Feb. 3, 1942. C. E. HEIL 2,271,764

JET

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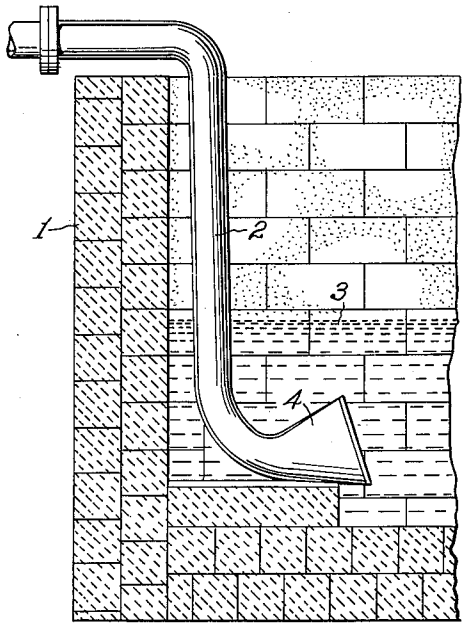


FIG. 1

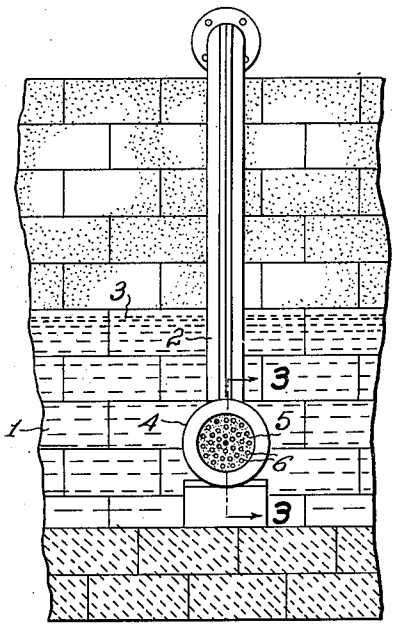


FIG. 2

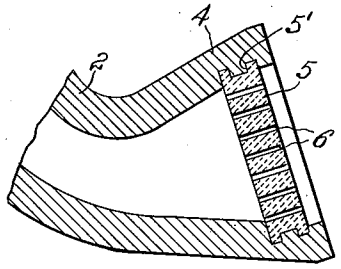


FIG. 3

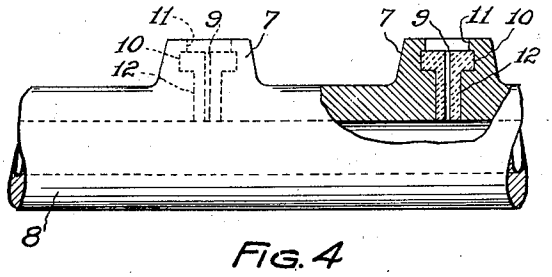


FIG. 4

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1 Claim. (Cl. 299—141)

This invention is an improvement in jets or nozzles and relates more particularly to articles of this class which are used to inject steam, air, gas or other fluid into a chemical solution.

It is one of the objects of my invention to construct a jet for injecting steam, air, gas, or other fluids into a chemical solution in which the jet is immersed, and to provide a jet or nozzle which will successfully resist erosion in such use.

Another object of the invention is to provide a jet of the class described, which comprises an outer casing of a chemical resistant, ductile metal and an insert or nozzle portion made of a non-metallic material, such as graphite or other carbonaceous material.

A further object is to provide a jet of this character which, due to the selection of materials of which it is made, will not set up an electrolytic potential in use and consequently is free from corrosive action due to such potentials.

Another object is to construct a jet of the above named character which is economical to manufacture, highly resistant to erosion and chemical reaction, is easy to install and operate, and possesses longer useful life than similar devices now in use.

Other objects and advantages of my invention will become more apparent from the following description of two embodiments of my invention, reference being made to the accompanying drawing in which like reference characters are employed to designate like parts throughout the same.

In the drawing:

Figure 1 is a side view of one embodiment of my invention shown as applied in use;

Figure 2 is a front elevation of the device shown in Figure 1;

Figure 3 is a vertical section through a jet embodying my invention; and

Figure 4 illustrates a modified form of the present invention and shows a type of nozzle embodied in a pipe section at spaced intervals, and in which each nozzle is provided with a single orifice.

It is the practice at the present time in pickling metal stock to employ a pickling tank having a chemical solution therein in which the metal is immersed for a predetermined time. It is customary to agitate the pickling solution and to heat it to a predetermined temperature by injecting steam or other fluid under pressure below the surface of the solution. This is done by means of jets or nozzles conveniently located in the walls of the tank or suspended within the tank so that the injected fluid will be delivered below the level of the solution. Many difficulties have arisen with present methods and apparatus for accomplishing these results, and it is well known that it is necessary to replace corroded and worn out nozzles frequently. This results in loss of time and is rather expensive.

According to my invention I have eliminated these disadvantages by providing a jet and nozzle which need not be discarded after short use, but which is possessed of an extremely long useful life.

Referring now more particularly to the accompanying drawing, I have shown one form of the invention in Figures 1, 2, and 3. In this embodiment a section of the tank is indicated at 1, while my improved jet 2 is shown immersed in the pickling solution 3.

The jet is illustrated in detail in Figure 3 and comprises a pipe section 2 curved at its base and terminating in an enlarged open end 4. The material of the pipe section, and particularly that portion which is intended to be immersed in the pickling solution, consists of a ductile, chemical resisting metal, such as lead or tellurium bearing lead metal. Other materials, such as copper, tin, chromium nickel steels, nickel or the commercial metal known as "Monel" metal may be used.

In further carrying out my invention, I provide a nozzle member 5 preferably in the form of a perforated disk or plate which is fitted within the open enlarged end of the pipe. The nozzle member or insert 5 may be secured in place in the pipe in any desirable manner. One method is to cast or mold the pipe section around the member 5 which has its peripheral wall grooved as at 5'. In this manner, the pipe material will enter the groove and overlie the outer faces of the member 5 as indicated in Figure 3 to form a locking connection between the members. Another method of securing the member 5 in place is to provide it with threads engageable with threads formed within the mouth of the pipe, or the member 5 may be retained in place by means of a retaining ring or cap. Other methods of assembling the parts may be employed if desired.

These nozzle members 5 are formed of a non-metallic material. I have found carbon or graphite to be highly desirable and either may be treated or impregnated to reduce porosity. The nozzle member 5 may be in the form of a plate having one or more orifices 6 communicating with the internal bore of the pipe to convey the air,

steam or other fluid into direct contact with the pickling solution in the tank. Other materials, such as fired ceramic clay or machined natural minerals having chemical resistant qualities may be used in place of graphite or carbon.

In Figure 4, I have illustrated a modified form of the invention, in which I have provided a series of jets or nozzles 7 of the single orifice type arranged along a pipe section 8, the single orifice 9 in each nozzle extending transversely of the pipe axis. In this form of the invention the non-metallic nozzle members 7 are enclosed and retained in the recess 10 by means of the retaining members 11 formed in the pipe, the shanks of the members 7 extending into the openings 12 in the pipe as indicated.

While my invention has been described as being particularly useful in introducing steam, air, gases or other fluids into a pickling tank to heat and agitate the solution within the tank, it is equally effective and useful in injecting chemical gases and liquids into solutions for the purpose of effecting chemical reactions.

In either use, it will be seen from the above description of the construction and operation of my invention, that I have made a distinct advance in the art and have enabled many of the difficulties heretofore encountered to be effectively overcome.

Jets made in accordance with the present invention have the distanct advantage of superior mechanical strength and ductility in the pipe as well as chemical resistant properties in the orifice insert, the whole composite structure representing low initial cost of manufacture and low subsequent maintenance or replacement costs.

Various changes may be made in the details of construction or the arrangement of parts of my invention without departing from the spirit of the invention or the scope of the appended claim.

I claim:

Means for introducing a fluid such as steam into an active chemical solution, said means comprising a conduit section of ductile metal and an integral discharge nozzle communicating with the conduit, said nozzle comprising a frustro-conical section having an enlarged opening at its base or discharge end and having an annular locking recess in its inner wall adjacent its open end, and an orifice insert comprising a member having an annular wall for cooperating locking engagement with the locking recess in the nozzle, said insert being formed in its entirety of a graphitic carbon material.

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