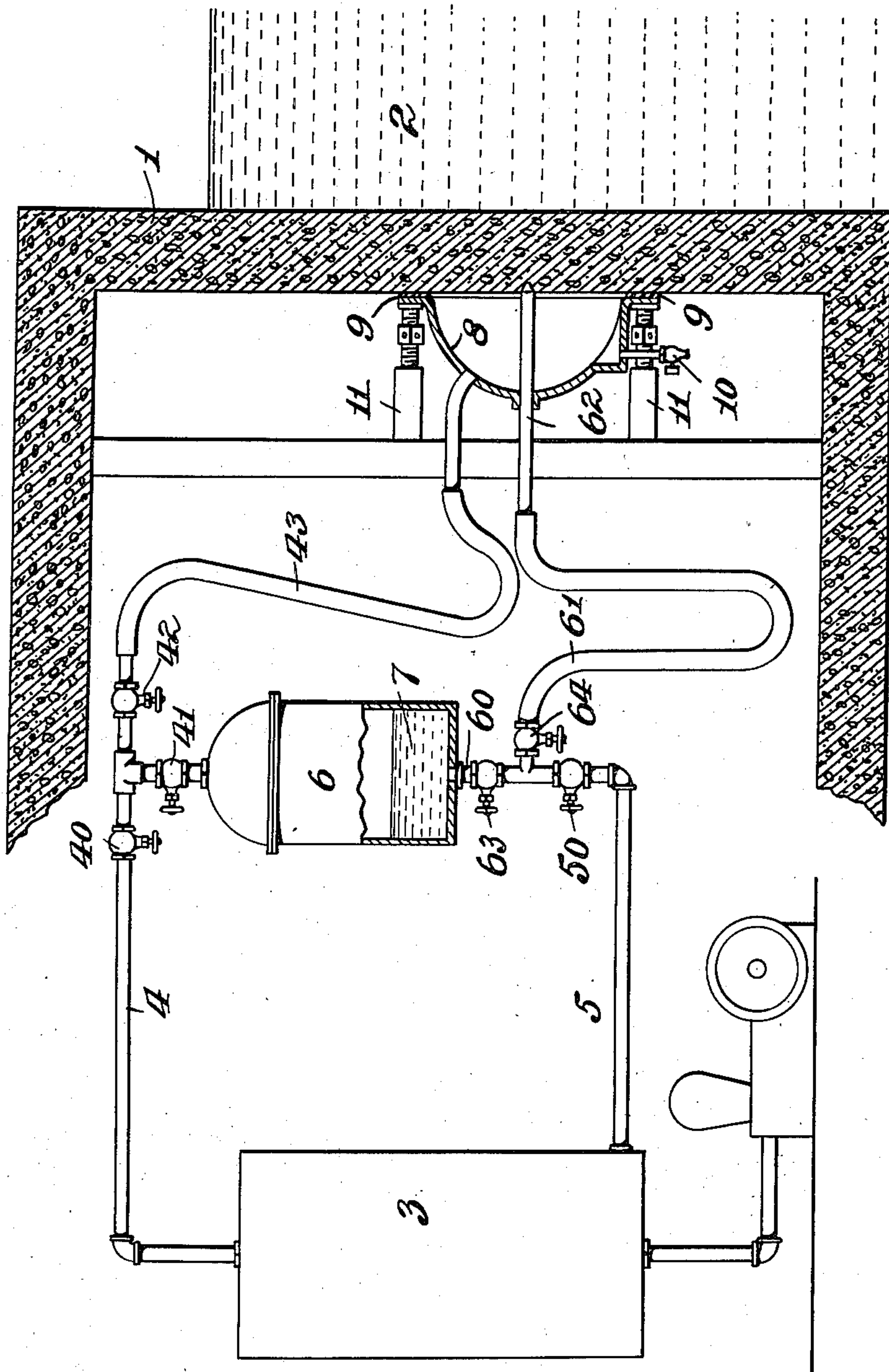


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TREATMENT OF POROUS STRUCTURES.
APPLICATION FILED DEC. 17, 1909.

996,042.

Patented June 20, 1911.



Attest:
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UNITED STATES PATENT OFFICE.

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TREATMENT OF POROUS STRUCTURES.

996,042.

Specification of Letters Patent. Patented June 20, 1911.

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To all whom it may concern:

Be it known that I, JASON C. MOORE, a citizen of the United States, and resident of Jonespoint, Rockland county, New York, have invented certain new and useful Improvements in the Treatment of Porous Structures, of which the following is a specification.

This invention relates to the treatment of porous structures such as concrete subject to infiltration of water whereby they are rendered waterproof and impervious to future infiltration and its novelty consists in the several successive steps of the process employed.

In tunnel tubes under water and with other structures at the edges of rivers or bodies of water, when such tubes or structures are made of concrete a serious difficulty has arisen from the infiltration of water into the concrete. At times such action of the adjacent water is sufficient to threaten disintegration of the structure or at least to cause its rapid and permanent deterioration. Many attempts have been made to cure this condition, but so far as known to me they have heretofore been unsuccessful. I have discovered a method which is hereinafter described by which the concrete is rendered impervious to future action of the water and one which is reasonably low in price in its application.

It consists briefly in first clearing a suitable area of the concrete of entrained water by driving the same back with air or other gas under pressure, secondly introducing into the concrete so cleared a suitable waterproofing liquid and simultaneously preventing the escape of the latter by maintaining an external pressure on the concrete and thirdly keeping up such external pressure until the liquid has had time to act.

In the drawing there is illustrated an apparatus which may profitably be employed in carrying out my process. It is of my own invention and I prefer to use it, but the steps of the process may be carried out by any other suitable apparatus or quite independently of any particular kind of structure.

The apparatus described is made the subject of a separate application for Letters Patent of the United States.

In the drawing the different devices employed are represented essentially in diagram.

1 represents a concrete wall placed in close proximity to or surrounded by a body of water indicated at 2, and which water creeps into the interstices of the concrete.

A reservoir of air or other suitable gas under pressure is indicated at 3. Two pipes 4 and 5 lead from this reservoir.

A receptacle indicated at 6 is filled wholly or partly with a suitable waterproofing liquid indicated at 7.

A hood 8 of any suitable size and material is adapted to be closely pressed against the surface of the concrete and is provided with gaskets indicated at 9 to prevent leakage. Means indicated at 10 are provided to secure the complete and constant contact of the hood against the wall. In the case illustrated this is shown as a framework of timber or other suitable structural material, but any means which will accomplish the desired purpose may be used in this connection. The pipe 4 connects with the interior of this hood and also with the interior of the receptacle 6 and is controlled by means of suitable valves indicated at 40, 41 and 42.

The receptacle 6 is provided with an outlet conduit 60 which is connected to a flexible hose 61 which terminates in a nozzle 62 passing through the hood and adapted to be adjusted against the concrete. The outlet conduit is controlled by a valve 63 and the nozzle by a second valve 64. The pipe 5 connects with the outlet conduit 60 by a coupling and is controlled by a valve 50.

In use the hood 8 is first secured firmly against the wall, the gaskets 9 being moistened if necessary. The nozzle 62 is then pressed firmly against the wall so that all of the parts are secure and rigid. The receptacle 6 is then filled with the waterproofing material. The valves 41 and 63 are then closed to shut off the receptacle 6 from the compressed air system and the valves 50 and 64 are opened and the compressed air is delivered through the nozzle 62 into the concrete and presses back the entrained water toward the body of water 2 and causes some of it to escape under such pressure into the interior of the hood 8, whence it may be drawn off by means of a drip-cock indicated at 10. When this step has been continued for a time sufficient to relieve a considerable portion of the concrete of its water, preferably an area about coincident in extent to the area covered by the edges of the hood 8, the valve 50 is closed and the

valves 63, 40 and 41 are opened whereby the air pressure coming through the pipe 4 upon the upper surface of the mass 7 in the receptacle 6 is forced through the conduit 5 60, hose 61 and nozzle 62 into the interstices of the concrete.

It will sometimes occur that a portion of the waterproofing liquid will, under the pressure placed upon it, be forced backward 10 into the hood 8 in the same manner as the entrained water had been so forced above described. To prevent this wholly, or to a sufficient extent for practical purposes, a counter-pressure is developed within the 15 hood by means of the valve 42 which is opened to admit a column of air from the pipe 4 through the hose indicated at 43 into the hood 8, thereby preventing such leakage. This counter-pressure is continued a sufficient 20 length of time to enable the waterproofing material to act. After this has occurred, the valves 40 and 50 are closed to shut off the air pressure and the valves 41 and 63 are closed to disconnect the waterproofing receptacle from the air system and 25 the hood 8 is removed and set up again to cover a new area of the concrete to be treated.

It will be understood that the counter-pressure may be set against the concrete wall 30 1 within the hood 8 prior to the introduction of the water-proofing fluid and in fact prior to the introduction of air pressure through the nozzle 62. In such case no water would 35 be pressed back into the hood 8 by the pressure through the nozzle 62, but all of it would be forced away from the hood and toward the body of water indicated at 2. The valve 42 may also be made of usual 40 form so as to vary the amount of pressure which can be taken from the air system and introduced into the hood 8. The ability to create such variation may be useful when waterproofing fluids of different degrees of 45 density and viscosity are employed.

Of course, while I have described this process as applicable primarily to the waterproofing of concrete or similar porous or semi-porous structural material, it is evident 50 that it is applicable within a wider range and may be employed usefully in other spheres of activity, for instance, in the impregnation of other porous articles with gaseous or liquid fluids not possessing waterproofing qualities necessarily, but which it 55 may be desired to introduce into such porous article.

What I claim as new is:—

1. The process of waterproofing concrete 60 against the infiltration of water which consists first in clearing the concrete of water by the application of a jet of gas under pressure, and second introducing within the concrete so treated a waterproofing liquid and 65 third maintaining a gaseous counter pres-

sure against the concrete during the introduction of said fluid and until the waterproofing fluid has had time to act.

2. The process of treating a porous material as concrete subjected to the action of 70 water which consists first driving back the incoming water by a column of air under pressure, second following the same by a column of waterproofing fluid under pressure and third preventing the escape of the 75 fluid so introduced by a suitable counter pressure around the area of application.

3. The process of impregnating a porous article subjected to the action of one fluid 80 with another fluid, which consists in introducing the second fluid into the article under pressure at one point and putting a counter pressure upon the article upon a limited area surrounding the point of application of the 85 fluid whereby its leakage is prevented.

4. The process of impregnating a porous article with liquid which consists first in forcing the liquid under pressure into the article at one point and second putting a 90 counter pressure on a limited area of the surface of the article around the point of application of the liquid.

5. The process of treating a porous wall subjected to the action of water to render it 95 waterproof which consists in introducing a waterproofing fluid within the wall at one point under pressure and producing a counter pressure on the wall surrounding said point.

6. The process of waterproofing concrete 100 against the infiltration of water which consists first in subjecting a limited area of the concrete to the pressure of a gaseous fluid, second introducing into the concrete under a greater pressure a waterproofing liquid 105 and third maintaining both pressures until the waterproofing liquid has filled the interstices of the concrete.

7. The process of impregnating a porous article subjected to the action of one fluid 110 with another fluid which consists in putting the pressure of a gaseous envelope upon the surface of the article to be treated and introducing the second fluid into the article while maintaining such surface pressure. 115

8. The process of impregnating a porous article with a liquid which consists in forcing the liquid into the article against the internal resistance of the article, and maintaining an external pressure against the surface of the article within a substantially 120 closed chamber adjacent to the point of application of the liquid.

9. The process of impregnating a porous wall with a liquid which consists in forcing 125 the liquid into the wall at different points successively along its surface against the internal resistance of the wall, and maintaining an external pressure against the surface of the wall within a movable substan- 130

tially closed chamber surrounding successively each point of application of the liquid.

10. The process of impregnating a porous article, which consists in forcing a liquid
5 into the porous article at a predetermined point on its surface and producing around said point and against a larger area of the surface, a gaseous pressure to prevent the return of the liquid so introduced.

10 11. The process of impregnating a porous article having a liquid pressure against one side of the same, which consists first in applying a gaseous pressure against the opposite side of the article to drive back the

liquid that has entered the pores thereof, 15 then introducing through said other side at a predetermined point, a liquid proofing material, and producing around said point and against a larger area of the said other side, a gaseous pressure to prevent the return of 20 the water-proofing liquid so introduced.

Witness my hand this 14th day of December, 1909, at New York, N. Y.

JASON C. MOORE.

Witnesses:

SARA G. O'ROURKE,
DAISY WESTERVELT.