(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
4 August 2016 (04.08.2016)

WIPO | PCT

(10) International Publication Number
WO 2016/123331 A4

(51) International Patent Classification:
A47K 11/12 (2006.01) *E03D 13/00* (2006.01)

(21) International Application Number:
PCT/US2016/015347

(22) International Filing Date:
28 January 2016 (28.01.2016)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/108,925 28 January 2015 (28.01.2015) US

(71) Applicant: **GREEN DRAIN INC.** [US/US]; 15275 Collier Blvd Suites 201-262, Naples, Florida 34119 (US).

(72) Inventor: **LANDON, Frank**; 1822 East Camino Avenue, Santa Ana, California 92705 (US).

(74) Agents: **SHIN, Minyoung** et al.; Fish & Tsang, LLP, 2603 Main Street, Suite 1000, Irvine, California 92614 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

— *with amended claims (Art. 19(1))*

Date of publication of the amended claims: 1 September 2016

(54) **Title**: SLIDING SKIRT VALVE

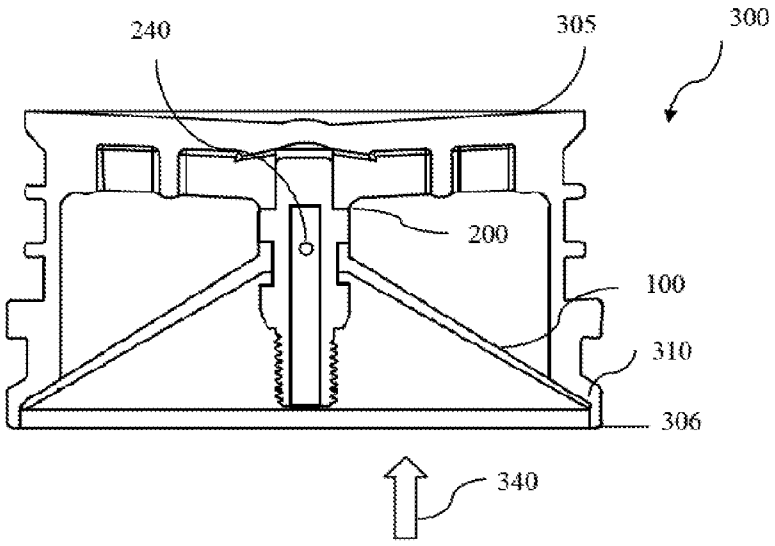

Figure 3B

(57) **Abstract**: Sliding skirt valves for waterless urinals and method of controlling fluid flow through the sliding skirt valve are presented. The sliding skirt valve has a valve body, which includes an inlet, an outlet and a sealing surface. The sliding skirt valve also has a central shaft with an upper stop and a lower stop and a barrier interface. Between the upper and the lower stops, a conical barrier is slidingly engaged with the barrier interface. In a normal pressure state, the conical barrier lies against the lower stop of the central shaft. In a back pressure state, the conical barrier moves upwardly to lie against the upper stop of the central shaft and block the vent to upward fluid flow from the downstream of the sliding skirt valve.

WO 2016/123331 A4

AMENDED CLAIMS
received by the International Bureau on 25 July 2016 (25.07.2016)

1. A device for controlling fluid flow, comprising:

a valve body comprising an inlet, an outlet, and a sealing surface;

a central shaft that is positioned within the valve body comprising an upper stop that is positioned below the inlet, a lower stop that is positioned below the upper stop, and a barrier interface that lies between the upper stop and the lower stop;

a conical barrier, configured as the surface of a frustum of a cone and a small base oriented towards the inlet and comprising an aperture positioned at the small base, wherein the central shaft passes through the aperture at the barrier interface,

wherein the conical barrier is slidably engaged with the central shaft at the barrier interface and is configured to move between the lower stop and the upper stop; and

a vent positioned at the barrier interface, wherein the vent is blocked in a backpressure state and exposed in a normal pressure state.

2. The device of claim 1, wherein the inlet, conical barrier, and outlet define a passageway through which a liquid can flow through the device.

3. The device of claim 1, wherein the vent is blocked by the small base of the conical barrier when the small base slidably moves upwardly toward the vent.

4. The device of claim 1, wherein the central shaft comprises a lumen, and at least a portion of a surface of the lumen is threaded.

5. The device of claim 1, wherein at least a portion of outer surface of the central shaft is threaded.

6. The device of claim 5, wherein the portion of outer surface that is threaded is located below the lower stop.

7. The device of claim 1, wherein the conical barrier is a skirt valve.

8. The device of claim 1, wherein the conical barrier has an inner portion and an outer portion, and the outer portion has greater flexibility than the inner portion.

9. The device of claim 1, wherein the inner portion has an average first thickness and the outer portion has an average second thickness, and the average first thickness is greater than the average second thickness.

10. A method for controlling fluid flow, comprising;

providing a sliding skirt valve, the sliding skirt valve comprising

(a) a valve body comprising an inlet, an outlet, and a sealing surface,

(b) a central shaft that is positioned within the valve body comprising an upper stop that is positioned below the inlet, a lower stop that is positioned below the upper stop, and a barrier interface that lies between the upper stop and the lower stop,

(c) a conical barrier, configured as the surface of a frustum of a cone and a small base oriented towards the inlet and comprising an aperture positioned at the small base, wherein the central shaft passes through the aperture at the barrier interface;

(d) a vent that is positioned at the barrier interface, wherein the vent is blocked in a backpressure state and exposed in a normal pressure state; and

directing a flow of fluid through the sliding skirt valve,

wherein the sliding skirt valve has a normal pressure state that permits the flow of fluid from the inlet to the outlet and a back pressure state that prevents the flow of fluid from the outlet to the inlet.

11. The method of claim 10, wherein the flow of fluid passes through a waterless urinal.

12. The method of claim 10, wherein the aperture is in contact with the lower stop when the sliding skirt valve is in the normal pressure state.

13. The method of claim 10, wherein the aperture is in contact with the upper stop when the sliding skirt valve is in the back pressure state.

14. The method of claim 10, wherein the vent is blocked by the small base of the conical barrier when the small base slidably moves upwardly toward the vent.

15. The method of claim 10, wherein the sliding skirt valve deforms between the normal pressure state and the back pressure state, and the backpressure state is resulted from fluid flowing through the skirt valve from the outlet towards the inlet.

16. The method of claim 15, wherein the fluid is a liquid originating from a sewer.

17. The method of claim 15, wherein the fluid is a gas originating from a sewer.