

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
12 October 2006 (12.10.2006)

PCT

(10) International Publication Number
WO 2006/107789 A3

(51) International Patent Classification:
F16C 11/00 (2006.01)

(21) International Application Number:
PCT/US2006/012109

(22) International Filing Date: 3 April 2006 (03.04.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/668,309 5 April 2005 (05.04.2005) US
11/278,372 31 March 2006 (31.03.2006) US

(71) Applicant (for all designated States except US): **BAL SEAL ENGINEERING CO., INC.** [US/US]; 19650 Pauling, Lake Forest, California 92610-2610 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **BALSELLS, Peter, J.** [US/US]; 6 Canyon Terrace, Newport Beach, California 92657 (US).

(74) Agent: **HACKLER, Walter, A.**; Patent Law Office, 2372 S.E. Bristol Street, Suite B, Newport Beach, California 92660-0755 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

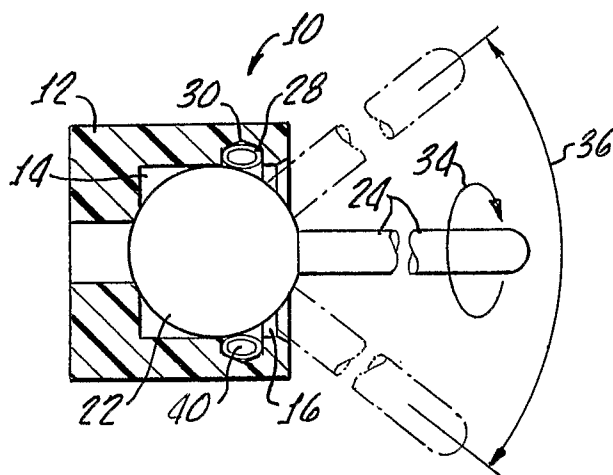
- with international search report
- with amended claims

(88) Date of publication of the international search report:
24 May 2007

Date of publication of the amended claims: 5 July 2007

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: BALL HOLDING, LATCHING AND LOCKING APPLICATIONS USING RADIAL AND AXIAL SPRINGS



(57) Abstract: A latching mechanism includes a housing with a cavity therein with an opening thereto. A ball having a stem of smaller diameter extending from the ball. The ball is sized for insertion into the housing cavity through the opening. At least one groove in the housing cavity is disposed proximate the cavity opening and a coil spring is disposed in the groove and retains the ball for rotation within the cavity with the stem at selected conical angles.

AMENDED CLAIMS

WO 2006/107789

received by the International Bureau on
03 April 2007 (03.04.2007)

PCT/US2006/012109

IN THE CLAIMS

1. A latching mechanism comprising:
 - a housing having a cavity therein with an opening thereto;
 - a ball having a stem of smaller diameter than said ball and extending therefrom, said ball being sized for insertion into the housing cavity and disconnection from the housing cavity through said opening;
 - at least one groove in the housing cavity proximate the cavity opening;
 - a coil spring disposed in the groove and enabling ball rotation within said cavity with said stem at selected conical angles with respect to a housing centerline, said coil spring having a contact angle with the ball determined by a groove configuration in order to control ball insertion and ball disconnect forces.
2. The mechanism according to claim 1 wherein said groove is circumferential and said coil spring is a continuous spring.
3. The mechanism according to claim 1 wherein a plurality of arcuate grooves are disposed in the housing cavity and an arcuate coil spring segment is disposed in each of the arcuate grooves.
4. The mechanism according to claim 1 wherein a plurality of spaced apart circumferential grooves are disposed in the housing cavity with a continuous spring disposed in each groove enabling positioning of said ball at different lateral positions within said housing and control ball insertion and ball disconnect forces.

5. The mechanism according to claim 1 wherein a portion of said cavity is spherical.

6. The mechanism according to claim 5 wherein two grooves are disposed in the housing cavity with a coil spring therein, the grooves being disposed on opposite hemispheres of said ball.

7. A latching mechanism comprising:

a housing having a cavity therein with an opening thereto;

a ball having a stem of smaller diameter than said ball and extending therefrom, said ball being sized for insertion into the housing cavity and removal therefrom through said opening;

at least one groove in the housing cavity proximate the cavity opening;

a coil spring disposed in the groove and enabling ball rotation within said cavity, said coil spring having a contact angle with the ball determined by a groove configuration in order to control ball insertion and removal forces.

8. The mechanism according to claim 7 wherein said groove is circumferential and said coil spring is a continuous coil spring.

9. The mechanism according to claim 7 wherein a plurality of arcuate grooves are disposed in the housing cavity and an arcuate coil spring segment is disposed in each of the arcuate grooves.

10. The mechanism according to claim 7 wherein a plurality of spaced apart circumferential grooves are disposed in the housing cavity with a continuous

11. A spring disposed in each groove
positioning of ball at different lateral position
within the housing and ball insertion and removal
forces.

11. The mechanism according to claim 7 wherein
a portion of said cavity is spherical.