

HYDROGEN TORCH FOR VARIOUS PURPOSES

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Introduction

Hydrogen has a very manifold uses. At present time it has found applications both as the energy carrier and as the power source. If the change of electric current by moved hydrogen in pipe-lines is a rather complicated process, its transferring in containers of different construction has been put into operation firmly.

Contrary to all another constructions the metal-hydride accumulators in addition to the possibility of compact storage and transportation of hydrogen allow to purify and compress it as well as to solve a series of other problems.

In our work we show the union in one construction of container for hydrogen transportation and gaseous torch representing the instrument – demand of hydrogen. The hydrogen metal-hydride torch is the self-contained, compact device and it works without additional sources of energy. This torch is usable in settlements remote from centralized energy supply.

Results and discussion

Using the totality of our experience on the creation of hydrogen accumulators with capacity of 1÷100 litres we have developed and produced in our department of IPMS NASU the torches with metal-hydride accumulators of hydrogen. The external appearance and schematic view of the created metal-hydride torch are presented in Fig. 1–6. The metal-hydride torches are dedicated to the brazing of small-sized parts by high-temperature solders as well as for the cutting of part from foil and in the realization of another specialized works in conditions of high ecological requirements.

Each torch consists of cylindrical container filled with metal hydride, filter element, locking valve, jet orifice, mixing chamber, nozzle, manometer. In addition, the torch “Alsav” is provided with the device of firing of inflammable mixture on the piezoelectric element.

The torch container has been produced from stainless steel with cylinder wall 1,5 mm thick. The filter element has been made of pipe frame fabricated from stainless steel with external diameter 8 mm and 5 µm filter micron-insert from porous fluoroplastic.



Fig. 1. The metal-hydride torch “Viachbog-30”.

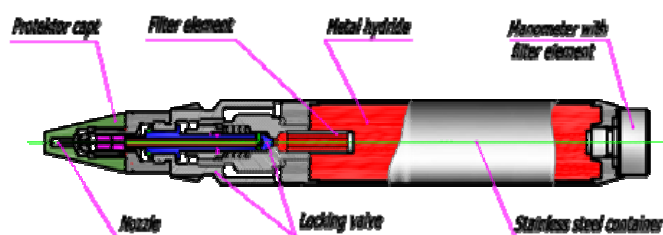


Fig. 2. Schematic view of the metal-hydride torch “Viachbog-30”.



Fig. 3. The hydrogen torch “Alsav” with piezoelectric firing of flame.

The locking valve, having the centreline channel for hydrogen emission up to the jet orifice, provides the necessary flow of hydrogen in pursuance of specific works.

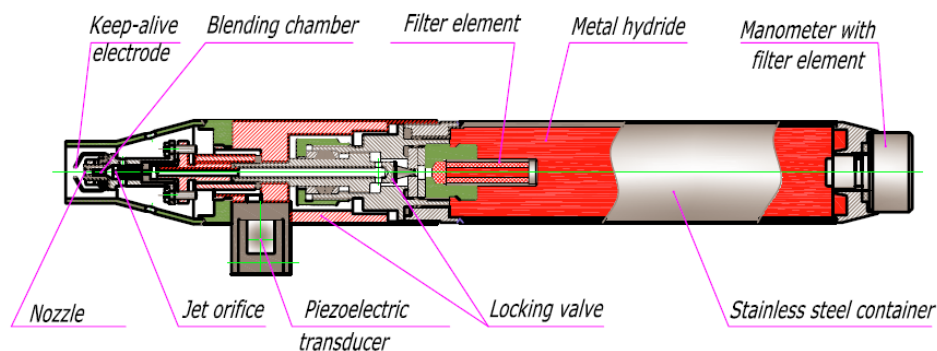


Fig. 4. Schematic sketch of the hydrogen self-contained metal-hydride torch “Alsav” with piezoelectric firing of flame.

The main technical characteristics of these torches are:

- inner volume of container – 60 cm^3 ;
- mass of metal hydride – $0,18 \text{ kg}$;
- hydrogen capacity – 30 l ;
- total mass – $0,45 \text{ kg}$;
- working pressure at room temperature – $0,2 \div 0,5 \text{ MPa}$;
- maximum working pressure – 1 MPa ;
- length – 245 mm ;
- diameter – 29 mm .

To increase the temperature of gaseous flame the oxydric torch (Fig. 5, 6) has been developed and manufactured with metal-hydride accumulator of hydrogen, cylinder of high pressure for oxygen and piezoelectric firing of flame.

The main technical characteristics of the oxydric torch:

- capacity of metal-hydride accumulator – 50 l ;
- capacity of cylinder for oxygen – 15 l ;
- mass – $2,8 \text{ kg}$.



Fig. 5. The oxydric torch with metal-hydride accumulator of hydrogen, cylinder of high pressure for oxygen and piezoelectric firing of flame.

The special features and advantages of created metal-hydride torches:

- the high reliability in the work, convenience in operation and maintenance;
- the ease of process of brazing and cutting;
- the possibility of their use in the most severe conditions of surrounding medium;
- the lack of environment pollution.

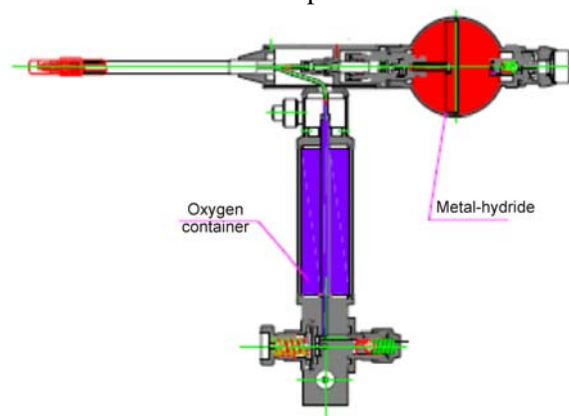


Fig. 6. Schematic representation of the oxydric metal-hydride torch.

The work is also underway toward the construction of torches with accumulators of hydrogen of non-permanent application with container from aluminium alloys based on alkali, alkali-earth and another metals.

Conclusions

We hope that hydrogen torches designed in our department will be put into use in the many branches of industry and areas of man’s activities. They will fill the gaps in instrumental provision those at present are bridged by another less suitable devices or are not closed at all.