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RESEARCH AND DEVELOPMENT OF TECHNICAL MEANS FOR COLLECTING OIL PRODUCTS FROM THE SURFACE OF WATER BODIES

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Abstract. The article deals with the problems of water surface pollution by oil and oil products. The construction of a new device for collecting petroleum products from the water surface in terms of its operational and technical characteristics, which has high mobility, increased productivity and reduced energy costs compared with existing counterparts is proposed. The device can be used as a mobile device to provide cleaning of water areas of water bodies from accidental spills of oil products, as well as will significantly improve the environmental situation in the region in places of storage and collection of wastewater containing oil products.

Key words: water area, pollution, oil products, device, emergency spills, cleaning.

Introduction. Oil pollution is a formidable factor affecting the life of the entire world's oceans, a major ecological problem that deals a cruel blow to the biological balance of water bodies. No other pollutant nowadays can compare to oil in terms of speed of spreading, scale and types of environmental pollution.

The main sources of pollution of the water surface and the environment by oil products are producing enterprises, pumping and transportation systems, oil depots and oil terminals, rail transport, river and sea oil tankers, oil product storages [1].

Due to the growth of production, transportation, refining and consumption of oil and petroleum products, the scale of pollution of nature is expanding even more. Pollution of the aquatic environment by oil products is also growing.

In the composition of wastewater oil products can be in two states: emulsion, when the two-phase liquid is a heterogeneous system consisting of water droplets distributed between the molecules of oil.

To eliminate emergency spills, today mechanical oil skimmers are more or less successfully used. Mechanical method of oil and oil products collection is widely used due to the simplicity of implementation [2-3].

Oil skimmers are the most acceptable oil gathering equipment for elimination of emergency spills of oil and its products and collection of oil-containing waste water from water surface of storages and accumulators of oil-containing waste water of oil products. A high-quality skimmer helps quickly and efficiently collect oil from the water surface [4-6].

Materials and methods. Scientific novelty and significance of this research consists in the creation and research of the device by its technical and operational characteristics, which has high mobility, increased productivity and reduced energy consumption compared with existing analogues, allowing to clean surfaces of industrial wastewater storage tanks, storage of waste oil, as well as to clean surfaces of water bodies from accidental oil spills, solving the most important problems of ecology.

The task of the proposed invention is to create a device with improved performance: mobility; increased productivity; reduced energy costs (Fig. 1).

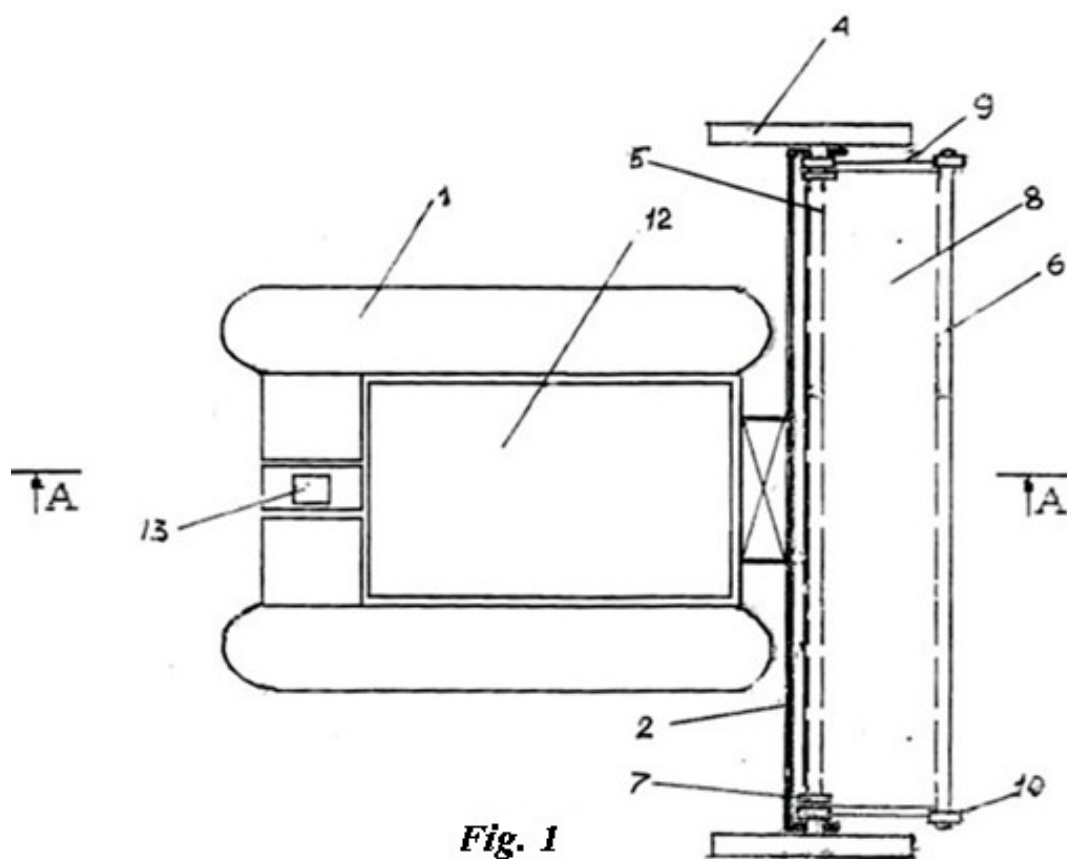


Fig. 1

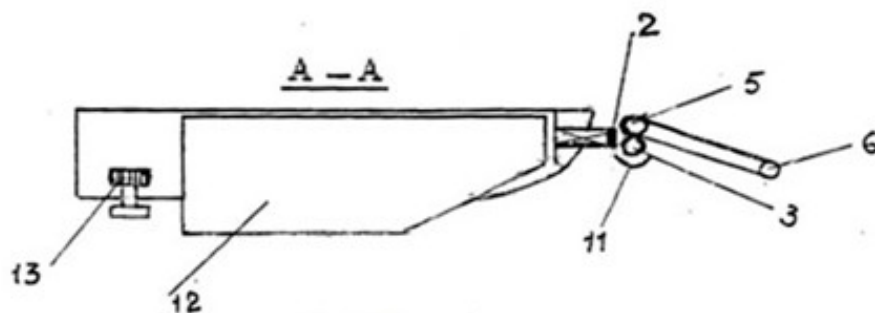


Figure 1 - Oil product collection device

Results. The technical result of the development - improving the performance of the device is achieved by the fact that the device for collecting petroleum products from the water surface, according to the invention, is made in the form of a floating device 1 (preferably catamaran), equipped with a working body, attached to the front of the float and consisting of a leading shaft 2, both ends of which are rigidly connected to the blades 3.

Above the drive shaft there is a driven shaft 4, which is connected to the idler shaft 5. Leading and driven shafts are equipped at both ends with four-toothed gears 6, by means of which the driven shaft is rotated. A wide endless strip 7 made of oil-resistant, well absorbent material is stretched on the driven and tensioning shafts.

Tensioning of the oil-absorbing strip is carried out by means of two adjusting rods 8 attached to the ends of the driven and tensioning shafts with sockets 9 with bearings. Below, under the driving and driven shafts, a tray 10 is installed, connected to the receiving vessel 11, located inside the floating craft, on which the motor 12 is installed.

The device works as follows:

When the motor 12 is switched on, the watercraft begins progressive motion, with rotation of the blades 3 and the drive shaft itself, rigidly attached to the drive shaft 2 and located in the water, clockwise. The leading shaft by means of toothed gears 6 transfers the rotation to the slave shaft 4, which rotates counterclockwise pulling an oil absorbing strip 7 between the leading and slave shafts, stretched on the slave and tensioning 6 shafts. Tension of the endless oil absorbing strip is regulated by means of bars 8. With progressive motion of the device, oil absorbing strip begins to absorb oil products located on the water surface, which are then squeezed when pulling the strip between the drive and driven rollers in the oil-receiving tray 10, installed under the drive and driven rollers, and are drained by gravity into the receiver tank 11, located inside the floating craft.

Conclusion. Developed "Device for the collection of oil from the water surface" can be used as a mobile tool to eliminate emergency spills of petroleum products, as well as given the high rate of spread and pollution by oil products, to clean the surface of existing storage of waste water containing oil, solving the most important task of ecology.

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