The opinion in support of the decision being entered today is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte YUTA ICHINOSE and YOSHIHIKO ONISHI

Appeal No. 2007-2452
Application No. 10/421,761
Technology Center 3700

Decided: September 26, 2007

Before WILLIAM F. PATE, III, TERRY J. OWENS, and DAVID B. WALKER, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

The Appellants appeal from a rejection of claims 1-9. Claims 10 and 11 stand allowable.

THE INVENTION

The Appellants claim an electromagnetic valve, and disclose that the valve is used, for instance, "to change the pressures of hydraulic operating fluid at

respective operating portions of an electronic control automatic transmission for motor vehicles" (Spec. 1). Claim 1 is illustrative:

> 1. An electromagnetic valve comprising:
> a solenoid coil;
> a rod arranged on an axis of said solenoid coil for movement in an axial direction thereof;
> a plunger fixedly attached to an intermediate portion of said rod;
> a core arranged at one side of said rod so as to surround it and operable to attract said plunger upon energization of said solenoid coil;
> a yoke arranged at the other side of said plunger so as to surround it; and
> a pair of bearings formed of a non-magnetic substance and arranged at opposite sides of said plunger, respectively, for movably supporting said rod at an outer peripheral surface thereof by clearance fit, at least one of said pair of bearings being configured to permit tilting with respect to an axis of said rod;
> wherein at least one of said pair of bearings is clearance fitted to an inner peripheral surface of said core or to an inner peripheral surface of said yoke.

THE REFERENCES

Ichiryu	US 4,919,390	Apr. 24, 1990
Bircann '519	US 5,685,519	Nov. 11, 1997
Bircann '226	US 6,497,226 B2	Dec. 24, 2002
Modien	US 6,644,622 B2	Nov. 11, 2003 (filed Nov. 14, 2001)
Bircann '875	US 6,670,875 B2	Dec. 30, 2003 (filed Feb. 12, 2001)

THE REJECTIONS

The claims stand rejected under 35 U.S.C. § 103 as follows: claims 1, 4, 5 and 7-9 over Ichiryu in view of Bircann '875 and Modien; claims 2 and 3 over Ichiryu in view of Bircann '875, Modien and Bircann '519; and claim 6 over Ichiryu in view of Bircann '875, Modien and Bircann '226.

OPINION

We affirm the aforementioned rejections.

Claims 1 and 4-9[1]

Ichiryu discloses a solenoid device (2) coupled to a valve body (1) for controlling the flow rate of hydraulic fluid (Ichiryu, col. 1, ll. 8-10; col. 3, ll. 61-63). The solenoid device comprises a coil (17), a plunger (13) having at one end a first rod (13a) surrounded by a bearing (15a) and having at the other end a second rod (13b) surrounded by a bearing (15b), a plunger guide (11) into which the first bearing is fitted, a lid body (14) into which the second bearing is fitted, and an inner yoke (10) surrounding the plunger at its second rod end and separated from the plunger guide by a protruding portion (18) of a polymeric bobbin frame (16) (Ichiryu, col. 3, l. 63 – col. 4, l. 27; fig. 1). An outer yoke (19) surrounds the plunger guide, bobbin frame, coil and inner yoke, and is fixed to the inner yoke (Ichiryu, col. 4, ll. 28-31).

Bircann ‘875 discloses a solenoid used in mechanical linear actuators (Bircann ‘875, col. 1, ll. 10-11). Bircann’875 teaches that it is important that a bearing (40) fitted around a shaft (22’) be formed of a nonmagnetic material because if the bearing were ferromagnetic, an armature for which the bearing acts as a fixed stop to limit the armature’s travel would become magnetically attached to the bearing, interfering with the actuator’s operation (Bircann ‘875, col. 3, ll. 29-33).

Modien discloses an exhaust gas recirculation valve having, at each end of an armature (135), a bearing (146, 148) with a through hole that compensates for

[1] Although an additional reference (Bircann ‘226) is applied to claim 6, the Appellants do not separately argue that claim (Br. 14).

any slight non-concentricity between the bearing and a shaft (144) that extends through the armature and the bearings (Modien, col. 6, ll. 15-19; fig. 1). The portion of the wall of each through hole (146c, 148c) toward the armature has a circular cylindrical shape, and beyond that portion the wall (at 146f, 148f) has a frustoconical shape that provides clearance to the shaft (Modien, col. 6, ll. 20-25; figs. 2, 3). Frustoconical portions 146f and 148f extend for approximately one-half the length of the through hole and compensate for any slight non-concentricity of the bearings to the shaft's centerline (Modien, col. 6, ll. 28-32). The edges at each end of the bearings are chamfered to provide leads at the through hole entrances (Modien, col. 6, ll. 25-28).

The Appellants argue that Ichiryu's core is the plunger itself (Br. 10). The Appellants, however, do not explain how Ichiryu's plunger functions as a core.

Ichiryu, the Appellants argue, already has a yoke (inner yoke 10), and does not disclose that the plunger guide functions as a yoke (Br. 10-11). The Examiner has provided a plausible explanation (Ans. 5-6) as to how Ichiryu's plunger guide (11) functions as a core which, the Appellants argue, is "a mass of (usually) iron serving to concentrate and intensify the magnetic field resulting from a current in a surrounding coil" (Br. 10). That is, the plunger guide is surrounded by an outer yoke (19) such that the plunger guide serves as an outer yoke extension to provide a magnetic force that attracts the plunger to the left in Ichiryu's figure 1. *See id*. As pointed out by the Examiner (Ans. 5), the opposite end of the plunger is surrounded by an inner yoke (10) that is integral with the outer yoke (Ichiryu, col. 5, ll. 1-5) and appears to attract the plunger to the right in Ichiryu's figure 1. The Appellants argue that Ichiryu does not disclose that the inner yoke attracts the plunger (Reply Br. 5), but the Appellants provide no explanation to the contrary.

The Appellants argue that the purpose of the protruding portion (18) of Ichiryu's bobbin frame (16) is to ensure that the opposed end portions of the plunger guide and the inner yoke are sufficiently strong, and that Ichiryu does not disclose that the protruding portion magnetically separates the plunger guide and the inner yoke (Reply Br. 5). What Ichiryu uses to provide the strength referred to by the Appellants is a reinforcing nonmagnetic ring (Ichiryu, col. 2, ll. 29-33; col. 3, ll. 18-21; col. 5, ll. 61-67). Ichiryu's disclosures that the reinforcing ring is nonmagnetic and that the protruding portion is polymeric (which is nonmagnetic) (Ichiryu, col. 4, ll. 18-26) indicate that the region between the plunger guide and the inner yoke is magnetically insulating. Thus, those disclosures support the Examiner's above-discussed reasoning that the polepieces of Ichiryu's solenoid are the plunger guide and the inner yoke.

Because the Examiner finds that Ichiryu's plunger guide functions as a core and the Examiner provides a plausible supporting explanation, and the Appellants provide no substantive argument to the contrary, we accept the Examiner's finding as fact. *See In re Kunzmann*, 326 F.2d 424, 425 n.3, 140 USPQ 235, 236 n.3 (CCPA 1964).

The Appellants argue that Bircann '875 discloses one nonmagnetic bearing and does not suggest a pair of nonmagnetic bearings (Br. 11). Bircann '875 is relied upon by the Examiner for a suggestion to make Ichiryu's bearings nonmagnetic (Ans. 3), not for a disclosure of a pair of bearings.

The Appellants argue that there is no teaching or suggestion in the prior art that bearing interaction with a coil is a problem (Br. 12). The problem, as indicated in Bircann '875, is interaction between the bearing and the armature (plunger) (Bircann '875, col. 3, ll. 49-54). Bircann '875 would have led one of

ordinary skill in the art to make Ichiryu's bearings nonmagnetic to avoid that problem.

The Appellants argue that Modien does not teach or suggest that bearings 146 and 148 are configured to permit tilting (Br. 12). The Appellants argue that the chamfering of Modien's bearings would not necessarily result in tilting (Reply Br. 8). The Appellants' disclosure indicates that by "clearance fit" the Appellants mean that the bearings have an end portion curvature (Spec. 9:3-9). That end portion curvature appears comparable to Modien's chamfering of the bearing's inside and outside end portions (compare the Appellants' Spec. 9:3-9 and figs. 1, 3, 4 and 5 with Modien's col. 6, ll. 24-27 and figs. 2 and 3). Moreover, Modien's bearings have not only chamfering, but also have a frustoconical section (146f, 148f) that extends approximately one-half the length of the bearing and provides clearance to the shaft through the bearings and compensates for non-concentricity of the bearings to the centerline of that shaft (Modien, col. 6, ll. 21-24). This frustoconical section, in combination with the chamfered inside and outside end portions of the bearings (fig. 3), appear to enable the bearing to tilt to provide the desired compensation for non-concentricity with the shaft.

For the above reasons we are not convinced of reversible error in the rejections of claims 1 and 4-9.

Claims 2 and 3

Bircann '519 discloses an exhaust recirculation valve having a compression spring (112) between a bearing (98) and an armature (146) to provide a biasing force to maintain a tight face seal between a shoulder (84) and the bearing's surface (106) opposite the armature while permitting the bearing to move in a radially aligning fashion (Bircann '519, col. 5, ll. 20-26; col. 6, ll. 13-14; fig. 2).

The Appellants argue that there is no indication that the Bircann ‘519 spring is between a plunger and a bearing (Br. 13). The Bircann ‘519 spring is between an armature (146) and a bearing (98) (fig. 2) which are comparable, respectively, to the Appellants’ plunger and bearing.

The Appellants argue that there is no teaching or suggestion that the Bircann ‘519 tapered portion 160 is between a spring and a plunger for preventing a load of a spring from being applied to the plunger (Br. 14; Reply Br. 9). The Bircann ‘519 valve stem (92) has affixed thereto a curved piece which the upper end of the spring presses against (fig. 8). That curved piece prevents a load of the spring from being applied to the armature (which corresponds to the Appellants’ plunger) and, therefore, corresponds to the holder recited in the Appellants’ claim 3.

Hence, we are not persuaded of reversible error in the rejection of claims 2 and 3.

DECISION

The rejections under 35 U.S.C. § 103 of claims 1, 4, 5 and 7-9 over Ichiryu in view of Bircann ‘875 and Modien, claims 2 and 3 over Ichiryu in view of Bircann ‘875, Modien and Bircann ‘519, and claim 6 over Ichiryu in view of Bircann ‘875, Modien and Bircann ‘226 are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037