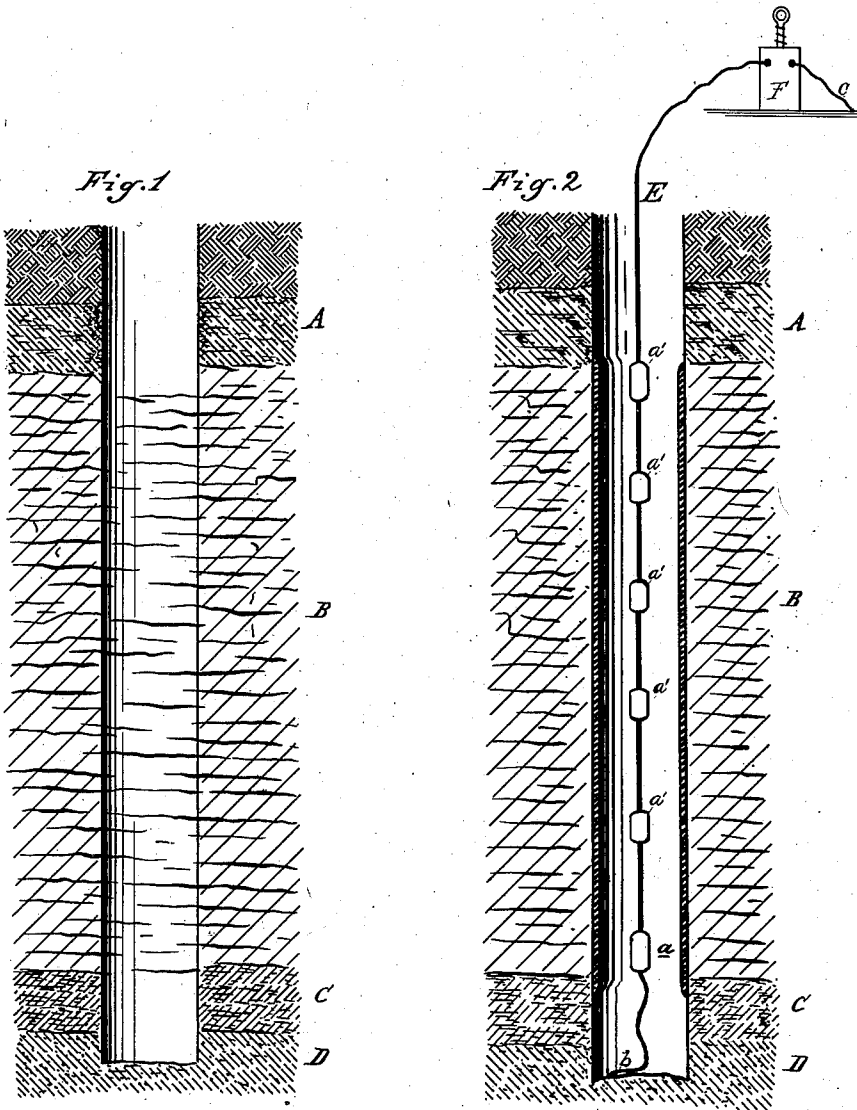


J. MASON.
Cleaning Salt Wells.

No. 224,024.

Patented Feb. 3, 1880.



Attest:

Thos. S. Day
Jas. Payne

Inventor:
John Mason
By atty
Thos. S. Day

UNITED STATES PATENT OFFICE.

JOHN MASON, OF EAST SAGINAW, MICHIGAN.

CLEANING SALT-WELLS.

SPECIFICATION forming part of Letters Patent No. 224,024, dated February 3, 1880.

Application filed April 1, 1879.

To all whom it may concern:

Be it known that I, JOHN MASON, of East Saginaw, in the county of Saginaw and State of Michigan, have invented an Improvement in Cleaning Salt-Wells, of which the following is a specification.

The nature of my invention relates to an improved method or process of cleaning salt-wells in which the flow of brine is obstructed.

Salt-wells are bored through the various strata of clay and rock, through the lime-rock overlying the salt-bearing rock, and into the underlying shales. Iron tubing is then inserted from the top, in successive lengths, until the lower end of the bottom length reaches the lime-rock, which almost invariably overlies the salt-bearing rock. This latter-named rock is fissured, and the brine finds an outlet through the fissures into the well, whence it is withdrawn by pumping. In the course of time it is found that the well runs dry, or nearly so. This is occasioned by the "bleeding," as it is technically termed, of the overlying strata, which contain gypsum, iron, and other soluble substances, which drip down and, with the rust of the iron piping, gradually form a coating upon the wall of the bore through the salt-bearing rock until the fissures therein are closed, to the exclusion of the brine.

In order to remove this thin coating, it has been the practice to insert a suitable tool attached to a rod and ream out the bore through the salt-bearing rock, thereby removing the scale. Each time this is done the bore through this salt-bearing rock is slightly increased in diameter until the tool, which cannot be larger than the bore of the iron piping above, will be required to be so correspondingly increased in size that it cannot be inserted through the pipe. In this case the pipe must be removed at a large expense, as such wells are several hundred feet deep, and then be replaced after the bore through the salt-bearing rock has been reamed out. The great depth at which this rock is found and the necessity of using jointed rods to operate the reaming-tool prevents the practicability of using an expanding tool for the purpose of removing the scale.

As the salt-bearing rock is usually from ninety to one hundred feet thick, and the bore through it becomes coated its whole length,

the explosion of a torpedo at the bottom, as is done in oil-wells, would not produce the desired result, for the effect produced would be confined to a given radius from the point of explosion.

The object of my invention is to obviate all these difficulties by the following very effective method.

Figure 1 is a vertical central section of a salt-well from the top of the overlying lime-rock, at which the iron piping ceases, to the bottom of the well, and showing the fissures in the salt-bearing rock. Fig. 2 is a like view, showing the fissures and bore through the salt-bearing rock coated with the drip from above.

In the accompanying drawings, which form a part of this specification, A represents the usual stratum of lime-rock overlying the salt-bearing rock B. C represents the underlying shale, and D a red shale, in which the bore of the well usually terminates. The section of the well between the surface and the lime-rock A is not shown. This is the section hereinbefore referred to which is tubed with the iron pipe spoken of above.

E represents an insulated electrical wire, which is connected with a battery, F, at the surface. This wire is of sufficient length to reach to the bottom of the well, where its end *b* is left exposed and forms a ground-connection. The battery F also has a ground-connection, as shown at *c*. Near the lower end of the wire E, and about at the bottom of the salt-bearing rock, is attached to such wire a small torpedo, *a*, and above this torpedo are strung upon such wire a series of small torpedoes, *a'*, placed at suitable intervals apart, the upper torpedo of the series being near the top of the salt-bearing rock.

To attach the torpedoes to the wire they are cut in halves in the direction of their length. Each half is then placed against the covered insulated wire which passes through each torpedo, as shown. The torpedoes are then tied in a proper manner to the insulated wire at the desired distances apart. The lowest torpedo, *a*, contains an electrical exploder, of any usual construction, the covering of the wire E being removed and the wire exposed at that point for contact with the exploder.

In exploding the torpedoes the upper torpedoes are not affected by the electrical current which passes to and explodes the lowest torpedo, *a*, while the torpedoes above are exploded in succession, each by the concussion caused by the explosion of the torpedo next below. The torpedoes, being designed simply to break up and remove the coating from the bore of the well, should be quite small, and placed at such a distance apart that the whole coating will be removed without causing any unnecessary breaking down of the walls of the well.

It will be seen that, the well being bored wholly through the salt-bearing rock a distance usually of ninety or one hundred feet, a single torpedo of sufficient length to affect the whole bore through such rock would produce a greater explosion than would be necessary for the purpose of simply removing the coating, and would break down the walls of the well to such an extent as to soon render the well unsuitable for use. With the small torpedoes, however, placed at certain distances apart, this damage is avoided, since the force of the explosion can be regulated to a nice degree.

By exploding the lowest torpedo first and the others above in succession a better result is obtained, since if the upper torpedo were first exploded, the bore of the well being small, the débris would fall down and fill the bottom of the well, so as to lessen or destroy the effect of the explosion of the lowest torpedo.

In practice, the pump being removed, this wire *E*, with the series of torpedoes attached,

is lowered into the well, and as the distance from the surface to the bottom of the salt-rock is known, the torpedoes are easily placed in position. The upper end of the wire is attached to the electrical apparatus at the surface, and a current of electricity is then sent through the wire, which discharges or explodes the lowest torpedo, the other torpedoes being exploded in succession by concussion, as before explained. By this means the entire surface is cleaned of its coating and the fissures in the salt-bearing rock are disclosed, allowing the brine to flow into the well. The wire is then withdrawn, first having been disconnected from the battery, and the pump replaced. In a short time the operation of the pump will be found to withdraw the materials which formed the coating.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The method of removing the coating from the walls of salt-wells, consisting in exploding in succession, commencing with the lowest, a number of small torpedoes, *a a'*, placed at intervals in the bore through the salt-bearing rock, substantially as described.

2. The means for removing the coating from the walls of salt-wells, consisting of the insulated wire *E*, the series of small torpedoes *a a'*, the lowest torpedo containing an electrical exploder, the battery *F*, and ground-connections *b c*, substantially as described and shown.

JOHN MASON.

Witnesses:

H. S. SPRAGUE,
A. BARTHEL.