



- (51) **International Patent Classification:**
B01D 21/01 (2006.01) *C02F 1/52* (2006.01)
B03D 3/00 (2006.01)
- (21) **International Application Number:** PCT/IN2012/000096
- (22) **International Filing Date:** 13 February 2012 (13.02.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:** 1747/MUM/2011 15 June 2011 (15.06.2011) IN
- (71) **Applicant (for all designated States except US):** **TATA CONSULTANCY SERVICES LIMITED** [IN/IN]; Nirmal Building, 9th Floor, Nariman Point, Mumbai 400021 (IN).
- (72) **Inventor; and**
- (75) **Inventor/Applicant (for US only):** **GANVIR, Viviek** [IN/—]; Tata Research Development and Design Centre, 54-B, Industrial Estate, Hadapsar, Pune 411013, Maharashtra (IN).
- (74) **Agent:** **GUPTA, Priyank**; Legasis Partners, B-105, ICC Trade Towers, Senapati Bapat Road, Pune 411016 (IN).
- (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, 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, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) **Title:** ARSENIC REMOVAL FILTER USING IRON POWDER, FERRIC HYDROXIDE COATED RICE HUSK ASH

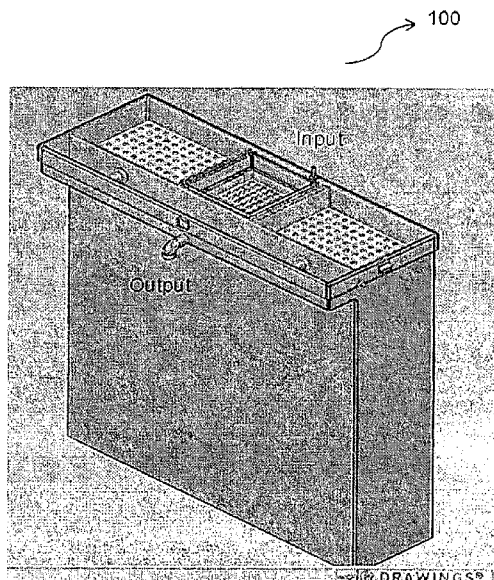


Figure 1

(57) **Abstract:** The present invention provides an apparatus and method for removing contamination of iron and Arsenic from the drinking water. The said apparatus comprises dual filter stage i.e. pre-filter stage and main filter stage, wherein the pre-filter removes iron flocs and maintained pH to 6.0-8.5 range. This pH helps in improvement of the adsorption capacity of ferric hydroxide coated RHA. The said apparatus also removes clogging of filter from iron particles via a pre-filter stage.





Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

Published:

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

(88) Date of publication of the international search report:

4 April 2013

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IN12/00096

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B01D 21/01; B03D 3/00; C02F 1/52 (2012.01)

USPC - 210/724, 723, 348, 198.1, 600

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC (8): B01D 21/01; B03D 3/00; C02F 1/52 (2012.01)

USPC: 210/724, 723, 348, 198.1, 600, 668, 669, 682, 688, 748, 913; 502/406

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

MicroPatent (US-Granted, US-Applications, EP-A, EP-B, WO, JP, DE-G, DE-A, DE-T, DE-U, GB-A, FR-A); DialogPRO (Derwent, INSPEC, NTIS, PASCAL, Current Contents Search, Dissertation Abstracts Online, Inside Conferences); Google Scholar; SciVerse; IP.com; filter*, filtr*, purif*, treat*, remediat*, water*, Rice Husk Ash, adsor*, RHA, iron*, ferric* metal*, arsenic*, contaminat*, impurit*

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2010/150273 A1 (DAS, KK) December 29, 2010, page 3, second paragraph; page 8, fifth paragraph; page 16, second to fourth paragraphs	1-14
Y	US 7892436 B2 (GADGIL, AJ) February 22, 2011, column 9, lines 10-18; column 13, lines 1-4	1-14
Y	US 7459086 B2 (GAID, A) December 02, 2008, abstract; column 2, lines 7-27	1-14
Y	US 5080805 A (HOUSER, S) January 14, 1992, column 6, lines 12-22	1-14
Y	KHAN, SB, et al. Appraisal Of A Simple Arsenic Removal Method For Groundwater Of Bangladesh. J. Environ. Sci. Health. 2000, Vol. A35, No. 7, pp 1021-1041; page 12, table 1.	4, 11
Y	NOUBACTEP, C. Metallic Iron For Safe Drinking Water Worldwide. Chemical Engineering Journal. 01 December 2010, Vol. 165, No. 2, pp 740-749, abstract; SciVerse [online], [retrieved on 2012-10-26]. Retrieved from the Internet: <URL: http://www.sciencedirect.com/science/article/pii/S1385894710008958 >; abstract; figure 1.	6, 13
Y	US 4149953 A (ROJO, S et al.) April 17, 1979; column 2, lines 49-60	6, 13
Y	US 6200482 B1 (WINCHESTER, EL et al.) March 13, 2001; column 2, lines 53-59; column 3, lines 33-46	7, 14

 Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

02 November 2012 (02.11.2012)

Date of mailing of the international search report

22 JAN 2013

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Shane Thomas

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774