

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
15 November 2007 (15.11.2007)

PCT

(10) International Publication Number  
**WO 2007/129157 A3**

- (51) International Patent Classification:  
*E05F 5/10* (2006.01)      *F16F 9/00* (2006.01)
- (21) International Application Number:  
PCT/IB2007/000922
- (22) International Filing Date: 28 March 2007 (28.03.2007)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
PI 20062082      5 May 2006 (05.05.2006)      MY
- (71) Applicant (for all designated States except US): **HARN MARKETING SDN. BHD** [MY/MY]; Plot 32, Lengkok Rishah 1, Kawasan Perindustrian Silibin, 30100 Ipoh, Perak (MY).

AT, AU, AZ, BA, BB, BG, BH, 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, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **LAM, Harn Lian** [MY/MY]; 7, Jalan Au Kong, Taman Kampar, 30250 Ipoh, Perak (MY). **LAM, Harn, Yan** [MY/MY]; 7, Jalan Au Kong, Taman Kampar, 30250 Ipoh, Perak (MY).
- (74) Agents: **WYATT, David, Alan** et al.; c/o Henry Goh & Co. SDN. BHD, Suite 3.02, Level 3, Amoda Building, 22, Jalan Imbi, Kuala Lumpur, 55100 (MY).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

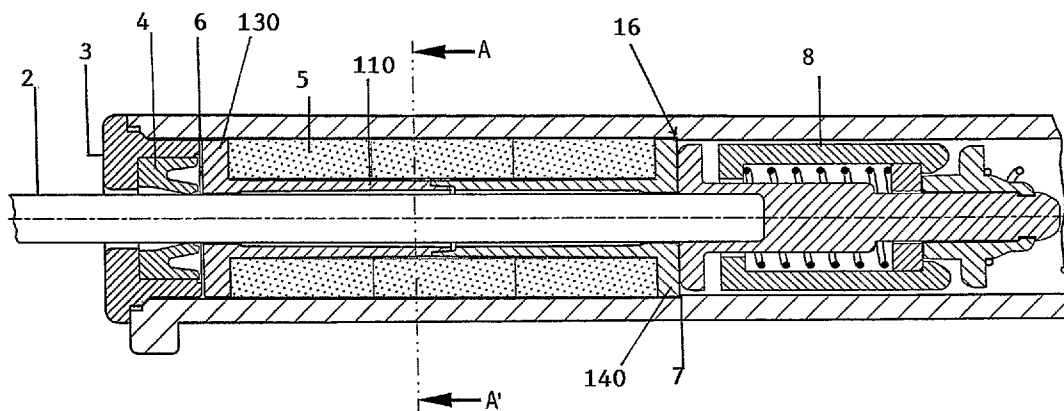
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, 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).

**Declarations under Rule 4.17:**  
— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))  
— of inventorship (Rule 4.17(iv))

**Published:**  
— with international search report  
— with amended claims

(88) Date of publication of the international search report: 31 January 2008  
Date of publication of the amended claims: 27 March 2008

(54) Title: FLUID DAMPER



(57) Abstract: A fluid damper for use in applications such as furniture is provided. The fluid damper comprises a cylinder (10) having an open end (13) and a closed end (14) with a piston disposed within the cylinder. The piston has a piston rod (2) for moving the piston between the open and closed end of the cylinder with the piston rod extending out of the cylinder open end through a seal (4). A guide bushing (100, 200) having a central hollow shaft (110, 210) for guiding the piston rod is disposed within the cylinder. The guide bushing allows damping fluid to flow in the space (17) between the central shaft and cylinder wall. In one embodiment, elastic material (5) is located in the space between the guide bushing central shaft and cylinder wall with the elastic material comprising multiple pieces that are individually compressible by the damping fluid as the piston moves to the closed end of the cylinder. In another embodiment, a respective flange portion (130, 140, 230, 240) is provided at each longitudinal end of the guide bushing with each flange portion extending radially to the cylinder wall. The two flange portions constitute the sole bearing surfaces for the piston rod within the cylinder.

WO 2007/129157 A3

## AMENDED CLAIMS

(Received by the international Bureau on 28 January 2008)

1. A fluid damper for use in applications such as furniture, comprising:  
a cylinder (10) having an open end (13) and a closed end (14);  
5 a piston disposed within said cylinder (10);  
the piston having a piston rod (2) for moving the piston between the open (13)  
and closed end (14), the piston rod extending out of said open end through a  
seal (4);  
a guide bushing (100, 200) disposed within the cylinder (10);  
10 the guide bushing (100, 200) having a central hollow shaft (110, 210) for guiding  
the piston rod (2); the guide bushing allowing damping fluid to flow in the space  
(17) between the shaft and cylinder wall; and  
elastic material (5) located in said space (17);  
characterized in that:  
15 the elastic material (5) comprises multiple pieces of fluid-porous material that are  
individually compressible by the damping fluid as the piston moves to the closed  
end (14) of the cylinder (10).
2. A fluid damper as claimed in claim 1 wherein the guide bushing (100, 200) is  
fixed in its axial position within the cylinder (10).
- 20 3. A fluid damper as claimed in claim 1 or 2 wherein the guide bushing (100, 200) is  
located toward the open end (13) of the cylinder (10).
4. A fluid damper as claimed in claim 1 or 2 wherein each longitudinal end of the  
guide bushing (100, 200) comprises a disc-shaped flange (130, 140, 230, 240).
- 25 5. A fluid damper as claimed in claim 4 wherein each of said disc-shaped flanges  
(130, 140, 230, 240) has a plurality of fluid passages (150, 250).

6. A fluid damper as claimed in claim 4 wherein one of said disc-shaped flanges (140, 240) has a plurality of fluid passages (150, 250).
- 5 7. A fluid damper as claimed in claim 5 wherein the fluid passages (150, 250) comprise apertures that are distributed about the disc-shaped flange (130, 140, 230, 240).
8. A fluid damper as claimed in claim 6 wherein the fluid passages (150, 250) comprise apertures that are distributed about the disc-shaped flange (130, 140, 230, 240).
- 10 9. A fluid damper as claimed in claim 5 wherein the fluid passages (150, 250) comprise openings about the periphery of the disc-shaped flange (130, 140, 230, 240).
10. A fluid damper as claimed in claim 6 wherein the fluid passages (150, 250) comprise openings about the periphery of the disc-shaped flange (130, 140, 230, 240).
- 15 11. A fluid damper as claimed in claim 1 wherein the multiple pieces of elastic material (5) surround the guide bushing central shaft (110, 210).
12. A fluid damper as claimed in claim 1 wherein the multiple pieces of elastic material (5) are aligned axially relative to one another in the cylinder (10).
- 20 13. A fluid damper as claimed in claim 1 wherein adjacent ones of the multiple pieces of elastic material (5) abut one another when in a relaxed state.
14. A fluid damper as claimed in claim 1 wherein the multiple pieces of elastic material (5) comprises tubular pieces.

15. A fluid damper as claimed in claim 1 wherein the elastic material (5) comprises three said pieces.
16. A fluid damper as claimed in claim 1 wherein the two longitudinal ends (130, 140, 230, 240) of the guide bushing (110, 210) constitute the sole bearing surfaces for the piston rod (2) within the cylinder (10).
17. A fluid damper as claimed in claim 1 wherein the guide bushing (100, 200) comprises an assembly of parts.
18. A fluid damper as claimed in claim 17 wherein there are two said parts connectable in the shaft (110, 210).
19. A fluid damper for use in applications such as furniture, comprising:  
a cylinder (10) having an open end (13) and a closed end (14);  
a piston disposed within said cylinder (10);  
the piston having a piston rod (2) for moving the piston between the open (13) and closed end (14), the piston rod extending out of said open end through a seal (4);  
a guide bushing (100, 200) disposed within the cylinder (10);  
the guide bushing (100, 200) having a central hollow shaft (110, 210) for guiding the piston rod (2); the guide bushing allowing damping fluid to flow in the space (17) between the shaft and cylinder wall;  
a respective flange portion (130, 140, 230, 240) is provided at each longitudinal end of the guide bushing (100, 200), each flange portion extending radially to the cylinder wall; and the two flange portions constitute the sole bearing surfaces for the piston rod (2) within the cylinder (10)  
characterized in that:  
the guide bushing (100, 200) comprises an assembly of two parts that are connectable in the shaft (110, 210).

20. A fluid damper as claimed in claim 19 wherein the guide bushing (100, 200) is fixed in its axial position within the cylinder (10).
21. A fluid damper as claimed in claim 19 or 20 wherein the guide bushing (100, 200) is located toward the open end (13) of the cylinder (10).
22. A fluid damper as claimed in claim 19 or 20 wherein the flange portions (130, 140, 230, 240) are disc-shaped.
23. A fluid damper as claimed in claim 19 wherein each of said flange portions (130, 140, 230, 240) has a plurality of fluid passages (150, 250).
24. A fluid damper as claimed in claim 19 wherein one of said flange portions (140, 240) has a plurality of fluid passages (150, 250).
25. A fluid damper as claimed in claim 23 or 24 wherein the fluid passages (150, 250) comprise apertures that are distributed about the flange portion (130, 140, 230, 240).
26. A fluid damper as claimed in claim 23 or 24 wherein the fluid passages (150, 250) comprise openings about the periphery of the flange portion (130, 140, 230, 240).
27. A fluid damper as claimed in claim 19 wherein elastic material (5) is located in said space (17) between the guide bushing central shaft (110, 210) and the cylinder wall.
28. A fluid damper as claimed in claim 27 wherein said elastic material (5) comprise multiple pieces.
29. A fluid damper as claimed in claim 27 or 28 wherein the elastic material (5) surrounds the guide bushing central shaft (110, 210).

30. A fluid damper as claimed in claim 28 wherein the elastic material (5) comprises multiple pieces that are aligned axially relative to one another in the cylinder (10).
- 5 31. A fluid damper as claimed in claim 28 wherein adjacent ones of the elastic material (5) abut one another when in a relaxed state.
32. A fluid damper as claimed in claim 28 wherein the elastic material (5) comprises three said pieces.
33. A fluid damper as claimed in claim 27 wherein the elastic material (5) comprises tubular pieces.
- 10 34. A fluid damper as claimed in claim 27 wherein the elastic material (5) comprises fluid-porous material.
35. A fluid damper as claimed in claim 1 or 19 wherein the guide bushing (100, 200) is made of a hard material.
- 15 36. A fluid damper as claimed in claim 1 or 19 wherein the guide bushing (100, 200) is made of a hard plastic material.
37. A fluid damper as claimed in claim 1 or 19 wherein a resilient means (9) is provided between the piston and the closed end (14) of the cylinder (10).
- 20 38. A fluid damper as claimed in claim 1 or 19 wherein the inner wall of the cylinder (10) comprises a constricting step (16) for axially locating the guide bushing (100, 200).

39. A fluid damper as claimed in claim 37 wherein the guide bushing (100, 200) is located such that one longitudinal end (130, 230) of the guide bushing is in contact with said seal (4) and the other longitudinal end (140, 240) is in contact  
5 with the constricting step (16).