May 5, 1931. M. W. BADEN 1,804,078

MEANS FOR PREVENTING CORROSION IN PIPES

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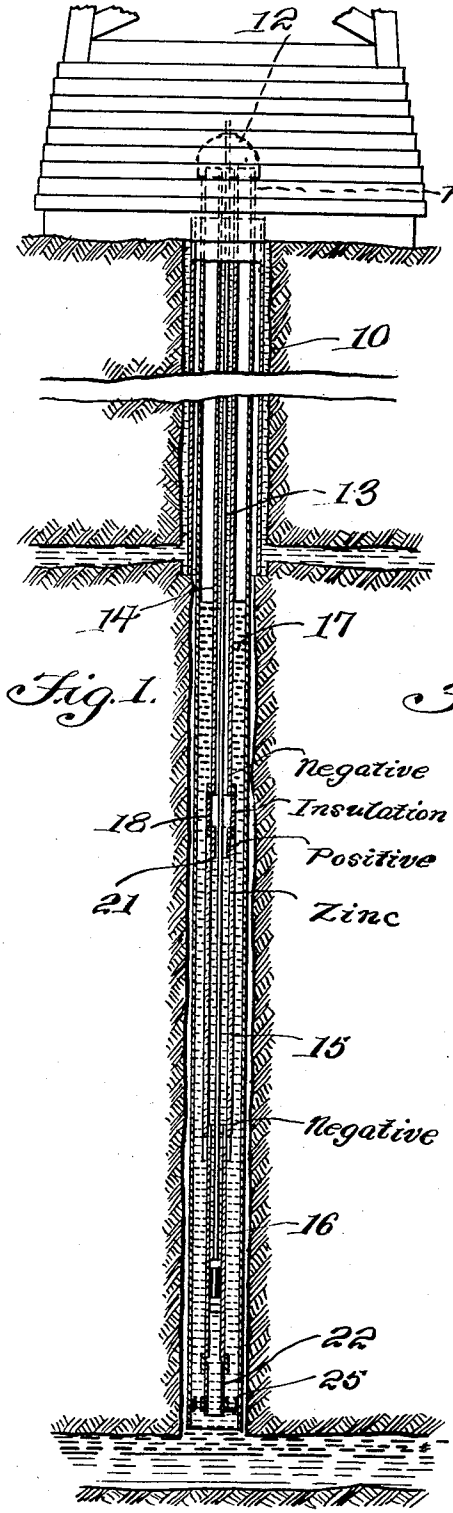


Fig. 1.

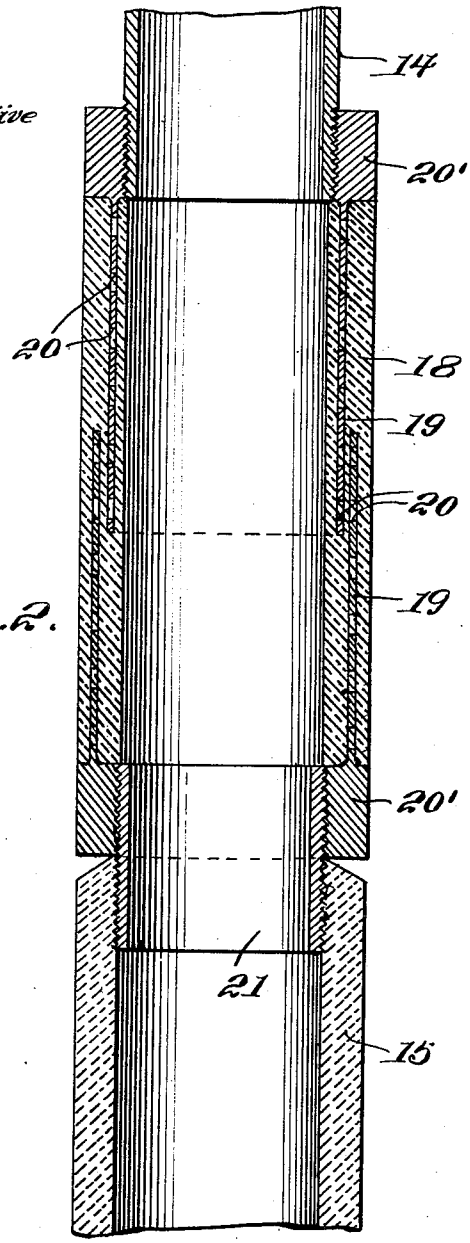


Fig. 2.

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Fig. 3.

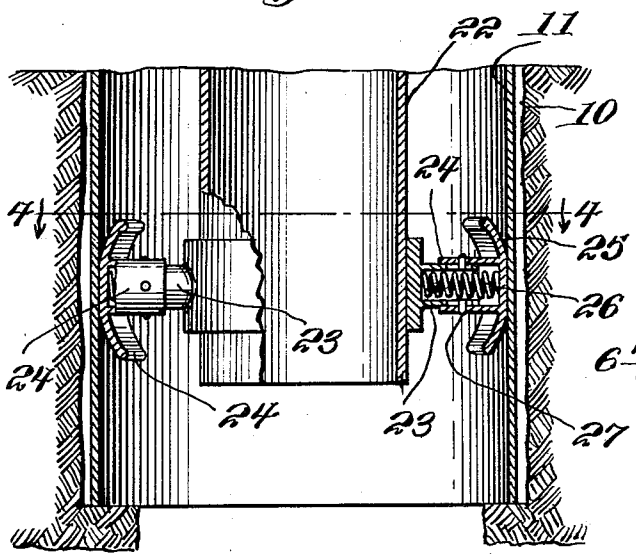


Fig. 5.

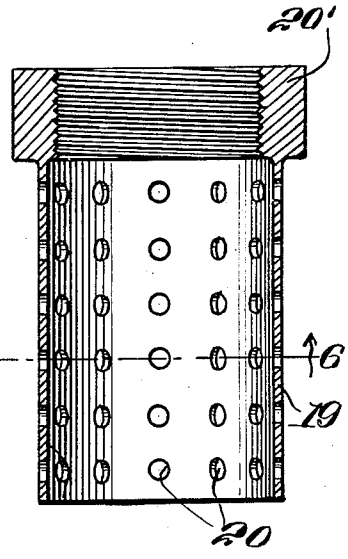


Fig. 4.

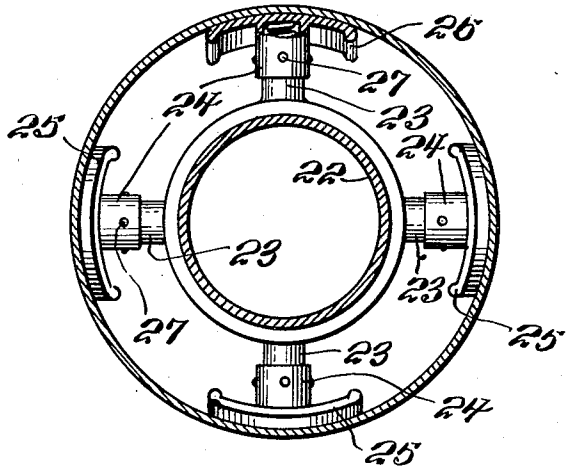
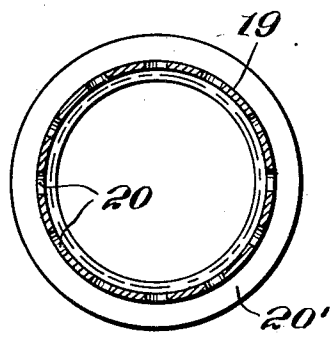


Fig. 6.



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UNITED STATES PATENT OFFICE

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MEANS FOR PREVENTING CORROSION IN PIPES

Application filed November 26, 1928. Serial No. 322,017.

This invention relates to an apparatus to be used in oil and water wells, the object being to provide means for resisting corrosion of the apparatus within the well, such corrosion being due to an excessive amount of salt and sulphurated hydrogen gas, or salt and magnesium chloride found in the waters of many water and oil bearing horizons. The sulphurated hydrogen gas being mixed with the waters of many oil wells converts the water into a sulphuric acid solution; or where the elements in the water is salt and magnesium chloride, the water is converted into a hydrochloric acid solution. This causes excessive corrosion on the steel or copperized steel casing and tubing used in the wells.

For this purpose the invention provides means for setting up a galvanic or electrolytic action within a well by constructing the apparatus so as to provide positive and negative electrodes which are submerged within the electrolyte fluid of the well so that the corrosion will pass from the steel casing and copperized or steel tubing and affecting the zinc tubing which may be replaced.

With the above and other objects in view, the invention further includes the following novel features and details of construction, to be hereinafter more fully described, illustrated in the accompanying drawings and pointed out in the appended claims.

In the drawings:—

Figure 1 is a vertical sectional view, partly broken away, illustrating the apparatus used in the oil or water well constructed in accordance with the invention.

Figure 2 is an enlarged sectional view showing insulated connection between the positive and negative electrodes.

Figure 3 is an enlarged fragmentary section showing the electrical connection between the tubing and casing.

Figure 4 is a section on the line 4—4 of Figure 3.

Figure 5 is a detail sectional view of the reinforced sleeve at one end of the insulating coupling.

Figure 6 is a section on the line 6—6 of Figure 5.

Referring to the drawing in detail wherein like characters of reference denote corresponding parts, the reference character 10 indicates the bore of a well which is provided with a metallic casing 11. In the opening of the upper end of the casing is a casing head 12, and extended through this casing head into the well is the tubing, rods, working barrel and equipment necessary to lift the oil or water 17.

The pumping rod 13 is surrounded by a tubing as is usual in apparatus used in flowing or pumping wells, but this tubing instead of being formed of iron sections is preferably formed of one or more copperized steel, or steel sections 14, and one or more thick zinc sections 15, while connected to the lower end of the zinc section is the working barrel 16 and anchor. However, if conditions so require, the zinc section may be used as an "anchor" below the working barrel.

The steel section 14 of the tubing forms a negative electrode while the zinc 15 forms the positive electrode and when these electrodes are submerged within the fluid 17 of the well, the latter is converted into an electrolyte or galvanic cell where the fluid contains salt water and sulphurated hydrogen gas; or salt water and magnesium chloride.

Section 14 of the tubing and section 15 thereof are connected by an insulated sleeve as illustrated in Figure 2 of the drawings. This sleeve is formed from a suitable insulating material such as hard rubber, mica, composition or the like as indicated at 18, and has embedded therein relatively thin metallic reinforced sleeves 19, which are provided with openings 20, so that the sleeves 19 are securely anchored within the sleeve 18. The sleeves 19 extend beyond the open end of the sleeve 18 and these extended portions are relatively thick as shown at 20' and are internally threaded for connection with the adjacent ends of sections 14 and 15. The last mentioned section may carry an externally threaded thimble 21.

By the construction just described, the

upper end of section 14 forms the negative pole and the lower end the positive pole of one of the elements of the electrolytic or galvanic cell, while the upper end of the section 14 forms the negative pole and the lower end the positive pole of the other element of the galvanic or electrolytic cell.

The lower end of the tubing below the working barrel is electrically connected with the casing 11, and for this purpose a tubular extension 22 is connected to the lower end of the working barrel and this extension carries the radially disposed sleeves 23. The sleeves 23 telescopes and is slidable within a sleeve 24, whose outer end carries the contact shoe 25, which engages the casing 11. The springs 26 act to force the shoe into such engagement, while a pin or slot connection 27 is provided between the sleeves 23 and 24.

By means of the construction shown and described an electrolytic or galvanic action will be set up within the water or oil well, similar to that of ordinary electrolytic or galvanic cells, so that a potential will be set up between the copperized steel or steel section and the zinc section of the tubing. The difference in potential of these two elements will throw all of the corrosive action on the zinc section 15, and the latter will be constantly de-polarized by action of the movement of fluid by pumping the fluid within the well and the zinc sulphate, or zinc chloride will pass out of the well when the latter is in operation and corrosive action will thus be prevented from taking place on the copperized steel or steel tubing as well as the casing.

The invention is susceptible of various changes in its form, proportions and minor details of construction and the right is herein reserved to make such changes as properly fall within the scope of the appended claims.

Having described the invention what is claimed is:

1. Electrolytic apparatus for installation in a well casing to resist corrosion of the casing and the pumping equipment operating therein, said apparatus comprising a tube consisting of tubular sections of metals of different polarity, a connecting unit for the ends of the sections comprising a tubular body of insulating material, metallic sleeves embedded in the said body with their relatively adjacent ends concentrically arranged one within the other and in mutually spaced relation, the said sleeves being provided with thickened relatively remote ends abutting the tubular body of insulating material and threaded to provide for their connection with the tubular sections of the said tube, and radially disposed shoes at the lower end of the lower tubular section for spacing the tube from the casing and establishing electrical connection between the casing and the said tubular section.

2. Electrolytic apparatus for installation in a well casing to resist corrosion of the casing and the pumping equipment operating therein, said apparatus comprising a tube consisting of tubular sections of metals of different polarity, a connecting unit for the ends of the sections comprising a tubular body of insulating material, metallic sleeves embedded in the said body with their relatively adjacent ends concentrically arranged one within the other and in mutually spaced relation, the said sleeves being provided with thickened relatively remote ends abutting the tubular body of insulating material and threaded to provide for their connection with the tubular sections of the said tube, radially disposed shoes at the lower end of the lower tubular section for spacing the tube from the casing and establishing electrical connection between the casing and the said tubular section, and means for yieldably holding the shoes in contact with the casing comprising tubular telescopic stems connected with the shoes and the said lower tubular section, and a compression spring arranged within the said stems.

In testimony whereof I affix my signature.

MARTIN WILLIAM BADEN.