June 20, 1933. J. W. POULTER 1,915,032

METHOD OF AND MEANS FOR CORRECTING PAVING SETTLEMENTS

Filed May 13, 1930

Fig. 1.

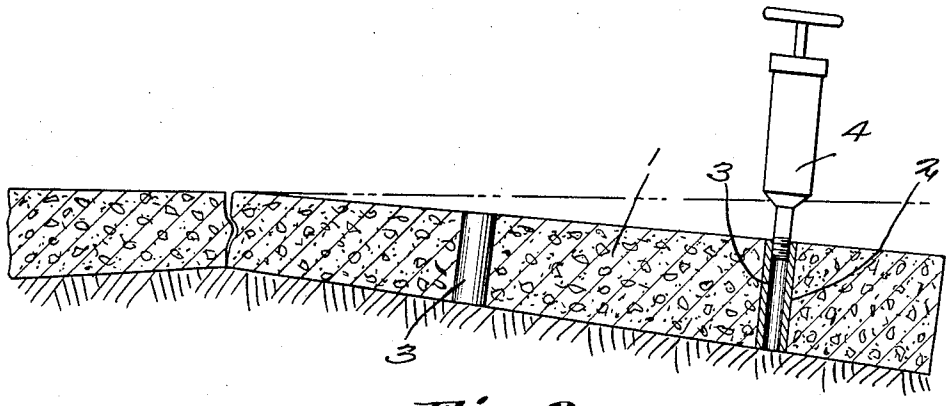


Fig. 2.

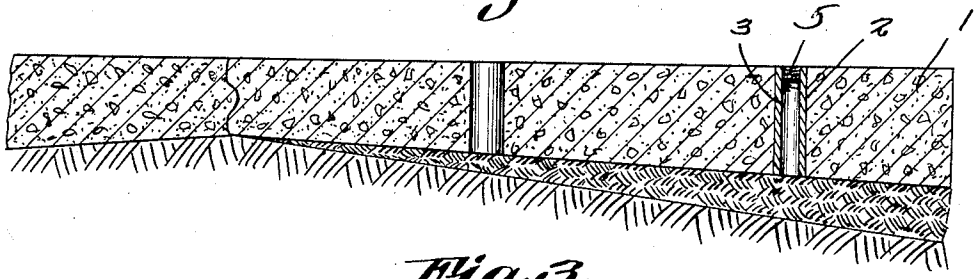


Fig. 3.

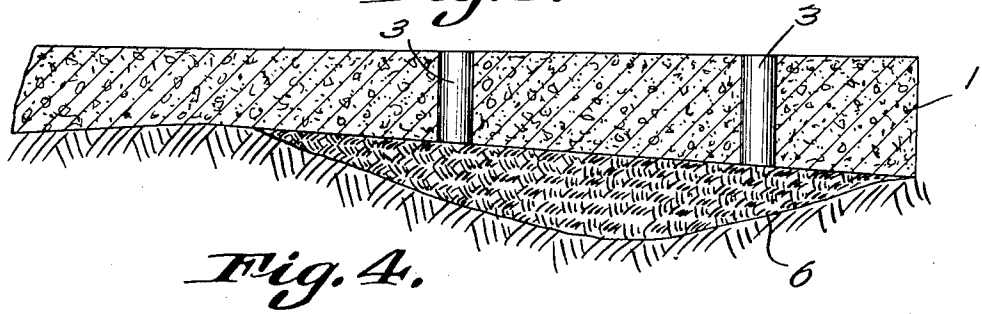
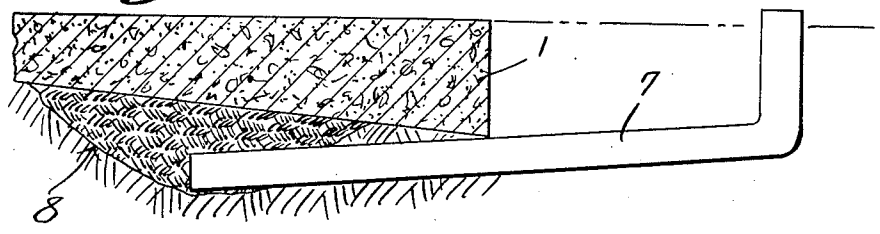


Fig. 4.



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1,915,032

UNITED STATES PATENT OFFICE

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METHOD OF AND MEANS FOR CORRECTING PAVING SETTLEMENTS

Application filed May 13, 1930. Serial No. 452,002.

This invention relates to a method whereby concrete paving or the like can be raised to proper level after it has become displaced due to the settlement of the fill on which it is supported.

The invention also has reference to novel means whereby settlement of a pavement can be corrected quickly and efficiently.

As is well known to those skilled in the art it frequently becomes necessary to build pavements on fills which will settle and produce cavities under the pavements and cause the pavements ultimately to sag. It has practically been impossible to restore the pavement to its proper condition without rebuilding it, resurfacing it, or pursuing some other costly method.

It is an object of the present invention to provide a simple method for lifting the sunken portions of pavements whenever found necessary, the cost of the operation being relatively low.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in certain novel steps of the method hereinafter disclosed, and in certain details of construction which will be herein explained, it being understood that changes may be made in the invention without departing from the spirit thereof and within the scope of the appended claims.

In the accompanying drawing certain steps of the method as well as the means employed in carrying out the same, have been illustrated.

In said drawing

Figure 1 is a section through a portion of a section of pavement which has settled below its proper level, said settled portion being shown provided with a means for returning it to proper position.

Figure 2 is a similar view showing the section restored to its proper level.

Figure 3 shows a section of paving following the filling of a cavity which had formed thereunder.

Figure 4 is a view illustrating a modified means for filling cavities beneath a pavement and for elevating a pavement.

It frequently happens that the fill or other base on which a pavement is laid will settle and this either results in settlement of the paving or else produces a cavity which leaves the paving unsupported so that it will in time break through. Various means heretofore employed for correcting these faults have been unsuccessful or quite expensive. The present invention aims to overcome the faults by injecting into the cavities a fluid which will harden and leave the underlying space completely filled. By means of the present invention it is also possible to force a fluid through or under a settled section of paving with such force as to cause the paving to move upwardly to its proper position where it will be held by the fluid filling as it dries and hardens.

One means for elevating a settled section of paving has been illustrated in Figure 1. In said figure the settled portion of the paving has been indicated at 1 and it has been shown provided with holes 2 drilled therethrough and having metal linings 3. A pump of any desired construction and which can be operated by hand power or by machine is adapted to be screwed into or otherwise connected to the lining 3. One type of pump has been shown at 4 in Figure 1.

It is intended to provide the metal linings in those sections of paving which are laid on material which is expected to settle frequently so that frequent readjustments of the paving will be required. If the pavements are not laid on material expected to settle, it will not be necessary, when laying the pavement, to embed the tubular members 3 therein.

Following the settlement of the pavement to a position such as shown, for example, in Figure 1, one or more plugs 5 which are normally seated in the upper ends of the tubes 3 can be removed and the pump 4 screwed into engagement with the tubes or otherwise attached. Under many conditions, instead of utilizing the tubes 3, one or more holes can be drilled through the paving and a hose extending from a pump can be inserted into the hole where it will expand under pressure from the pump.

After a pump has been connected to the paving a suitable filling material is forced thereby through the openings provided in the pavement. This filling material can consist of a fluid mixture of dirt and water with which a small percentage of cement can be mixed. It frequently happens, however, that other materials in a fluid state can be used to advantage. It is merely essential that the material used be capable of drying out quickly and leaving a hard filling material in the cavity beneath the pavement being treated. If the pavement has settled as in Figure 1, the forcing of filling fluid therethrough will cause the depressed section to be lifted to the proper elevation. It will there be held by the filling fluid while it is drying out or hardening.

If a cavity has formed beneath the pavement it can be filled by the method herein explained. In Figure 2 the pavement 1 has been shown raised to its proper position with the filling material packed thereunder. In Figure 3 a cavity 6 has been shown beneath the pavement 1 after it has been packed with filling material.

Under some conditions it is possible to force the filling material under the pavement without forming a hole in the pavement. For example, and as shown in Figure 4, a pipe 7 leading from a forcing means can be extended under the side of the pavement 1 into the cavity 8 to be filled or it can be inserted laterally under a sunken section of paving whereby when a filling fluid is forced through the pipe under pressure it will act to lift the depressed portion of the pavement.

It will be noted that in all instances wherein the present method is followed, the fluid used is adapted to harden, forming a filling which will support the lifted pavement so that it will rest on a solid base.

What is claimed is:

1. The method of treating paving constructions which includes the step of forcing under the pavement a filling material in fluid form until the construction is elevated.

2. The method of treating settlements in paving constructions which includes the step of elevating the settled portion of the pavement to desired grade by hydraulic pressure of a fluid adapted to solidify and hold the construction in its elevated position.

3. The method of treating settlements in paving constructions which includes the step of forcing beneath the pavement and under pressure a fluid mixture adapted to solidify, said fluid constituting means for directing pressure upwardly against the pavement to lift it.

4. The method of treating settlements in paving constructions which includes the steps of forming a hole in the pavement and thereafter forcing through the hole in fluid mixture adapted to lift the apertured portion of the paving and produce a cavity thereunder which will be filled by the mixture when solidified.

5. The method of treating slabs which comprises forming an opening therein through which the condition of the subgrade may be observed, establishing a sealing connection between the opening and a fluid conduit and forcing through said conduit and opening a filling material until the slab is elevated by said material.

6. In combination, a slab adapted to be elevated by pressure fluid, a passage therethrough, a tubular member in said passage threaded to receive fluid conveying means for the introduction of pressure fluid beneath the slab to elevate the same, and a closure member adapted to coact with the threaded member.

7. A method of raising a structure such as sunken pavements or the like, comprising forcing a filling material under said structure in sufficient quantity and under sufficient pressure to elevate said structure into a desired position.

8. A method of raising a structure such as sunken pavement or the like comprising the steps of manipulating a conduit to place its point of discharge beneath said structure, and then forcing a filling material under said structure in sufficient quantity to elevate the latter into a preselected position.

9. A method of raising a structure such as sunken pavement or the like, comprising the steps of forcing a filling material beneath said structure in a quantity sufficient to compact the adjacent earth to a point where it will serve to provide an adequate reactance for raising the structure, and then forcing further material beneath said structure in sufficient quantity to elevate the latter to a desired position relative to the earth.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

JOHN W. POULTER.

CERTIFICATE OF CORRECTION.

Patent No. 1,915,032. June 20, 1933.

JOHN W. POULTER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 65, claim 4, for "in" read "a"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of August, A. D. 1933.

M. J. Moore.

(Seal) Acting Commissioner of Patents.