Feb. 23, 1954 C. M. RADER 2,670,327

ELECTROLYTIC LIQUID TREATING DEVICE

Filed May 26, 1950

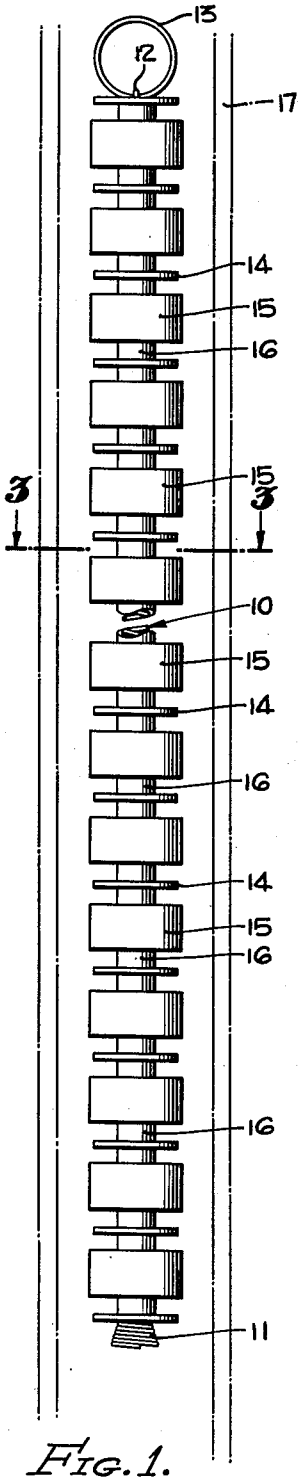


FIG. 1.

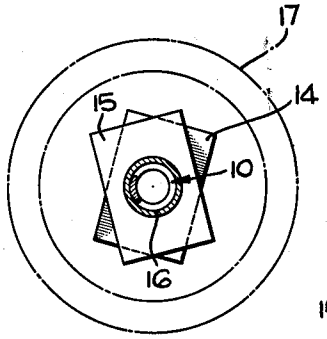


FIG. 3.

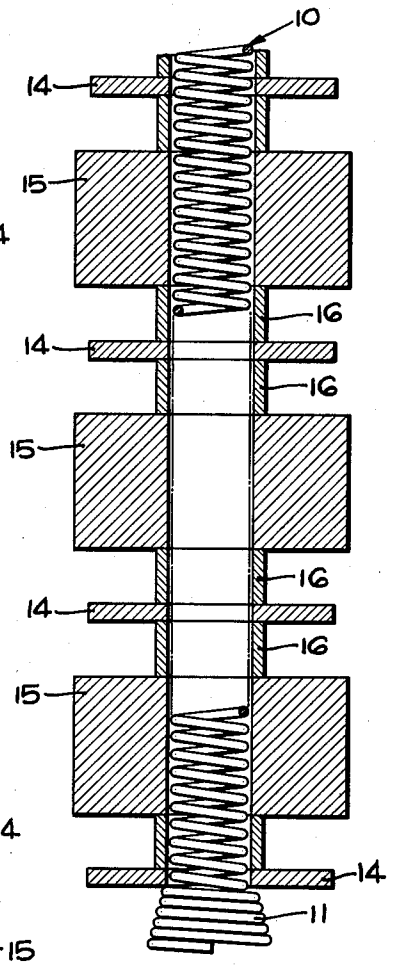


FIG. 2.

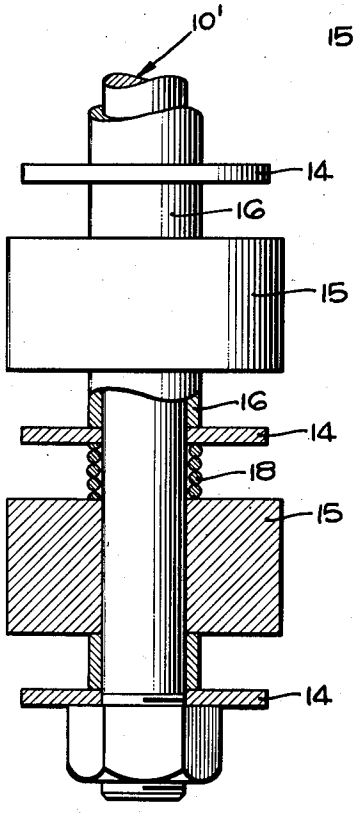


FIG. 4.

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ELECTROLYTIC LIQUID TREATING DEVICE

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1 Claim. (Cl. 204—248)

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This invention relates to a liquid treating device.

It is well known that during the operation of boilers and like apparatus the suspended solids contained in the boiler water are often precipitated from the water and accumulate in the form of incrustation on the confining walls of the boiler or the tubes through which the water flows. It is also well known that in the operation of oil well pumps it is found that the cognate fluid being pumped from the well contains suspended solids which may form objectionable deposits upon the pump or sucker rods or within the pump barrels. It is presumed that this action is brought about by an electrolytic action. It has, however, been observed that when treating water for use in a boiler or when treating the fluids passing through a pump, the establishment of an electrolytic action will break down the deposit of solid material on the particles contacted by the fluid. Simple devices for setting up an electrolytic action in a fluid have been known for a long time. These usually comprise a central rod upon which are strung alternate disks or electrodes of copper and zinc. These disks are usually spaced a distance apart by metallic members. This spacing permits free circulation of the treated fluid between the conductors or faces of the disks and insures a more efficient operation. It has been found in practice that efficient operation of a structure of the type described requires suitable metallic contact between the disks and spacers so that the structure will be maintained in a permanently assembled position at all times. In some instances the disks and spacers were mounted upon a rigid rod, During the electrolytic process which occurred when the structure was submerged in a liquid to be treated, it was found that the zinc disks would be excessively eroded so that they assumed a loosely assembled position upon the center rod. This impaired the electrical contact between the spacers and the disks and therefore reduced the efficiency of the device in precipitating the solids which had been deposited in a vessel or which were carried by the liquid confined therein. It has been found to be desirable to exert pressure to hold the electrodes and disks in intimate contact. It was also observed that due to the rigid structure of the center rod it was not possible at all times to install the device within a tube or to pass it through a connection. It was found desirable therefore in some instances to provide a flexible tensioned center member which exerted longitudinal tension to maintain the disks

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and spacers in intimate contact with each other and which member also possessed flexibility so that the structure might be bent and passed through conduits of a regular configuration.

It has also been found that when devices of the character described extend through a conduit, the electrolytic action is more effective if the liquid within the conduit is agitated and it is therefore desirable to shape the disks with different configurations so that there will be a disturbance in the flow of liquid around the disks and along the device.

It is the principal object of the present invention therefore to provide a structure of the character described having a central tensioned rod to maintain a series of disks and spacers of varying contour in the intimate contact with each other and to permit the assembled length of the structure to flex as required, and which structure may if desired be flexible and designed to disturb the flow of fluid therearound.

The present invention contemplates the provision of a central rod-like member formed of a coil of wire under tension upon which member are strung a plurality of copper and zinc elements provided with intermediate spacers, the spring rod being under longitudinal tension and being flexible for the purpose herein described, the invention also contemplating the use of other tensioning means and a variation in the configuration of the electrodes.

The invention is illustrated by way of example in the accompanying drawings in which:

Figure 1 is a longitudinal view of a form of the present invention as it may be installed within a vertical conduit.

Fig. 2 is an enlarged central fragmentary section showing the details of construction of the present device.

Fig. 3 is a view in transverse section as seen on line 3—3 of Fig. 1 and indicates the irregular perimeter which the disks may assume in producing agitation in the liquid passing through a conduit in which the unit is mounted.

Fig. 4 is a fragmentary view in elevation showing tensioning means carried upon a rigid center rod and acting between electrodes strung thereon.

Referring more particularly to the drawings, 10 indicates a center rod. This rod is particularly shown in Fig. 2 of the drawing as being formed of a tightly wound helical spring. The spring is, of course, constructed of spring wire having a suitable tension and being wound to form and engage end 11 at one end and loop 12

at its opposite end. The loop 12 may receive a ring 13 by which the structure may be held in its assembled position since the engaged end 11 will permit the displacement of the disks strung upon the rod. The disks as shown comprise copper disks 14 which are relatively thin and zinc disks 15 which are relatively thick. It is to be understood that the invention is not limited to the use of zinc and copper electrodes, some other metals are known to produce the electrolytic action desired. These disks or electrodes are held in spaced relation to each other by bushings 16 which are preferably made of brass and while they act as conductors of electricity between the disks 14 and 15 they do not take part in producing the electrolytic action which occurs when the members 14 and 15 are submerged in a liquid. When a suitable number of disks 14 and 15 and the intermediate bushings 16 have been strung on one of the rods 10, the rod is placed under tension and the ring 13 is passed through the loop 12 to hold the rod under a desired longitudinal tension. This will cause the contacting end faces of the disks 14 and 15 and the bushing 16 to be held against each other firmly. This action will maintain the faces of the disks parallel and will not impair the electrolytic action of the structure as would be the case if the disks had an opportunity to contact each other. The tension also insures that when there is any wasting away of the contacting surfaces of the disks or bushings, these members will be drawn against each other intimately and will insure that any electric current created through the structure from one disk to another will be maintained at maximum strength. This same tensioning action is obtained in the rigid rod structure as shown in Fig. 4 of the drawings.

It is to be understood that the electrolytic unit may be constructed and assembled as shown in Fig. 1 for the purpose of installation in a conduit as indicated by dotted lines at 17 in Fig. 1. Such a structure may also be mounted in a suitable case and interposed within a steam boiler or within the flow of liquids through an automobile radiator. In both of which cases the electrolytic action will tend to maintain the water clear and will remove the precipitate therefrom. It is also desirable to use the present invention in connection with oil well pumping apparatus in which the electrolytic unit may be associated with the pump plunger or may be installed suitably at some point along the length of a sucker rod. In any event care should be taken that the electrolytic unit shall not come into intimate contact with other metallic surfaces.

By reference to Fig. 3 of the drawings it will be seen that the electrodes 14 and 15 are of irregular configuration and not circular as indicated in Fig. 1 of the drawings. This insures that when liquid circulates longitudinally of the device within a confined space there will be a maximum agitation of the liquid and a more efficient operation performed.

Referring particularly to Fig. 4 of the drawings, it will be seen that center rod 10' is rigid

and that interposed between two of the electrodes is a spring tensioning member 18 which will serve the same purpose as the spring rod 10.

In operation of the present invention the structure is made and assembled as shown in Figs. 1 and 2 of the drawing after which the device is suitably installed in a vessel containing water to be treated. It may occur that the installation is to be made within a vessel having a sinuous opening or within a sinuous conduit. In either of these instances the spring-like construction of the coiled center rod 10 affords flexibility which will permit the device to be manipulated and installed at the operating position required, after which fluid circulates in its normal course through the vessel or conduit and precipitation or solids deposited therein or suspended in the liquid will be removed by electrolysis.

It will thus be seen that the structure here disclosed may be simply made and assembled and that it will be held yieldably in its assembled position to operate efficiently and to permit it to be installed conveniently.

While I have shown the preferred form of this invention as now known to me, it will be understood that various changes may be made in the combination, construction and arrangement of parts of the structure by those skilled in the art without departing from the spirit of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

An electrolytic device comprising: a central rod-like member formed by a helical spring, alternate disks of copper and of zinc strung on said member, tubular metallic spacers also strung on said member between contiguous faces of said disks; and stop means at the opposite ends of said member, said stop means engaging opposite ends of the assembly on said member of said disks and spacers to place said helical spring in stretched condition whereby said spring holds said assembly with the contiguous faces of the disks and spacers in intimate contact with each other, in spite of said assembly decreasing in length due to erosion of said disks and spacers by electrolytic action, said spacers being of relatively small diameter to permit said device to flex sharply whereby it will readily pass around sharp turns in a pipe through which it is extended.

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