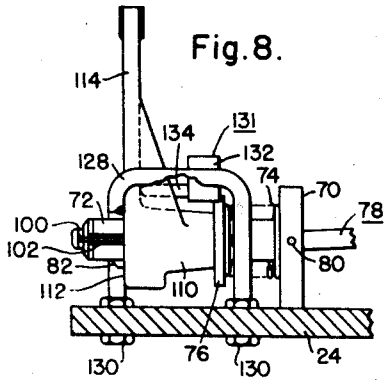


Fig. 9

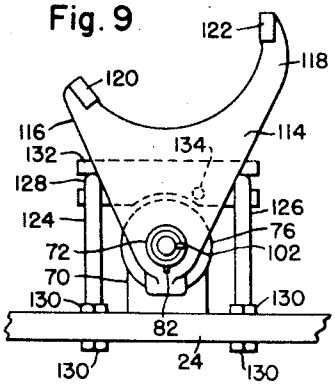
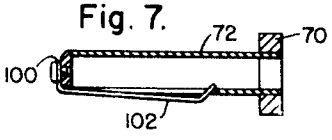


Fig. 7.



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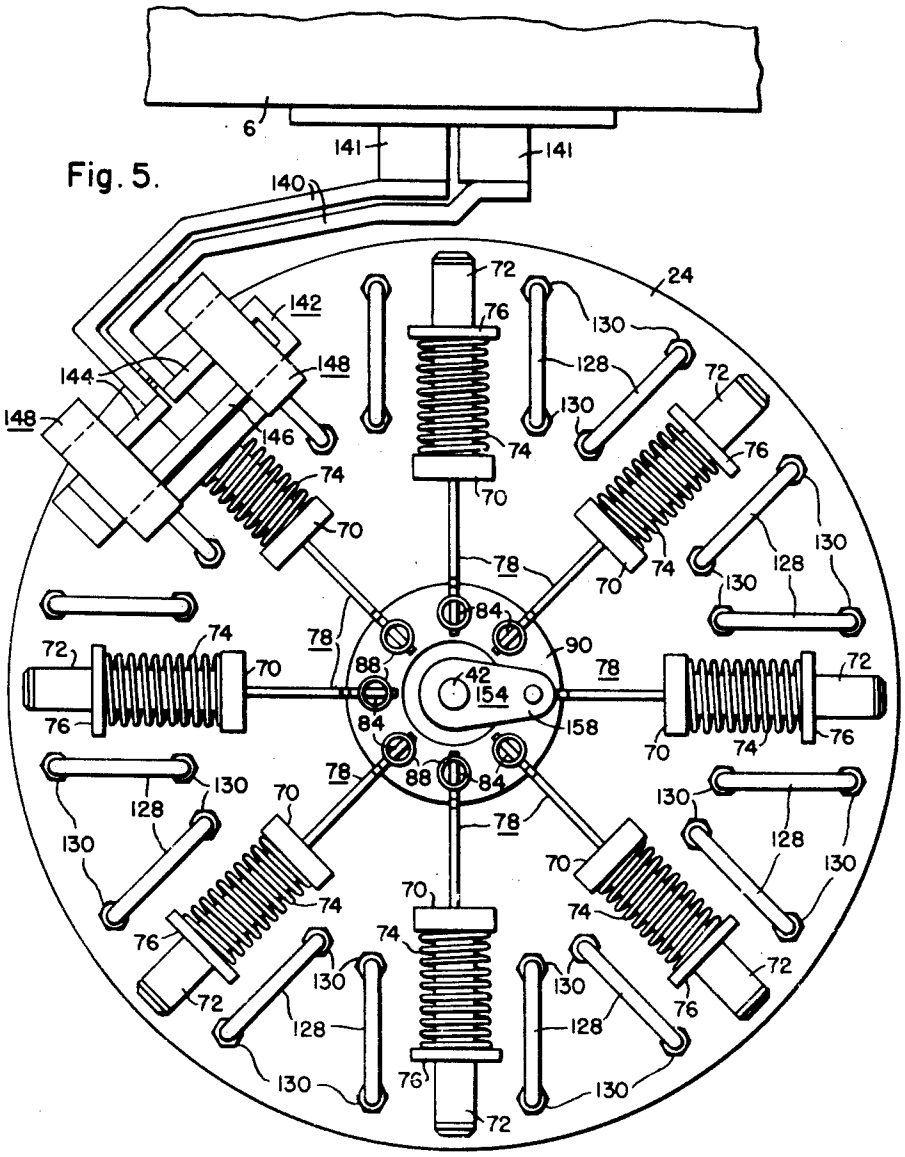
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INDUCTION HEAT-TREATING MACHINE

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Fig. 5.



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INDUCTION HEAT-TREATING MACHINE

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Fig. 6.

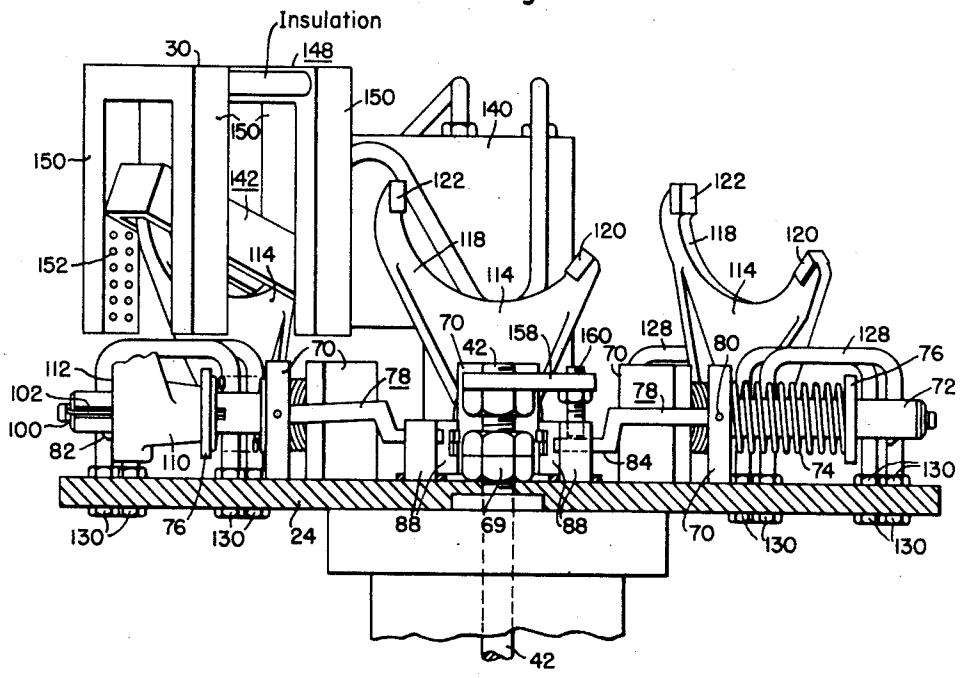


Fig. 11.

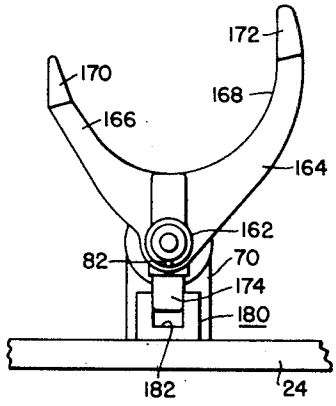
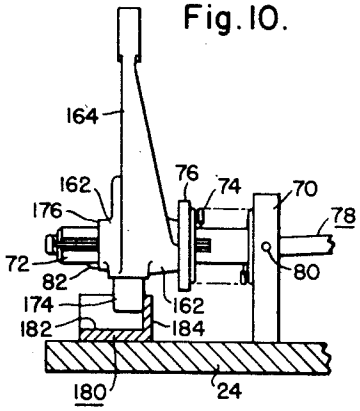


Fig. 10.



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United States Patent Office 2,697,161
Patented Dec. 14, 1954

2,697,161

INDUCTION HEAT-TREATING MACHINE

Arthur A. Lyness, Jr., Towson, Md., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Application October 29, 1949, Serial No. 124,329

9 Claims. (Cl. 219—10.67)

In general, this invention is related to induction heat-treating machine for heat-treating workpieces on a mass-production basis. Broadly, the invention provides an improved induction heating apparatus for heat-treating one or more parts of an irregularly shaped object or other workpiece. More particularly, the invention provides an improved high-production machine for inductively hardening certain wearing surfaces of shifter forks used for transmissions of automobiles and the like.

An object of the invention is to provide a high-production induction heat-treating machine of a type described having work-positioning means which permits irregular workpieces to be placed in the machine only in a proper position for heat-treatment of the desired parts of each workpiece.

A further object of the invention is to provide an induction heat-treating machine adapted to heat shifter forks and similar workpieces on a mass production basis by the use of high-frequency induction, the machine having mechanism which permits selected areas of each of the workpieces to be hardened as they pass through the machine, thereby eliminating expensive masking procedures.

An over-all purpose of the invention is to provide an induction heating machine which is rugged, which is economical in operation, which can be operated by a single operator whose main duty is to keep the machine supplied with workpieces to be heat-treated, and which is substantially foolproof in operation so that it can be operated by an unskilled operator.

An induction heat-treating machine in accordance with a preferred embodiment of my invention comprises one or more work-carrying turntables, each having several similar work-holding stations thereon. Each station has work-positioning means, comprising an arbor, which holds the associated workpiece in a predetermined position with respect to the turntable. The turntable is intermittently angularly turned step-by-step, or indexed, so that each station temporarily successively occupies a loading position, a heat-treatment position or positions, and an unloading position. The turntable is raised every time it places a new station in the heat-treatment position. This raising operation places selected parts of the associated workpiece in inductive relation to the heating space of an induction heating coil. As the turntable subsequently drops, the workpiece-parts leave the heating space inside the heating coil and pass through a spray of quenching water. The raising operation also automatically releases a heat-treated workpiece in the work-holding station which is at the unloading position of the turntable. Upon release of this workpiece, it is automatically ejected from the turntable into any suitable receptacle or bin.

A further object of this invention is to provide an induction heating machine having a single cabinet which contains a pair of turntables of a type described and driving means which rotates the turntables in opposite directions, with the facing parts of the turntables moving inwardly and providing a central loading position at which an operator can load both turntables. As the turntables move, the workpieces are first heat-treated and then are ejected, as aforesaid, on opposite sides of the cabinet so that it is unnecessary to provide an operator or operators for unloading the turntables.

Objects, features and innovations of my invention, in addition to the foregoing, will be discernible from the following description of preferred forms thereof for heat-treating shifter forks, but it is to be understood that my invention is not thus limited. The description is to be

taken in conjunction with the accompanying drawings which are on varying scales and in which some details have been omitted in the interests of clarity. In the drawings:

Figure 1 is a sketchy plan view of a comprehensive induction heat-treating machine embodying my invention;

Fig. 2 is a front elevational view thereof;

Fig. 3 is a vertical view, partly in section and partly in elevation, of equipment utilizable in the induction heating machine of Fig. 1, and showing an unloaded turntable in a lowered or down position with respect to its associated induction heat-treating means; this equipment being, in its own accord, an induction heating machine in accordance with my invention;

Fig. 4 is a sectional view on the lines IV—IV of Fig. 3;

Fig. 5 is a plan view of the equipment of Fig. 3;

Fig. 6 is a fragmentary sectional view of the equipment of Fig. 3, showing a partially loaded turntable in raised or up position with respect to the associated induction heat-treating means;

Fig. 7 is an axial section of an arbor of a work-holding station of a turntable;

Fig. 8 is a side view, partly in section, of a loaded work-holding station similar to that shown in Figs. 1 through 7, but modified slightly to illustrate a more elaborate work-positioning means;

Fig. 9 is an end view looking radially inwardly at the station of Fig. 8; and

Figs. 10 and 11 are views, similar to Figs. 8 and 9 respectively, of a modified form of work-holding station which is adapted to receive shifter forks of a sort different from that for the stations of Figs. 8 and 9.

In a preferred embodiment of my invention as shown in Figs. 1 through 7, I provide an induction heating machine which comprises a cabinet identified in its entirety by the reference numeral **2**. The cabinet comprises a rear compartmentized section **4** that contains the high-frequency generating equipment, including a tube-oscillator generator, and various controls for operating the machine. The cabinet further comprises a shelf **6** at which high-frequency power supply connections and water connections are available, and comprises a depressed sink **8** provided with any suitable water drain in its bottom, in accordance with conventional practice. The cabinet has a lower front wall **10** in front of the sink and side walls **12** and **14** at the sides of the sink. The sink extends forwardly from the higher rear section **4**, and has a top, represented by the line **16** of Fig. 2, which is about 3 feet, more or less, from the cabinet-supporting floor.

Supported in the sink **8**, in any suitable manner, is a pair of similar work-handling equipments indicated in their entireties by the reference numerals **20** and **22**. Each of the work-handling equipments **20** and **22** comprises a turntable **24** which has a plurality of equally circumferentially-spaced work-holding stations **26**. As shown in Figs. 1 and 5, eight similar work-holding stations are provided on each turntable, each station being adapted to hold a workpiece to be heat-treated.

For heat-treating the workpieces, an induction heat-treating means **28** is associated with the turntable **24** of the work-handling equipment **20**, and induction heat-treating means **30** is associated with the turntable **24** of the work-handling equipment **22**. Each of the heat-treating means **28** and **30** comprises an induction heating coil and a quench rod that are subsequently described. It is to be observed that the induction heat-treating means **28** and **30** are located centrally of the cabinet, in the region of the facing vertical sides of the turntables.

In accordance with my invention, for bringing the work-holding stations to the heat-treating means, the turntables are rotated in opposite directions, the right-hand turntable moving clockwise and the left-hand turntable moving counterclockwise, with respect to Fig. 1. Consequently, the facing sides of the turntables move in a direction from front to rear of the cabinet **2**. With this manner of turning the turntables, each station of the turntables can be loaded by an operator standing at the front of the machine. Consequently a station along the front of the machine is in a loading position. As each turntable moves, it brings the loaded station into a heat-treatment position under an induction heat-treating

means 28 or 30, as the case may be. When a station is in this heat-treatment position, the aforesaid turntable is raised into the heat-treatment means so that the workpiece carried by the station is inductively heated. The turntable is then dropped, during which time the workpiece is quenched. Subsequently the turntable is again indexed until the aforesaid station (containing the heat-treated workpiece) moves to a side of the cabinet 2, where it is in an unloading position. Preferably, the workpiece in such station is automatically forcibly ejected and thrown over the side of the cabinet into replaceable bins 34 at the sides of the cabinet. Equipment for accomplishing the foregoing operations on irregularly shaped objects in the form of shifter forks is shown in Figs. 3 through 7. These figures show a single turntable and associated equipment, it being understood that the other turntable and associated equipment are similarly constructed with suitable changes incorporated to accommodate for the difference in the directions of rotation of the turntables.

Referring more particularly to Figs. 3–7, each turntable 24 is indexed by a drive means thereunder, the drive means being indicated in its entirety by the reference numeral 36 (Figs. 3 and 4). The drive means comprises a base plate 38 which is suitably secured at the bottom of the sink 8. Extending upwardly is a stationary rod 42 that passes through a center hole of the turntable so that the top-plate of the turntable is in the form of an annular member.

Reciprocably about the rod 42 is a hollow stepped tubular member 44 which carries the inner race of a bearing means 46. The outer race of the bearing means is held by a tubular rotatable member 48. The turntable 24 is secured to the upper end of the member 48. An eight-position star-wheel 50 of a Geneva movement is secured to the lower side of the member 48. The hollow member 44 is reciprocable. To this end the hollow member 44 rests on a tubular plunger 52 of a pneumatic lifting and lowering cylinder of a pneumatic means 54 controlled by air pipes 56. Accordingly, the turntable 24 and star-wheel 50 can turn about the member 44 and rod 42; but when the member 44 is reciprocated by the pneumatic means 54, the turntable moves with it.

In addition to the star-wheel 50, the Geneva movement comprises a driving pin-wheel 58 which is rotated in a fixed plane at an adjusted constant speed by a motor 60. The pin-wheel 58 has a single pin 61 that intermittently and successively engages the eight slots 62 in the star-wheel 50 in a known manner.

For positively fixing the position of the star-wheel 50 every time it is indexed, the pin-wheel 58 also comprises a concentric upstanding cylindrical member 63 that fits in cut-out portions 64 in the periphery of the star-wheel 50. The cylindrical member 63 has a cut-out portion 65 in which outer portions of the star-wheel turn when the pin 61 engages a slot 62. When the pin leaves the slot 62, the outer round side of the member 63 abuts a cut-out surface 64 of the star-wheel 50. The member 63 is elongated so that the star-wheel does not disengage it when the star-wheel is being raised and lowered by the pneumatic means 54.

A plurality of posts 67 are secured to the base plate 38 and fit inside cylindrical members 68 that are attached to the hollow member 44 for further guiding the up and down movement of the turntable. Stop nuts 69 adjustably screwed on the stationary center rod 42 limit the upward movement of the turntable 24.

While I have described a particular drive means of indexing the turntable 24 and raising and lowering it, it is obvious that any suitable drive means of a similar character can be used. Generally any suitable control means can be provided for the pneumatic means 54 for raising, holding and then lowering the turntable 24 during the periods in which it is stationary between indexing steps. Obviously, the length of such stationary intervals can be controlled in any suitable manner. Thus, a limit and timing means including a microswitch 57 can be provided, the switch 57 being actuated by a cam 59 on the underside of the pin-wheel 58. Or the speed of the motor 60 can be controlled.

Each work-holding station 26 of the turntable 24 comprises an upright plate 70 secured thereto. The plate 70 has a hole in which is fixed a radially outwardly extending work-holding arbor 72 in the form of a hollow tube. Around the arbor 72 is a compression spring 74 which has one end anchored to the plate 70 and the other end anchored to a slide plate 76, slidable on the arbor 72. The arbor 72 also has a latch or rod 78 associated therewith, the latch having a portion extending axially inside the arbor and a portion beyond, the portions being on opposite sides of a pivot 80 for the latch 78. The pivot 80 is fixed to the inner end of the tubular wall of the arbor 72. The outer end of the latch 78 comprises a nose 82 that is releasably biased downwardly through vertically extending slot or hole 84 in the bottom of the arbor 72. For such biasing, the latch-rod 78 has an outer portion with an end 84 that passes through a hole 86 in an upright tube 88 fastened to an annular plate 90 that in turn is concentrically secured to the turntable 24. A spring 92 inside the tube 88 normally tends to bias or force the latch rod 78 into the position shown at the right in Fig. 3, with the latch-nose 82 protruding through arbor-hole 84.

In the operation of equipment thus far described, the work-holding arbor 72 and associated parts comprise a positioning means for receiving a workpiece having a hole that can fit around the arbor and a hole-length which corresponds to the distance between the latch-nose 82 and the slide plate 76 when the compression spring 74 is compressed either partially or wholly. To allow for manufacturing tolerances in the diameters of the holes in workpieces, the arbor 72 is made slightly smaller than the minimum tolerable diameter, and its front or outer end is provided with a tapered plug 98 that receives an eye 100 of a generally flat spring 102 that extends longitudinally along a narrow axial slot in the arbor 72, as indicated in Fig. 7. This expedient has been omitted from Fig. 5 in the interests of clarity. This spring 102 positions a workpiece snugly on the arbor 72.

The embodiment has been applied to heat-treating workpieces in the form of a shifter fork of the type such as shown in Figs. 6, 8 and 9. The shifter fork comprises a body portion 110 having an axial hole which permits the shifter fork to be placed on the arbor 72. As the shifter fork moves radially inwardly on the arbor 72, it holds the latch-nose 82 inside the arbor and its inner face forces the slide plate 76 toward the support plate 70 against the action of the spring 74 until the outer face 112 of the shifter fork passes inwardly beyond the latch-nose 82. When this happens, the latch-nose 82 is forced downwardly by the spring 92 acting on the end 84 of the latch-rod 78. The latch-nose 82 latches against the face 112 of the body-portion 110 of the shifter fork when the shifter fork is released by the operator; the compression spring 74 forcing the shifter fork against the flat side of the nose. Accordingly, the body portion 110 of the shifter fork will always be definitely held on and located axially with respect to the arbor 72 and radially with respect to the turntable 24, the location being determined by the position of the inner face of the nose 82.

The shifter fork shown also comprises a plate portion 114 that extends radially outward from the body portion 110 as an extension of the outer face 112. This plate portion 114 has different sized legs 116 and 118 that have wearing tips 120 and 122, respectively, that are to be heat-treated for hardening.

In order to position the legs 116 and 118 circumferentially with respect to the arbor 72 and hence also with respect to the outer circumferential portion of the turntable 24, the positioning means at each station further comprises a pair of U-shaped aligning bars 124 and 126 secured to the turntable 24 parallel to the arbor 72 at each side of it. The aligning bars 124 and 126 have parallel bridge-portions 128 against which the plate portion 114 of the shifter fork is adapted to seat, as indicated in Figs. 8 and 9. In this position of the shifter fork, the tips 120 and 122 of the legs 116 and 118 of the shifter fork lie along a slanted line. However, it is understood that any other suitable position can be provided by suitably spacing the aligning bars 124 and 126 or by adjusting their heights or both. For the latter purpose the aligning bars have their legs passing through holes in the turntable 24, these legs being threaded and adjustably held with respect to the turntable by a plurality of locking and adjusting nuts 130.

The positioning means at each station may be further augmented by a rejection device which is shown in Figs. 8 and 9 and not in Figs. 1–7. This rejection device 131 comprises a spanning bar 132 supported in a predetermined position at the rear of the aligning bars 124 and 126. A rejection pin 134 extends forwardly from the bar 132 and is adapted to engage the plate portion 114

of a shifter fork being placed in position on the arbor **72**. Should an operator attempt to put a shifter fork backwards on the arbor **72**, that is with the plate portion **114** of the shifter fork inwardly or first on the arbor **72**, the plate portion will engage the pin **134** before the body portion **110** of the shifter fork can be slipped completely on the arbor **72** so that the shifter fork cannot latch in position on the arbor. This immediately informs the operator to turn the shifter fork around 180° to the position shown in Fig. 8, with the face **112** facing radially outward rather than inward.

As an operator loads each station **26** of each turntable **24**, the drive means of the turntables indexes the stations in the directions of the arrow of Fig. 1 and moves the shifter fork on each station from the loading position at the front of the cabinet **2** successively to different positions until finally the shifter fork and the associated station reach the heat-treatment position directly under the heat-treating means **28** or **30** as the case may be. The heat-treating means are generally alike except for necessary accommodations to the direction of rotation of the associated turntable, so that a description of a single heat-treating means should suffice for both.

As shown more particularly in Figs. 3, 5 and 6, the heat-treating means **30** comprises a plurality of water-cooled energizing conductors **140** that are secured to the terminals **141** on the shelf **6** of the cabinet **2**. These conductors are suitably shaped to support a rectangular induction heating coil **142** comprising a single turn having, in effect, elongated sides **144** and **146**, the former consisting of two parts in line. The induction heating coil **142** insulatedly carries a quench member **148** which comprises a plurality of upstanding hollow quench bars or rods **150**, the facing sides of which are provided with quench openings **152**. Any suitable hose or water connection can be provided for feeding water to the quench rods.

When a station is indexed to the heat-treatment position, the drive means then operates to lift the turntable. This raises the shifter fork leg-tips **120** and **122** into the heating space within the induction heating coil **142**, as indicated in Fig. 6. The induction heating coil is slanted to correspond to the slant of a line connecting the two tips. The shifter fork is held in this raised position while high-frequency energy is supplied to the conductors **140** so that the tips **120** and **122** of the shifter fork are heated in the raised heat-treatment position. After a time-controlled interval of heating, the drive means drops the turntable, and quench water is in the meantime supplied to the quench rods **150**, which quenches the heated leg-tips **120** and **122** of the shifter fork. High-frequency energy is applied only when the turntable is in raised position. After the turntable drops, it is then indexed to place the shifter fork of the next succeeding station into heat-treatment position, and the foregoing operations repeat.

As the turntable is indexed, a station with a heat-treated shifter fork leaves the heat-treatment position and reaches the unloading position at a side of the cabinet **2**. In this unloading position, the heat-treated shifter fork on the station thereat is automatically ejected when the table is next raised. To this end the stationary rod **42** (Figs. 3, 5 and 6) is provided with a release means **154** that is adjustably positioned on the rod **42** by adjusting and locking nuts **156**. This release means comprises a narrow bar **158** having a depending abutment member **160** adjustably screwed in it and so located that when a turntable rises, the upper end of the hollow tube **88** of the station at the unloading position passes around the abutment member **160**. As the abutment member **160** moves relatively to the hollow tube **88**, it depresses the extension **84** of the latch-rod **78** against the action of the spring **92** in the tube **88**, so that the latch-rod **78** pivots about its pivot **80** and raises the latch-nose **82** out of the slot **84** in the arbor **72**. The releasing of the latch-nose from holding position on the surface **112** of the associated shifter fork permits the compression spring **74** forcibly to eject the associated shifter fork radially outwardly into a bin **34** at a side of the cabinet **2**. Subsequent indexing of the turntable moves the unloaded station to the loading position for reloading.

It is evident that the stations on the turntable can be suitably modified in accordance with the shape of the object or workpiece to be heat-treated; and Figs. 10 and 11 show a modified form of positioning means for each station for heat-treating another sort of shifter fork. This shifter fork comprises a body portion **162** having a plate portion **164** and legs **166** and **168** provided with tips **170** and **172**, respectively, to be hardened. The shifter fork has a stub shaft **174** which extends from the body portion **162** on the side opposite to that from which the legs **166** and **168** extend. The shifter fork also has an outer face **176** adapted to be engaged by the latch-nose of the work-holding station. It is to be noted that the stub shaft **174** is closer to the outer face **176** of the shifter fork than to the opposite inner face of the shifter fork.

Except for the aligning and rejection means aforesaid, the work-holding stations are the same as before. Instead of the alignment rods **124** and **126**, and the rejector device **131** of Figs. 1–9, the embodiment of Figs. 10 and 11 uses an aligning and rejecting means adapted to the differently shaped shifter forks. In Figs. 10 and 11 the alignment and rejection is obtained through a positioning block **180**. It has a radial slot **182** therein extending outwardly. This slot terminates at a back inner stop-wall **184** which is properly located when the block **180** is secured on the turntable **24** in any suitable manner. The slot **182** of the block **180** is adapted to receive the finished stub shaft **174** of the shifter fork.

As noted before this stub shaft **174** is closer to the outer face **176** of the shifter fork than to the inner face of the shifter fork that should abut the pressure plate **76** of the work-holding station. Consequently by locating the back stop **184** of the block **180** properly with respect to the nose **82** of the latch **78** of the station, the shifter fork can be placed on the arbor only when the body portion **162** of the shifter fork is positioned as shown in Figs. 10 and 11. Should the shifter fork be placed on the arbor in the reverse position, with the outer face inwardly, the stub shaft **174** will engage the stop wall **184** before the body portion **162** passes the latch nose **82**, so that an operator will immediately know that the shifter fork has not been properly located on the arbor. Even in the event the operator ignores the warning, the moment he releases the reversed shifter fork, the compression spring **74** will eject it because the shifter fork is not latched.

It is to be noted that the slot **182** of the positioning block **180** also positions the shifter fork circumferentially with respect to the arbor **72** and hence with respect to the circumferential portion of the turntable also. This is because the stub shaft **174** of the shifter fork can fit only vertically in the slot as indicated in Fig. 11.

While I have described my invention in forms which I now prefer, it is obvious that it is subject to considerable modification for adjusting its principles to the shape of the particular irregular object intended to be heat-treated, so that the claims should be interpreted with this in mind, subject of course to the limitations imposed by the prior art.

I claim as my invention:

1. An induction heating machine of a type described comprising, in combination, a cabinet provided with a shelf and with a sink having a front and a pair of sides, work-handling equipment in said sink comprising a pair of horizontal turntables alongside of each other and drive means for indexing said turntables in opposite directions, with facing turntable-sides moving toward said shelf, each turntable comprising a plurality of stations, each station having a work-holding means comprising a substantially horizontal radially extending arbor, positioning means associated with said arbor, for predetermining the position of work on said arbor, a spring about said arbor, and a latch associated with said arbor for holding work thereon against the bias of said spring, a pair of induction heating coils carried by said shelf, with one coil in a predetermined position over each turntable, said drive means comprising means indexing each turntable through a plurality of positions and means for raising each turntable to place a workpiece on an arbor of each turntable in heating position in the associated heating coil and subsequently to lower said turntables, and release means comprising an abutment member in a position at a side of said sink engageable by certain of said latches when said turntables are raised.

2. An induction heating machine comprising a turntable having a central hole and provided with a plurality of work-holding stations, each station comprising a work-holding member, a spring means biased to eject a workpiece from said member, and a latch means holding said

workpiece on said member against the action of said spring, drive means for moving said turntable so that each station moves successively to a loading position, a heat-treatment position, and an unloading position, an induction heating coil at said heat-treatment position, said coil having elongated spaced sides providing a heat-treating space therebetween for heating the workpiece of the station thereat, a stationary release rod, said rod carrying a release member located at said unloading position and engageable with the latch means of the station thereat to release the associated workpiece.

3. An induction heating machine as defined in claim 2 but further characterized by said turntable being annular and by said release rod extending upwardly through the central hole of said turntable.

4. An induction heating means as defined in claim 2 but further characterized by said drive means angularly indexing said turntable step-by-step, and raising and lowering said turntable vertically when each of said stations is in said heat-treatment position, and by said release member engaging said latch means of a station at said unloading position when said turntable is vertically moved by said drive means.

5. Induction heating equipment for hardening the tips of shifter forks, each having a body-portion having a hole and legs extending from said body-portion, the ends of said legs having said tips to be hardened, said induction heating equipment comprising work-holding means comprising an arbor that substantially fits said hole so that it receives a shifter fork, and work-positioning means fixing the position of said shifter fork in a predetermined manner with respect to said arbor, and with the fork-legs extending outwardly therefrom, said work-positioning means engaging an outer part of said shifter fork; heat-treating means comprising an induction heating coil having elongated spaced sides providing a heat-treating space for simultaneously receiving the tips of said legs, and drive means relatively moving said heat-treatment means and said work-holding means temporarily to place said leg-tips in said heat-treating space.

6. Induction heating equipment as defined in claim 5 but characterized further by said work-positioning means comprising a compression spring on said arbor, and a latch holding the shifter fork against the action of said spring, and by a release means operable to release said latch.

7. An induction heating machine of a type described comprising, in combination, a cabinet provided with a sink having a front and a pair of sides; work-handling equipment in said sink comprising a pair of horizontally positioned turntables alongside of each other and drive means for said turntables, each turntable being annular in shape and having a central hole and comprising a plurality of stations, each station having work-holding means, biasing means tending to eject work from said work-holding means, and latch means for latching the work on said work-holding means against the action of said biasing-means; heat treating means carried by said cabinet comprising an induction heating coil over each of said turntables; and release means for releasing said latch means when the associated station is at a side of said sink; said drive means having means turning said turntables in opposite directions, with the facing parts of the turntables moving backwards with respect to said sink, said drive means comprising means indexing said turntables to place each of said stations in a plurality of different positions, and comprising means raising and lowering said turntable between indexing movements, and by a first of said turntables comprising an annular table, and by said release means comprising a stationary rod extending upwardly through the hole in said annular table, said rod carrying an abutment member for enaging said latch means of the station at a side of said sink.

8. An induction heating machine of a type described comprising, in combination, a cabinet provided with a sink having a front and a pair of sides; work-handling equipment in said sink comprising a pair of horizontally positioned turntables alongside of each other and drive means for said turntables, each turntable being annular in shape and having a central hole and comprising a plurality of stations, each station having work-holding means, biasing means tending to eject work from said work-holding means, and latch means for latching the work on said work-holding means against the action of said biasing means; heat-treating means carried by said cabinet comprising an induction heating coil over each of said turntables; and release means for releasing said latch means when the associated station is at a side of said sink; said drive means having means turning said turntables in opposite directions, with the facing parts of the turntables moving backwards with respect to said sink, said drive means comprising means indexing said turntables to place each of said stations in a plurality of different positions, and comprising means raising and lowering said turntable between indexing movements, and characterized by said release means comprising an abutment member associated with each turntable, said abutment members engaging and releasing certain of said latch means when the associated turntable is raised.

9. An induction heating machine of a type described comprising, in combination, a cabinet provided with a sink having a front and a pair of sides; work-handling equipment in said sink comprising a pair of horizontally positioned turntables alongside of each other and drive means for said turntables, each turntable being annular in shape and having a central hole and comprising a plurality of stations, each station having work-holding means, biasing means tending to eject work from said work-holding means, and latch means for latching the work on said work-holding means against the action of said biasing means; heat-treating means carried by said cabinet comprising an induction heating coil over each of said turntables; and release means for releasing said latch means when the associated station is at a side of said sink; said drive means having means turning said turntables in opposite directions, with the facing parts of the turntables moving backwards with respect to said sink, said work-holding means comprising a substantially horizontal, radially extending, work-receiving arbor, and by each of said biasing means comprising a spring around the associated arbor adapted to be compressed when work is placed on the arbor.

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