

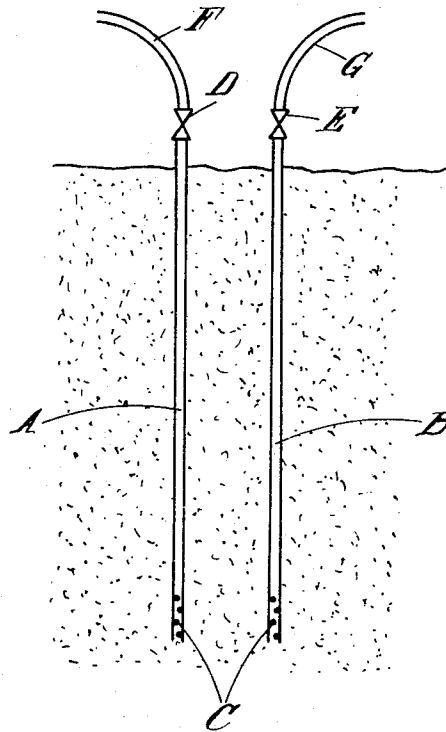
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GROUTING OF GROUND, SOIL, OR OTHER MEASURES

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GROUTING OF GROUND, SOIL, OR OTHER MEASURES

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1 Claim. (Cl. 61—36)

This invention relates to the grouting of ground, soil, or other measures by introducing therein a slurry of cement, lime or other material suitable for grouting operations.

5 The methods heretofore adopted for introducing a cement, lime or mortar slurry into the ground and especially into loose measures such as sand, soil, gravel, river ballast made ground, and the like, whether such measures have been
10 waterlogged or dry, have not resulted in a sufficiently uniform distribution of the slurry in all directions as to ensure that every solid particle of the mass to be treated should be entirely surrounded by the grouting material, and in consequence the ground is not ultimately transformed
15 into a homogeneous mass. In those methods the slurry introduced into the ground has been found to concentrate itself in certain places or along certain lines of least resistance to its penetration, and the result of the treatment has so far been to
20 obtain a non-homogeneous mass with the cement, lime or mortar content varying from place to place and consequently of irregular strength or resistance or having different degrees of watertightness at its different points. The primary
25 object of the invention is to obtain an intimate mixture of the slurry with the ground, soil or measures to be treated whether this may be for purposes of consolidation, watertightness or otherwise.

30 According to the present invention compressed air or other suitable gas is introduced continuously or intermittently and at a suitable pressure into the measures to be grouted, it may be at the
35 same time as the slurry, or prior to or after the introduction of the slurry, but is not intended to effect the introduction of the slurry which is introduced by any of the well known means such as by gravity, ram pumps or rotary, centrifugal
40 or other pumps. The compressed air or other suitable gas may be introduced into the ground either through the same tube or hole as the slurry or through other tubes or holes provided or formed for that purpose.

45 An apparatus for carrying out the invention is shown in the accompanying drawing, in which B is a tube which is forced into the ground by any suitable means, for example, a pneumatic hammer of any well known construction. The upper
50 end of the tube B communicates with a pipe G

through which air or gas under pressure may enter the tube B. The valve E controls the admission of air or gas to the pipe B.

A is a tube, similar to the tube B, which is likewise forced into the ground in any well known
55 manner, and at its upper end communicates with a pipe F through which grouting material may be introduced into the tube A. A valve D controls the admission of the grouting material from the pipe F to the tube A. Each of the tubes A and B
60 are open at their lower ends and have perforations in order to permit the grouting material and air or gas forced through the tubes A and B to spread into the ground.

In operation air or gas is preferably admitted
65 under pressure at the tube B prior to the admission of the grouting mixture through the tube A, and has the effect of giving a lead to such grouting mixture by driving out the water in that portion of the ground surrounding and immediately below the bore hole, which portion of
70 the ground is technically called "the measure", and forcing a passage for the grouting mixture subsequently introduced. After the measure has been suitably permeated by the air or gas, the
75 valve D is opened and the grouting mixture forced through the tube B into the measure.

The quantity of compressed air or other suitable gas introduced, the pressure and velocity at which it is introduced and the time occupied in
80 its introduction, vary according to the particular conditions of each case, such as for example the depth of treatment, whether the measures are waterlogged or not, head and quantity of water (if any) contained in the ground, nature of the
85 measures, and the method adopted for introducing the slurry into the ground. Its pressure, however, should be at least equal to the pressure at which the slurry itself is introduced which may be between atmospheric pressure and several thousand pounds per square inch according to conditions, although it is seldom necessary
90 that it should exceed four hundred pounds per square inch. The speed at which the slurry is introduced may be from two gallons per minute to twenty gallons per minute. In addition to variations necessary due to the particular conditions of different cases it may be necessary to progressively vary the pressure and speed of introduction of the slurry and the compressed gas in
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individual instances due to changes which may occur in the ground, soil or other measure as a result of the effect brought about by the introduction of the slurry and compressed gas.

- 5 The method according to the invention results in the obtaining of a more even distribution of the slurry in all directions, more intimate mixing of the slurry with the materials to be treated, and ultimately, the formation of a more homogeneously cemented material than heretofore obtained by the ordinary grouting process without introduction of compressed air or other gas.
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What we claim and desire to secure by Letters Patent of the United States is:—

The method of grouting which comprises rendering the measure to be grouted more permeable to the grouting by introducing a gaseous medium into the measure under pressure, and forcing grouting into the measure at a locus different from that in which the gaseous medium is introduced.

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