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⑤ Floating valve seat inductor.

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Courier Press, Leamington Spa, England.

Description

This invention relates to the art of inductively heating valve seats and more particularly to a floating valve seat inductor assembly to be used in inductively heating valve seats.

A floating valve seat inductor of the general type to which the present invention is directed is disclosed in US—E—29,046 to which reference is directed.

With the advent of low lead gasoline, it is now common practice to provide hardened valve seats in internal combustion engines. In this manner, the valve seats have a better wear characteristic and can withstand the constant pounding by a poppet valve. This is needed because the lubricating effect of lead and phosphorous in the gasoline being consumed is no longer available. Several concepts have been used in providing such hardened valve seats. One of these is to utilize hardened inserts to define the valve seats themselves. Of course, this solution presents obvious difficulties in that the valve seats are more expensive and require substantially more manufacturing and assembling costs. The most common approach is to inductively heat the conical surface forming the valve seat of an internal combustion engine by positioning an inductor adjacent the seat and directing high frequency currents through the inductor. After the inductor has been energized to heat the valve seats inductively, the heating operation is discontinued. At that time, the valve seat is quenched, generally by mass quenching which results from conduction of heat from the valve seat rapidly into the surrounding metal. In high production, it is desirable to heat all valve seats at the same time for subsequent quench hardening by liquid or mass cooling.

US—E—29,046 illustrates a machine for inductively heating several valve seats simultaneously. In accordance with the teachings of this prior patent a plurality of floating inductor assemblies are provided in a plurality of housings which are movable toward and away from respective valve seats of an engine component. Each of the inductor assemblies includes an inductor loop at one end of a carrier and a nose concentric with the loop extending toward the valve seat. This nose contacts the valve bore in the engine component to center the respective inductor carriers with respect to the valve seat preparatory to induction heating. This action occurs when the housings carrying the respective inductor assemblies are moved toward the valve seats. By using the inductor carrier and nose which enter the bore, each of the inductor assemblies is centered with respect to the particular valve seat to be heated, irrespective of certain manufacturing tolerances between adjacent valve seats.

After the housings move the carriers into the position with the inductors concentric with the valve seats, the motion of the housing toward the valve seats continues until the inductors actually engage the valve seats. Thereafter, the various housings carrying the inductor assemblies are

locked together and moved in unison away from the engine component a distance corresponding to the desired air gap for proper induction heating. In this manner, the machine compensates for axial offset of the respective valve seats being processed during a given cycle. To allow for radial alignment of the respective inductor assemblies with respect to the valve seats as the aligning noses enter the valve bore, each of the inductor assemblies floats within their respective housings in a manner to allow movement only in the radial direction. To accomplish this, a flange is provided around the inductor carrier of the inductor assembly. This flange is clamped within a companion housing to allow only radial movement. During processing of the valve seats, the inductor at the end of the inductor assembly is properly positioned in the radial direction and in the axial direction for the desired heating of the valve seats. This prior machine has been exceedingly successful and is generally used throughout the automotive industry.

As the engines being used in automobiles are reduced in size, the spacing between adjacent valve seats to be hardened has been reduced. Consequently, the prior housings carrying the floating inductor assemblies were too large to allow the desired small spacing between the adjacent inductors. This problem was solved in one of two ways. Either the engine component was processed twice so that only alternate valve seats were hardened during a heating cycle or the floating inductor assemblies were machined so that the inductor and nose were offset from the primary axis of the total floating inductor assembly. Each of these solutions had disadvantages. If the engine component required two cycles for processing its valve seats, the production rate was substantially reduced. If offset inductor assemblies were provided, it was necessary to provide different structures for the inductor assemblies used at adjacent valve seats. Consequently, at least two designs had to be manufactured and stockpiled. Also, even with the offset inductors, it was not always possible to simultaneously process the valve seats of the head of a relatively small engine.

The present invention relates to an improvement in the floating inductor assembly of the type shown in US—E—29,046, which invention overcomes the disadvantages experienced when the valve seats to be inductively heated for subsequent quenching are relatively close together.

According to the invention there is provided a floating inductor unit for an apparatus for inductively heating a generally conical valve seat disposed concentrically around a central bore in an engine component, said unit comprising an element adapted to be mounted in said apparatus for selective movement along an axis between an extended heating position and a retracted loading position therein, and an inductor assembly, said inductor assembly including a carrier, an inductor having a shape generally matching said seat and mounted onto said carrier, an aligning nose

member extending from said carrier parallel to said axis and generally concentric with said inductor, a flange on said carrier extending outwardly perpendicular thereto supporting said inductor assembly on said element, said flange co-acting with said element for allowing only radial movement of said carrier with respect to said element when, in use, said nose member enters into said bore during movement of said element into said heating position with said inductor in heating relationship with said seat, and centering means for biasing said carrier into a preselected radial position, characterised by said flange having first and second portions extending in diametrically opposite directions from said carrier, first coupling means for coupling said first flange portion onto said element, second coupling means for coupling said second flange portion onto said element, said first and second coupling means being generally diametrically opposed with respect to said axis, said coupling means allowing only radial movement of said flange portions with respect to said element, said element having a first dimension in a first direction transverse to both of said coupling means and a second dimension in a second direction generally orthogonal to said first direction and extending between said coupling means, said first dimension being substantially less than said second dimension; and said centering means including a centering structure at each of said flange portions.

The invention also includes an apparatus for inductively heating a generally conical valve seat disposed concentrically around a central bore in an engine component, including a floating inductor unit as defined in the last preceding paragraph, said element of said unit being mounted for selective movement along an axis between an extended heating position and a retracted loading position in the apparatus.

The invention also includes an inductor assembly as defined in the last but one preceding paragraph for a floating inductor unit as defined in that paragraph.

In order that the invention may be well understood, the preferred embodiment thereof referred to above and given by way of example only, will now be described, reference being had to the accompanying drawings, in which:

Figure 1 is a schematic top elevational view generally illustrating a machine for inductively heating a series of spaced valve seats in an engine component;

Figures 2A, 2B and 2C are enlarged side elevational views showing somewhat schematically the structure illustrated in Figure 1 in three operative positions;

Figure 3 is an enlarged cross-sectional view showing certain details of the machine schematically illustrated in Figure 1;

Figure 4 is a cross-sectional view taken generally along line 4—4 of Figure 3;

Figures 5 and 6 illustrate a structure for adjusting the angular position of a supporting flange onto an inductor assembly in the machine; and

Figures 7 and 8 are schematic partial views showing the relationship between the input gap of a heating inductor and the flange utilizing the concept illustrated in Figures 5 and 6.

Referring to the drawings, Figures 1 and 2 show a machine or apparatus A which coacts with an engine component B supported opposite thereto for inductively heating the generally conical valve seats C of the engine component. In accordance with standard practice, each of the valve seats has a concentric bore D into which the stem of a poppet valve fits during operation of the engine. Since the embodiment is an improvement in the apparatus described in US—E—29,046, to which reference is directed, machine or apparatus A will be described only briefly. This apparatus includes a frame 10 movable on a base 12 and adapted to carry a plurality of locking and journal blocks 14 so that the blocks move in unison with frame 10 as it is reciprocated between the heating and loading positions. Extending outwardly from each block 14 there is provided a housing or movable element 20 supported onto a tube 22 which is slidably received within a block 14. The block includes a locking arrangement for locking tubes 22 with respect to blocks 14 and, thus, frame 10 when desired. Around each tube 22 there is provided a coil spring 24 which bias housings 20 outwardly from blocks 14 toward engine component B. In accordance with known practice, the amount of outward movement of housing 20 is restricted by structure within the blocks 14 which is not shown. The locking arrangement within the blocks is not shown since it does not form a part of the present invention and is clearly illustrated in US—E—29,046. Within each housing 20 and forming a floating inductor unit therewith, is an inductor assembly F having an outwardly facing inductor loop 30 with an outwardly extending centering nose member 32. Extending in the opposite direction are tubular inlet leads 34 which will be described in more detail and which are also shown in US—E—29,046. Inductor loop 30 is adapted to be energized when adjacent a valve seat C for the purpose of inductively heating the valve seat. After inductor loop 30 is de-energized, the mass surrounding the valve seat quenches the valve seat to harden the conical surface thereof. This increases the wear characteristics of the valve seat.

In operation, housings 20 are aligned with respective valve seats C of engine component B, as shown in FIGURE 1. Frame 10 is moved into a retracted position, generally shown in FIGURE 2A, and springs 24 force housings 20 in a forward or extended direction to a position which will allow loading of an engine component B in front of machine A. Thereafter, as shown in FIGURE 2B, frame 10 is moved toward engine component B. This moves all of the locking and journal blocks 14 carrying housings 20 which are reciprocally mounted on the blocks. When nose 32 engages bore D, inductor loop 30 is centered with respect to valve seat C. After this centering action, which generally involves slight radial shifting of

assembly F and is shown in FIGURE 2B, is accomplished, frame 10 moves further in the forward direction until all of the inductor loops engage their respective valve seats. This is also shown in FIGURE 2B. Thus, irrespective of the axial displacement of adjacent valve seats, springs 24 allow proper positioning of the inductor loops in contact with the respective valve seats. In this position, locking blocks 14 lock all tubes 22 with respect to the blocks and, thus, with respect to common frame 10. Thereafter, frame 10 is retracted, as shown in FIGURE 2C, a distance corresponding to the desired air gap between the inductor loops and the valve seats. Consequently, all inductor loops are moved away from the valve seats a distance necessary to provide a desired, preselected air gap. This gap is illustrated as .040 inches (1 mm) in FIGURE 2C. In this slightly retracted, intermediate position, all inductor loops are energized for inductively heating the valve seats. Thereafter, the inductor loops are de-energized for quenching of the valve seats. The heating time, frequency and power level determine the amount and depth of heating. Following heating, frame 10 is retracted on base 12 to a loading position and the supporting tubes 22 are released for again projecting housings 20 into a forward position for subsequent operation as described. As can be seen, the floating inductor assemblies F must move radially to compensate for any radial misalignment between the centered position of assembly F and the actual position of a valve seat to be hardened. In practice, bore D and valve seat C are machined in a fixed relationship and generally in unison; therefore, by engaging bore D and shifting inductor assembly F with respect to this bore, loop 30, which is concentric with nose 32, is moved into a concentric position with respect to seat C. The illustrated embodiment of the present invention has a mechanism for mounting assembly F in housing 20 and for allowing this radial movement of floating inductor assembly F with respect to the housing, which does not require a substantial transverse dimension for housing 20. The transverse dimension means a dimension in a direction extending between the valve seats as shown in FIGURE 1.

Since all of the assemblies F are identical, only one assembly will be described in detail and this description will apply equally to all inductor assemblies F. Referring now to FIGURE 3, a carrier 60 machined from an insulating material includes a forwardly facing recess 62 into which is adhesively secured a plug 64 also formed from an insulation material. Inductor loop 30 is a hollow conductor and is held between plug 64 and carrier 60. Carrier 60 includes an outwardly facing conical portion onto the end of which is mounted the previously discussed centering nose member 32. This member has an enlarged support shoulder 32a abutting the end of plug 64, a cylindrical body portion 32b, which is concentric with axis x, and a tapered point 32c which allows insertion of nose member 32 into bore D. The tubular inlet leads 34 are formed as hollow tubes 70 and 72, each of

which forms an electrical connection for loop 30. An outer insulator sleeve 74 is provided on tube 70 and insulation sleeve 76 is provided between tubes 70, 72. Tubes 70, 72 are connected to leads 80, 82, respectively, at an input gap 90 of generally circular loop 30. Coolant lines 100, 102 direct coolant through tubes 70, 72 and leads 80, 82 for circulation of a coolant through loop 30. Electrical connections 110, 112 are connected across an appropriate power supply and are connected electrically to tubes 70, 72 for completing the electrical circuit through loop 30. Thus, when energizing connections 110, 112 alternating current is directed through loop 30. This alternating current, in practice, is radio frequency and has a power level to provide the desired heating temperature and pattern in a valve seat.

Onto carrier 60 there is secured a rectangular flange 140 having diametrically opposed flange portions 142, 144 extending radially outwardly from axis x. To fix the flange onto the carrier there is provided a coupling arrangement, best shown in FIGURES 5 and 6. In this structure, a sleeve 150 has a stop shoulder 152 and an outwardly facing cylindrical surface 150a defining a protrusion which enters into a recess 154 of carrier 60. During assembly, a pin 156 is forced through an opening in the outer surface of carrier 60 and into a bore within the metal sleeve 150. This pin locks sleeve 150 onto carrier 60 into a position where it can be assembled by an adhesive. Flange 140 includes a central cylindrical bore 160 surrounding surface 150a and fixedly held to sleeve 150 by a set screw 170 having an inwardly directed pin 170a. This pin is adapted to enter one of several angularly spaced bores 180 in sleeve 150. Any number of bores could be provided; however, three bores are illustrated. In this manner, the relative position of the flange portions 142, 144 with respect to loop 30 can be adjusted slightly for a purpose to be explained in more detail with respect to FIGURES 7 and 8. Rectangular flange 140 is assembled onto and becomes a part of the floating inductor assembly F by the structure so far explained.

Rectangular flange 140 is supported within housing 20 by spaced rectangular plates 200, 202 between which extends a rectangular wall 204. Peripheral bolts 206 clamp plates 200, 202 together to capture flange portions 142, 144 within housing 20. As previously mentioned, the coupling between housing 20 and floating inductor assembly F allows only radial movement between these two assembled components. To accomplish this, thrust units 220, 222, 224 and 226 are provided which firmly grip flange portions 142, 144 in a manner to allow only radial displacement of the total inductor assembly F with respect to the housing 20, which housing is reciprocated to and from the valve seat as previously described. Connections 100, 102 and 110, 112, as shown in FIGURE 3, are movable slightly to allow for this radial displacement of the floating inductor assembly with respect to the housing 20, which housing is fixed in block 14 in a radial

direction with respect to axis x of assembly F. Thrust units 220, 222, 224, 226 are formed in pairs and are located at the diametrically opposed flange portions 142, 144 to define a relatively small transverse distance which is used for controlling the radial movement of assembly F. Each of the thrust units includes spaced rings 230, 232 which define facing flat surfaces between which are located a circular array of ball bearings 240. These bearings are held together by an appropriate ball retainer 234, shown in FIGURE 4. The clamping action between plates 200, 202 exerts thrust between rings 230, 232, the former of which is supported on a rectangular plate and the latter of which is fixed onto flange 140, as best shown in FIGURES 3 and 4. In this manner, movement of the flange can take place in a radial direction as determined by the force exerted on hose 32 as it enters bore D during movement of frame 10 in the direction shown in FIGURE 2B. Sufficient clamping pressure is exerted onto the thrust units to prevent tilting of flange 140 during centering of loop 30 with respect to valve seat C. To support rings 230 of units 222, 226, there are provided circular bosses 250. A cam insert 252 supports the other two rings 230 and also provides a generally conical cam recess 252a into which a cam follower assembly 260 is forced to center both flange portions 142 and 144 with respect to housing 20. A variety of cam followers could be provided; however, cam follower assembly 260 includes an outer cylindrical surface to locate rings 232 onto flange 140. This function is provided by a hollow retainer 262 extending in opposite directions from flange 140 and adapted to receive an internal plunger 264 having a ball follower 266 which is forced toward cam recess 252a by an appropriate spring 268. For the purpose of compensating for tolerances and for adjusting the position of inductor 30 in an axial direction, insert 252 has a threaded shank 252b received in plate 200. Set screw 270 locks the insert in a position adjusted by an Allen wrench in recess 252c. A clearance opening 272 is provided at the forward end of housing 20 to allow slight radial movement of inductor assembly F during the centering action. An appropriate O-ring seal 280 is provided around the clearance opening to prevent ingress of deleterious material into the interior of housing or movable element 20.

As can be seen, the use of a rectangular flange 140 allows the use of relatively small, standard ball bearing rings for thrust elements in the assembly. Also any adjustment of pressure can be done by using adjustable inserts 252. Housing 20 includes an internal generally rectangular cavity 290, best shown in FIGURE 4. The periphery of this cavity is only slightly larger than the periphery of flange 140 to allow slight radial movement of the flange within the housing.

Referring now more particularly to Figure 4, it is noted that the use of diametrically opposed flange portions 142, 144 allows support of floating inductor assembly F without requiring a relatively large transverse dimension b for housing 20. This

dimension is dictated primarily by the transverse width a of the thrust units 222—226 and the width of flange portions 142, 144 needed to coact with these units. This dimension a is substantially less than the vertical height c of housing 20. In practice, the thickness or transverse dimension b is less than 7.5 cm when the height of housing 20 is greater than 10 cm. The clearance in cavity 290 for flange 140 is such that balls 240 stay on their supporting rings and the cam and followers on portions 142, 144 remain in active engagement. This dimension is selected to accommodate the largest axial misalignment of a valve seat with an assembly F and allows for movement of the flange relative to the housing 20 in any radial direction.

By providing the support arrangements in the vertical position and not in the transverse position, a relatively narrow housing can be provided. This then allows two housings to be moved close together as shown in FIGURE 1 to accommodate closely spaced valve seats in an engine component B. Also, only one design is necessary. It is not required that two floating inductor assemblies be provided, one for a right hand valve seat and the other for an adjacent left hand valve seat in a pair of seats. As shown in FIGURES 7 and 8, adjacent valve seats can be processed by reversing the position of the flange portions 142, 144. In this manner, the gaps 90 of inductor loops 30, which are on a side of assembly F, face in opposite directions, which relationship is desired in inductively heating two adjacent valve seats in a pair. By providing the set screw 170 and companion angularly disposed bores 180, gaps 90 can be adjusted slightly with respect to the vertical position of flange 140. In this manner, the gaps can be moved to desired circumferential positions in a valve seat being heated during set up of the machine A. By providing the gap 90 on the side of an assembly F, a right and left heating unit can be created only by inverting assembly F in its housing 20. Thereafter, slight angular adjustments can be made by turning flange 140 on carrier 60.

In practice 202 and wall 204 are formed as a unit.

Claims

1. A floating inductor unit for an apparatus for inductively heating a generally conical valve seat (C) disposed concentrically around a central bore (D) in an engine component (B), said unit comprising an element (30) adapted to be mounted in said apparatus for selective movement along an axis between an extended heating position and a retracted loading position therein, and an inductor assembly, said inductor assembly including a carrier (60), an inductor (30) having a shape generally matching said seat and mounted onto said carrier, an aligning nose member (32) extending from said carrier parallel to said axis and generally concentric with said inductor, a flange (140) on said carrier (60) extending outwardly perpendicular thereto supporting said inductor

assembly on said element (20), said flange (140) coacting with said element (20) for allowing only radial movement of said carrier with respect to said element (20) when, in use, said nose member (32) enters into said bore (D) during movement of said element into said heating position with said inductor in heating relationship with said seat, and centering means (252, 260) for biasing said carrier into a preselected radial position, characterised by said flange having first and second portions (142, 144) extending in diametrically opposite directions from said carrier (60), first coupling means (220, 222) for coupling said first flange portion (142) onto said element (20), second coupling means (224, 226) for coupling said second flange portion (144) onto said element (20), said first and second coupling means being generally diametrically opposed with respect to said axis, said coupling means allowing only radial movement of said flange portions with respect to said element (20), said element (20) having a first dimension (b) in a first direction transverse to both of said coupling means and a second dimension (c) in a second direction generally orthogonal to said first direction and extending between said coupling means, said first dimension being substantially less than said second dimension; and said centering means including a centering structure at each of said flange portions.

2. A unit as claimed in claim 1, wherein each of said coupling means includes first and second thrust units (220, 224 and 222, 226) one on each axial side of one of said flange portions (140, 142) and means (200, 202) on said element (20) for clamping said flange portions between said thrust units, each of said thrust units including intermediate ball bearings to allow radial deflection only of said thrust units.

3. A unit as claimed in claim 2, wherein said thrust units (220, 222, 224, 226) each include a first member (232) secured to said flange portion (142, 144) and engaging said ball bearings and a second member (230) secured to said element (20) and engaging said ball bearings.

4. A unit as claimed in claim 3, wherein said first and second members (232, 230) are generally flat rings.

5. A unit as claimed in claim 3 or 4, wherein said centering structure includes a cam follower (260) supported on a flange portion in the center of one of said first members (232) and a cam element (252) on said element (20) and within one of said second members (230).

6. A unit as claimed in any one of the preceding claims, wherein said inductor (30) is a loop with an input gap (90) and wherein said unit includes means (150a, 160, 170, 180) for adjusting the angular position of said flange (140) with respect to said input gap (90).

7. A unit as claimed in claim 6, wherein said adjusting means includes a cylindrical portion (150a) on said inductor carrier (60) and a cylindrical mounting opening (160) in said flange (140), with said flange mounted with said opening

journalled on said cylindrical portion and means (170, 180) for locking said flange in adjusted angular position on said cylindrical portion.

8. An apparatus for inductively heating a generally conical valve seat (C) disposed concentrically around a central bore (D) in an engine component (B), including a floating inductor unit as claimed in any one of claims 1 to 7, said element (20) of said unit being mounted for selective movement along an axis between an extended heating position and a retracted loading position in the apparatus.

9. An inductor assembly as defined in any one of claims 1 to 7 for a floating inductor unit as claimed in any one of claims 1 to 7.

Revendications

1. Ensemble formant inducteur flottant pour un appareil pour chauffer par induction un siège de soupape (C) de forme générale conique disposé concentriquement autour d'un alésage central (D) dans un composant de moteur (B), ledit ensemble comportant un élément (20) prévu pour être monté dans ledit appareil pour effectuer un déplacement sélectif le long d'un axe entre une position de chauffage en extension et une position de chargement en rétraction dans l'appareil; et comportant un ensemble formant inducteur, ledit ensemble formant inducteur comprenant un support (60), un inducteur (30) dont la forme s'adapte de façon générale audit siège et qui est monté sur ledit support, comprenant aussi un élément formant nez d'alignement (32) qui s'étend depuis ledit support, parallèlement audit axe, et de façon générale concentriquement audit inducteur, comprenant aussi un plateau (40) monté sur ledit support (60), s'étendant vers l'extérieur perpendiculairement audit support et supportant ledit ensemble formant inducteur monté sur ledit élément (20), ledit plateau (140) collaborant avec ledit élément (20) pour ne permettre qu'un déplacement radial dudit support par rapport audit élément (20) lorsque, en service, ledit élément formant nez (32) pénètre dans ledit alésage (D) au cours du déplacement dudit élément pour venir dans ladite position de chauffage avec ledit inducteur en relation de chauffage avec ledit siège, et comprenant aussi un moyen (252, 260) pour solliciter ledit support à venir dans une position radiale présélectionnée, caractérisé en ce que ledit plateau présente une première portion et une seconde portion (142, 144) qui s'étendent dans des directions diamétralement opposées depuis ledit support (60), présente aussi un moyen de couplage (220, 222) pour coupler ladite première portion du plateau (142) sur ledit élément (20) et un second moyen de couplage (224, 226) pour coupler ladite seconde portion du plateau (144) sur ledit élément (20), le premier moyen de couplage et le second moyen de couplage étant, de façon générale, diamétralement opposés par rapport audit axe, lesdits moyens de couplage ne permettant qu'un déplacement radial desdites portions du plateau

par rapport audit élément (20), ledit élément (20) ayant une première dimension (b) dans une première direction transversalement à l'un et à l'autre desdits moyens de couplage et une seconde dimension (c) dans une seconde direction généralement orthogonale à ladite première direction et s'étendant entre lesdits moyens de couplage, ladite première dimension étant sensiblement inférieure à ladite seconde dimension; et lesdits moyens de centrage incluant une structure de centrage à chacune desdites portions du plateau.

2. Ensemble comme revendiqué dans la revendication 1, dans lequel chacun desdits moyens de couplage comporte un premier ensemble de butée et un second ensemble de butée (220, 224 et 222, 226), un de chaque côté, par rapport à l'axe, de l'une desdites portions du plateau (140, 142) et un moyen (200, 202) monté sur ledit élément (20) pour brider lesdites portions du plateau entre lesdits ensembles de butée, chacun desdits ensembles de butée incluant des billes intermédiaires pour ne permettre qu'une déviation radiale desdits ensembles de butée.

3. Ensemble comme revendiqué dans la revendication 2, dans lequel lesdits ensembles de butée (220, 222, 224, 226) comportent chacun un premier élément (232) fixé à ladite portion du plateau (142, 144) et venant au contact desdites billes et un second élément (230) fixé audit élément (20) et venant au contact desdites billes.

4. Ensemble comme revendiqué dans la revendication 3, dans lequel ledit premier élément et ledit second élément (232, 230) sont des bagues de forme générale plate.

5. Ensemble comme revendiqué dans la revendication 3 ou 4, dans lequel ladite structure de centrage comporte un ensemble commandé par une came (260) supporté sur une portion du plateau au centre de l'un desdits premiers éléments (232) et un élément formant came (252) monté sur ledit élément (20) et à l'intérieur de l'un desdits seconds éléments (230).

6. Ensemble comme revendiqué dans l'une quelconque des revendications précédentes, dans lequel ledit inducteur (30) est une boucle présentant une fente d'entrée (90) et dans lequel ledit ensemble comporte des moyens (150a, 160, 170, 180) pour régler la position angulaire dudit plateau (140) par rapport à ladite fente d'entrée (90).

7. Ensemble comme revendiqué dans la revendication 6, dans lequel lesdits moyens de réglage comportent une portion cylindrique (150a) montée sur ledit support (60) de l'inducteur et une ouverture cylindrique de montage (160) dans ledit plateau (140), ledit plateau étant monté avec ladite ouverture tourillonnant sur ladite portion cylindrique, ainsi que des moyens (170, 180) pour verrouiller ledit plateau, dans ladite position angulaire réglée, sur ladite portion cylindrique.

8. Appareil pour chauffer par induction un siège de soupape (C), de forme générale conique, disposé concentriquement autour d'un alésage central (D) dans un composant de moteur (D), com-

portant un ensemble formant inducteur flottant comme revendiqué dans l'une quelconque des revendications 1 à 7, ledit élément (20) dudit ensemble étant monté pour effectuer un déplacement sélectif le long d'un axe entre une position de chauffage en extension et une position de chargement en rétraction dans l'appareil.

9. Ensemble formant inducteur tel que défini dans l'une quelconque des revendications 1 à 7 pour un ensemble formant inducteur flottant tel que revendiqué dans l'une quelconque des revendications 1 à 7.

Patentansprüche

1. Schwebende Induktoreinheit für eine Vorrichtung zum induktiven Erhitzen eines im allgemeinen konischen Ventilsitzes (C), der eine in einem Maschinenteil (B) angeordnete Zentralbohrung (D) konzentrisch umgibt, wobei die Induktoreinheit ein Element (20) aufweist, das in der Vorrichtung für eine Auswahlbewegung längs einer Achse zwischen einer ausgeschobenen Heizstellung und einer zurückgezogenen Ladestellung montiert werden kann und wobei die Induktoreinheit eine Induktionsvorrichtung aufweist, die mit einem Träger (60) und einem Induktor (30) versehen ist, dessen Gestalt im wesentlichen mit dem Sitz übereinstimmt und der auf dem Träger befestigt ist und wobei die Induktoreinheit ein Zentrier-nasenteil (32) aufweist, der sich vom Träger aus parallel zu der genannten Achse und im allgemeinen konzentrisch zum Induktor erstreckt und wobei auf dem Träger (60) ein Flansch (140) angeordnet ist, der sich lotrecht dazu nach außen erstreckt und die Induktionseinrichtung an dem genannten Element (20) abstützt, wobei der Flansch (140) mit dem genannten Element (20) zusammenwirkt, um dem genannten Träger nur eine Radialbewegung gegenüber dem genannten Element (20) zu ermöglichen, wenn der Nasenteil (32) im Betrieb bei einer Bewegung des genannten Elementes in die Heizstellung in die genannte Bohrung (D) eintritt und der Induktor sich mit dem Sitz in einer Heizbeziehung befindet und wobei Zentriermittel (252, 260) vorgesehen sind, die den Träger in eine vorgewählte Radialstellung drücken, dadurch gekennzeichnet, daß der Flansch erste und zweite Teile (142, 144) aufweist, die sich von dem genannten Träger (60) aus in diametral einander gegenüberliegende Richtungen erstrecken, daß erste Kopplungsmittel (220, 222) zum Koppeln des genannten ersten Flanschteiles (142) mit dem genannten Element (20) und zweite Kopplungsmittel (224, 226) zum Koppeln des genannten zweiten Flanschteiles (144) an das genannte Element (20) vorgesehen sind und daß die genannten ersten und zweiten Kopplungsmittel in bezug auf die genannte Achse etwa diametral einander gegenüberliegen, wobei die Kopplungsmittel nur eine Radialbewegung der genannten Flanschteile gegenüber dem genannten Element (20) erlauben und daß das Element (20) in einer ersten, quer zu beiden Kopplungsmitteln angeordneten Richtung eine erste Abmessung (b) und

in einer zweiten, im wesentlichen rechtwinklig zu der ersten und sich zwischen den Kopplungsmitteln erstreckenden Richtung eine zweite Abmessung (c) hat, wobei die erste Abmessung wesentlich kleiner ist als die zweite Abmessung und daß die Zentriermittel an jedem der genannten Flanschteile eine Zentriereinrichtung aufweisen.

2. Einheit nach Anspruch 1, wobei jedes der Kopplungsmittel erste und zweite Druckeinheiten (220, 224 und 222, 226) aufweist, von denen sich je eine auf axial gegenüberliegenden Seiten eines der Flanschteile (140, 142) befindet und wobei Mittel (220, 202) auf dem genannten Element (20) zum Festklemmen der genannten Flanschteile zwischen den Druckeinheiten vorgesehen sind und jede der genannten Druckeinheiten Kugel-Zwischenlager aufweist, die nur eine radiale Auslenkung der Druckeinheiten gestatten.

3. Einheit nach Anspruch 2, bei der jede der genannten Druckeinheiten (220, 222, 224, 226) ein erstes Teil (232) aufweist, das an dem genannten Flanschteil (142, 144) befestigt ist und mit den genannten Kugellagern und einem zweiten Teil (230) zusammenwirkt, das an dem genannten Element (20) befestigt ist und die genannten Lagerkugeln berührt.

4. Einheit nach Anspruch 3, bei der die ersten und zweiten Teile (232, 230) im allgemeinen flache Ringe sind.

5. Einheit nach Anspruch 3 oder 4, bei der die genannte Zentrierkonstruktion eine Kurven-Folgeeinrichtung (260) aufweist, die in der Mitte eines der genannten ersten Teile (232) auf einem Flanschteil abgestützt ist und wobei ein Kurvenbahn-Element (252) auf dem genannten Element

(20) und innerhalb eines der genannten zweiten Teile (230) angeordnet ist.

6. Einheit nach einem der vorhergehenden Ansprüche, in der der genannte Induktor (30) eine Leitungsschleife mit Eingangsspalt (90) ist und wobei die Einheit Mittel (150a, 160, 170, 180) zum Einstellen der Winkellage des genannten Flansches (140) gegenüber dem genannten Eingangsspalt (90) aufweist.

7. Einheit nach Anspruch 6, bei der das Einstellmittel auf dem genannten Induktorträger (60) einen zylindrischen Teil (150a) und in dem Flansch (140) eine zylindrische Befestigungsöffnung (160) aufweist, wobei der genannte Flansch mit seiner genannten Öffnung auf dem genannten zylindrischen Teil gelagert ist und Mittel (170, 180) zum Befestigen des genannten Flansches in gerichteter Winkellage auf dem genannten zylindrischen Teil vorgesehen sind.

8. Vorrichtung zum induktiven Erhitzen eines im allgemeinen konischen Ventilsitzes (C), der konzentrisch eine Zentralbohrung (D) in einem Maschinenteil (B) umgibt, wobei die Vorrichtung eine schwebende Induktoreinheit aufweist, wie sie in einem der Ansprüche 1 bis 7 beansprucht ist, wobei das genannte Element (20) der genannten Einheit so montiert ist, daß es eine wahlweise Bewegung längs einer Achse zwischen einer ausgeschobenen Heizstellung und einer zurückgezogenen Ladestellung in der Vorrichtung ausführen kann.

9. Induktionseinheit, wie definiert in irgendeinem der Ansprüche 1 bis 7 für eine schwebende Induktoreinheit, wie sie in irgendeinem der Ansprüche 1 bis 7 beansprucht ist.

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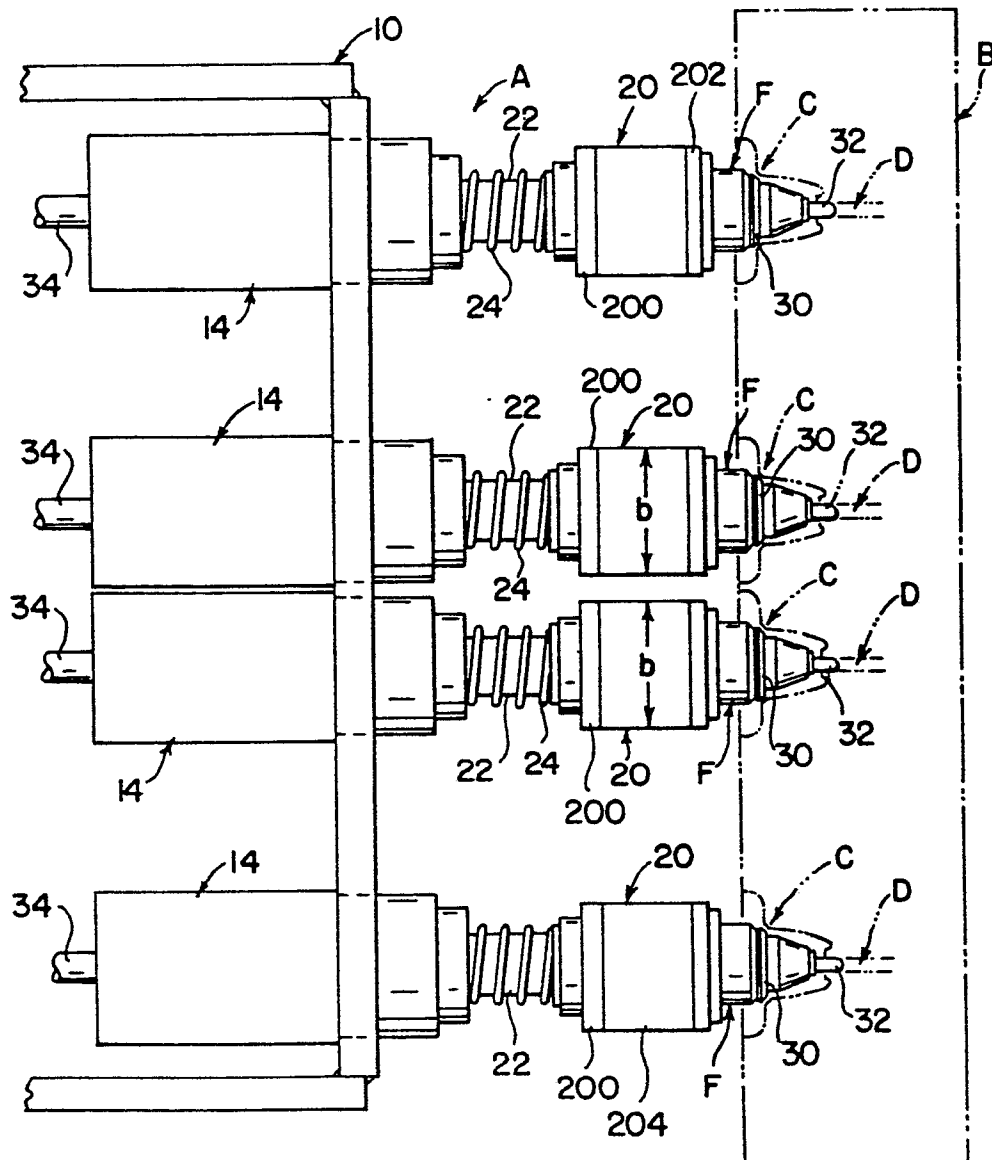
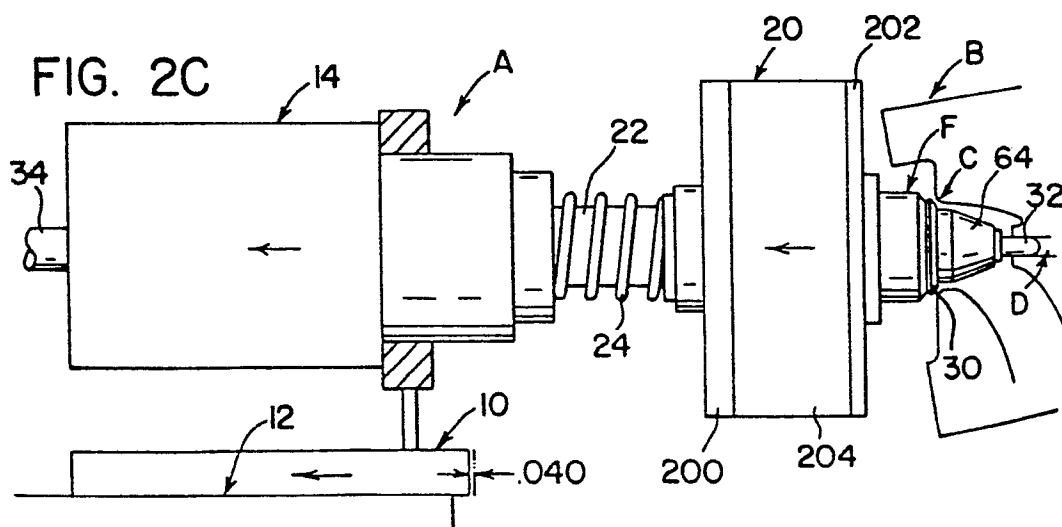
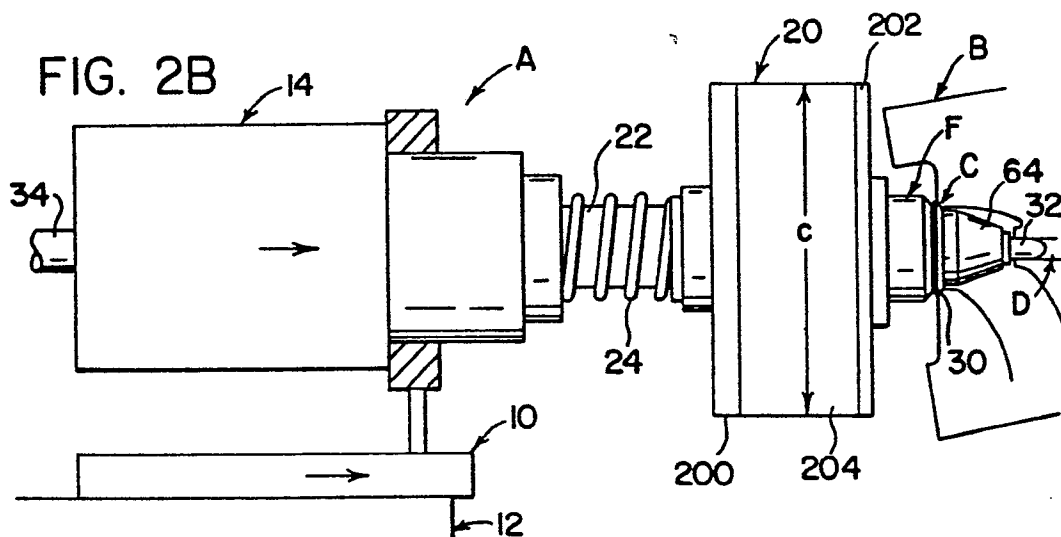
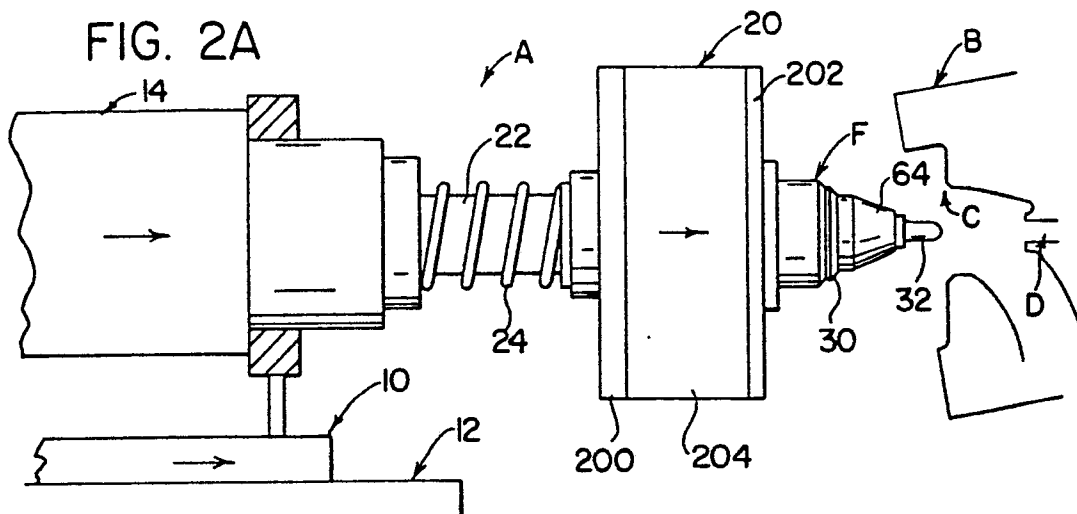
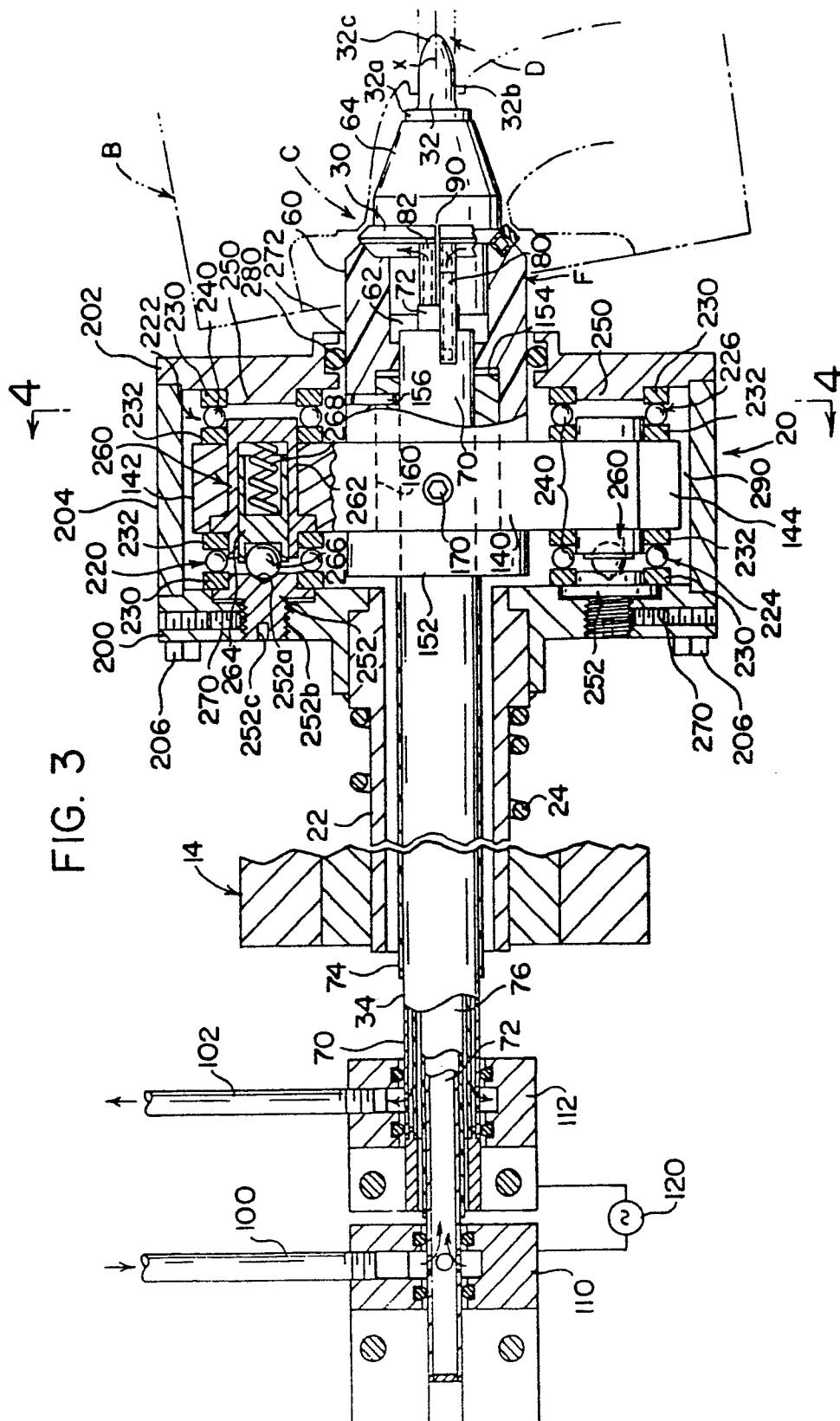


FIG. 1





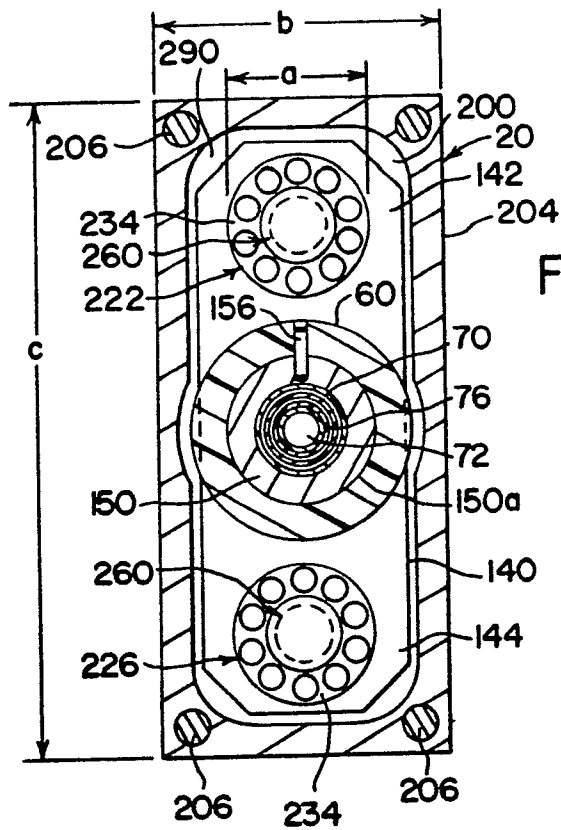


FIG. 4

$a = 4.4 \text{ cm}$
 $c = 10.2 \text{ cm}$
 $b \approx 7.5 \text{ cm}$

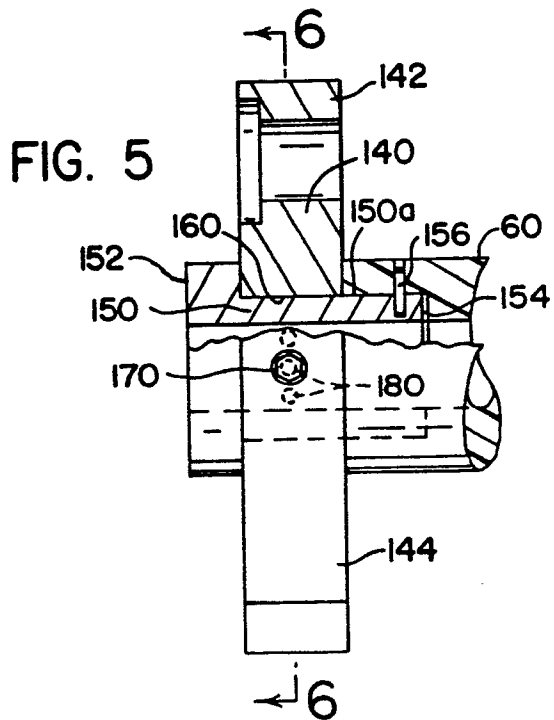


FIG. 5

FIG. 6

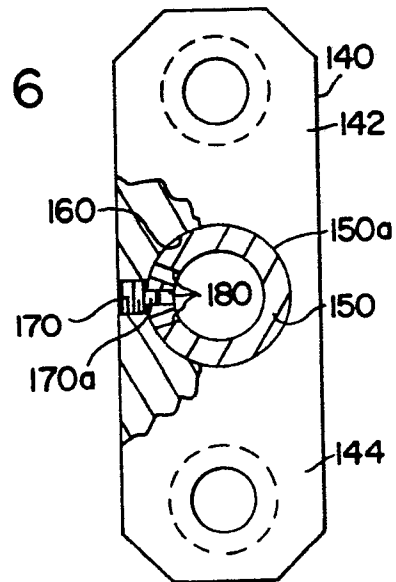


FIG. 7

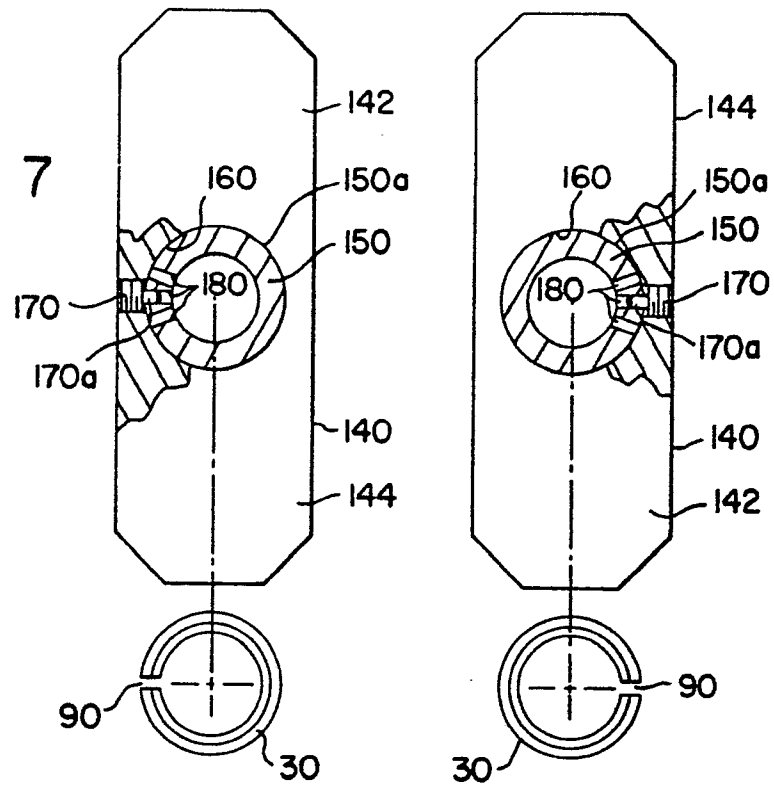


FIG. 8

