Universitatea Politehnica Timișoara

Granted Patents

INVENTOR: PINCA-BRETOTEAN CAMELIA

PATENT NO. 126966/2016

EXPERIMENTAL PLANT FOR RESISTANCE TO THERMAL FATIGUE

ROMÂNIA

DUPLICAT

ELIBERAT INVENTATORULUI
în baza Art.34 alin.(2),
din Legea nr.64/1991 republicată

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

Brevet de invenţie

Nr. 126966

Acordat în temeiul Legii nr.64/1991 privind brevetele de invenţie, republicată în Monitorul Oficial al României, Partea I, nr.613, din 19 august 2014.

Titular: UNIVERSITATEA "POLITEHNICA" DIN TIMIŞOARA, TIMIŞOARA, TM, RO

Titlul invenţiei: INSTALAŢIE PENTRU DETERMINAREA REZISTENŢEI LA OBOSEALĂ TERMICĂ

Inventatori: PINCA-BRETOTEAN CAMELIA, HUNEDOARA, HD, RO

Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 17/05/2010, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

Confirm cele de mai sus prin semnarea şi aplicarea sigiliului
Director General
Alexandru - Ioan Andrei

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI • ROMÂNIA •

Bucureşti, Data eliberării 30/03/2016

Tipărit la C.N. „Imprimeria Naţională" S.A.

The invention relates to an experimental plant for laboratory research of thermal fatigue. The facility allows experimental research on thermal fatigue on common metal samples whose section has different shape and sizes. Those samples are approximately equal in size and are mounted tangentially on the generator disk. The facility provides cyclic variations in temperature of samples during intervals ordered according to the samples' material features.

The system has also some advantages: it is providing the experimental determination of thermal fatigue on several samples different in shape and size and who are simultaneously subject to different heat stress regimes; it is much more modern than traditional experimental determination of thermal fatigue referring to metal samples subject to different cyclic thermal regimes; it significantly reduces time spent for performing experiments about thermal fatigue determination in case of metallic materials operating under variable temperature; heating temperature of the samples inside the furnace may be imposed and maintained at the desired limit, up to 9000, and can be recorded numerically and graphically on the computer; at the bottom, under the furnace, rotating evidence are cooling in different environments, such as air jets, water spray, dry ice in tubes or fire extinguishers and its variations can be recorded digitally on the computer; heating and cooling cycle of the samples can be modified depending on the number of revolutions of the spindle and of the electric motor drive through the control panel of the static frequency converter.

The constructive scheme of the installation to determine thermal fatigue resistance is shown in Figure no. 1, where an electric motor 1 controlled by a static frequency converter 2 which drives the main shaft 3 is assembled and mounted on the metal frame 4. Overlapping the samples mounted on the main shaft, there is a semicircular furnace 5 who is ordered to perform sample heating. At the end of the main shaft, as opposed to drive electric engine, there is the thermo-tension collector 6 which takes the electric signals from thermocouples whose wires are connected to the contact brushes rings. Disk supports are mounted on the main shaft - intermediate 7 and sideward 8, with screwed samples mounted on the generators 10. Support disks are mounted according to the length amongst samples and to the intermediate bushes 11 and end bushes 12; system hardening is achieved by means of interior screws 13 and pressure collar 14. Thermocouples are mounted placed on two opposite samples 15, with corresponding response inertia corresponding to operating cycle of the machine parts that were subject to thermal fatigue.

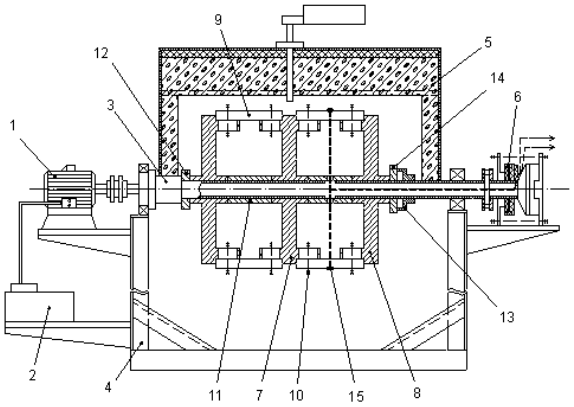

Fig.1 The constructive scheme of the installation to determine thermal fatigue resistance

The principle of investigations on experimental plant designed and built in two stages involve mounting two testing samples arranged opposite on the disk circumference of the thermocouple, and each are connected to a thermo-tension collector. The experimental plant is presented in fig.no.2.

Fig.2 Experimental entire plant

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PROCESS FOR HEXAVALENT CHROMIUM REMOVAL FROM WASTEWATER

ROMÂNIA

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

Brevet de invenţie

Nr. 127099

Acordat în temeiul Legii nr.64/1991 privind brevetele de invenţie, republicată în Monitorul Oficial al României, Partea I, nr.613, din 19 august 2014.

Titular: UNIVERSITATEA POLITEHNICA DIN TIMIŞOARA, TIMIŞOARA, TM, RO

Titlul invenţiei: PROCEDEU DE ÎNDEPĂRTARE A CROMULUI HEXAVALENT DIN APELE REZIDUALE

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Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 06/05/2011, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

Confirm cele de mai sus prin semnarea şi aplicarea sigiliului
Director General

Bucureşti, Data eliberării 30/09/2016

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI • ROMÂNIA •

The rapid industrialization and urbanization have brought with them a more and more heavy pollution of the entire environment. One of the most difficult problems to solve is the problem of waters contaminated with various pollutants. From the different types of pollutants, heavy-metals are particularly dangerous, both due to the toxic effects of metals and due to the fact that the natural conversion of metals in less toxic species (when this process is possible) take place over long time periods. Chromium is an important metal with widespread use in various industries such as electroplating, wood preserving, steel manufacturing, metal finishing, leather tanning, corrosion control, textile dying, manufacture of ceramics and pigments etc. As a result, large quantities of this metal have been discharged into the environment due poor storage practices, improper disposal or leakage of chromium waste. In natural environments, chromium can exist mainly in two oxidation states: (+III) and (+VI). Among these two, Cr(VI) exerts the most toxic effects on living organisms, having also the highest mobility in the environment. Therefore, it is important to reduce the concentrations of Cr(VI) in wastewaters below the permissible limits, before being discharged into environment. The most used method for the removal of Cr(VI) from wastewaters is by chemical reduction to Cr(III) followed by precipitation. The innovative element brought by our patent is that, instead of using conventional reducing agents ($FeSO_4$, SO_2, Na_2SO_3, $Na_2S_2O_4$, $Na_2S_2O_5$), we will use a cheap and locally available industrial waste: scrap iron from the mechanic processing of steel.

This way, some of the goals of sustainable development are achieved: waste recycling (scrap iron, in our case), water recycling, and environmental protection. In this patent we propose the continuous process of Cr(VI) removal from aqueous solutions, by reduction to Cr(III) with scrap iron coupled with precipitation of the resulted cations. The optimal conditions for Cr(VI) reduction with scrap iron are identified, as well as the optimal conditions for the separation of cations resulted from the reduction of Cr(VI) with scrap iron.

The invention describes a process for hexavalent chromium removal from wastewaters having a content of 1-100 mg/L of Cr(VI).

According to the invention, the process consists in reduction of hexavalent chromium to trivalent chromium with scrap iron, at pH 2.5 and a contact time of 1-2 hours. The column effluent is then directed to the mixing chamber of a clarifier where the pH is corrected to 8.3 with NaOH 30%. After a settling time of 5 hours, concentrations of total chromium and total iron in the clarifier effluent are within the maximal limits admitted for the discharge into the sewage system (NTPA002).

The wastewater treatment setup comprises:
(1) - pH correcting basin;
(2) - H_2SO_4 storage tank;
(3) - NaOH storage tank;
(4), (5) and (7) - pumps;
(6) and (11) - stirrer;
(8) - activation/reactivation/reduction column;
(9) - scrap iron filling;
(10) - horizontal clarifier.