Feb. 7, 1928. 1,658,253

C. L. POWELL

METHOD AND MEANS FOR CONSTRUCTING TRENCHES

Filed June 15, 1925

Fig. 1.

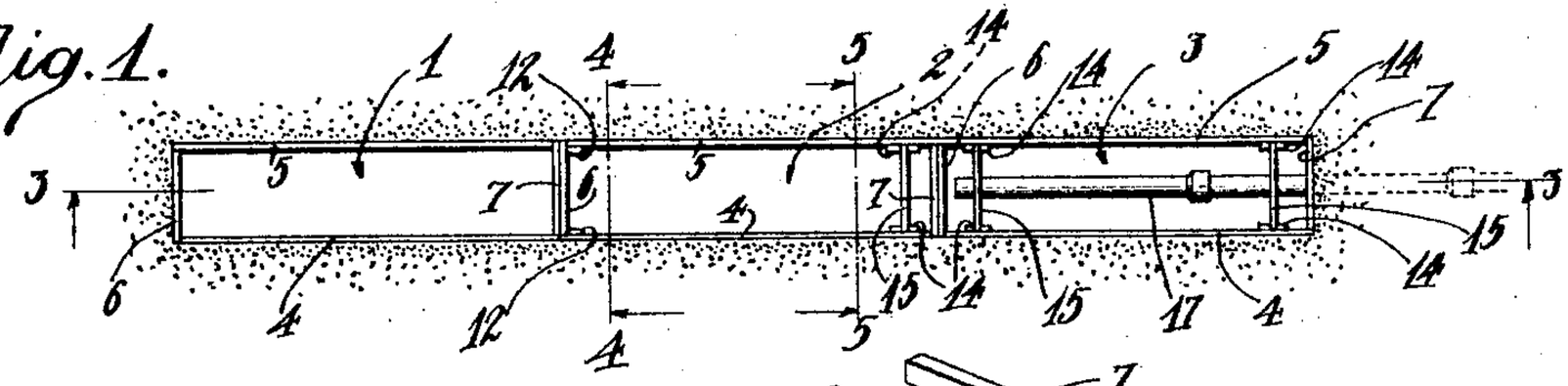
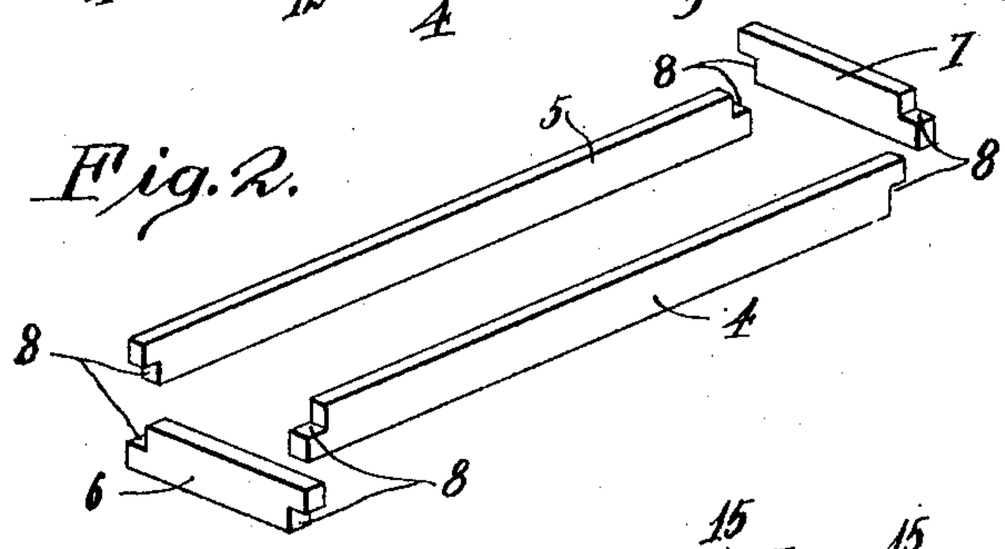


Fig. 2.



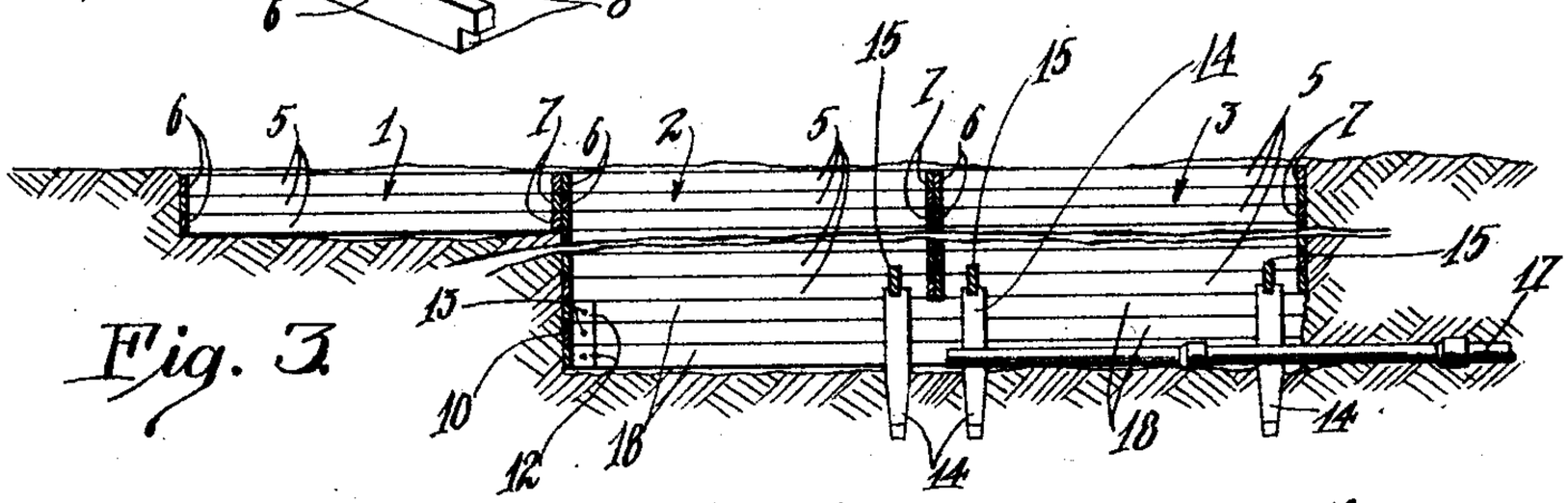


Fig. 3.

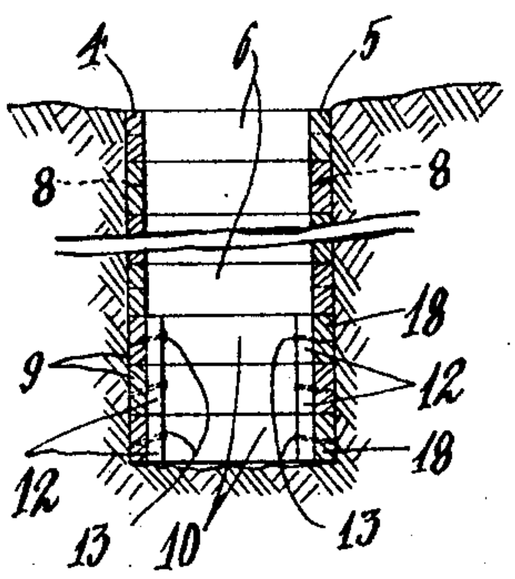


Fig. 4.

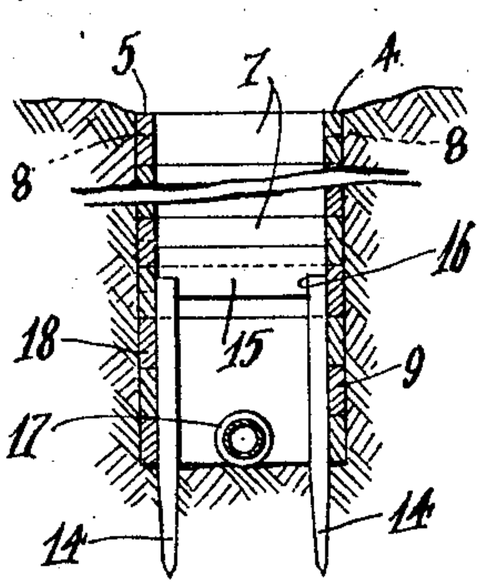


Fig. 5.

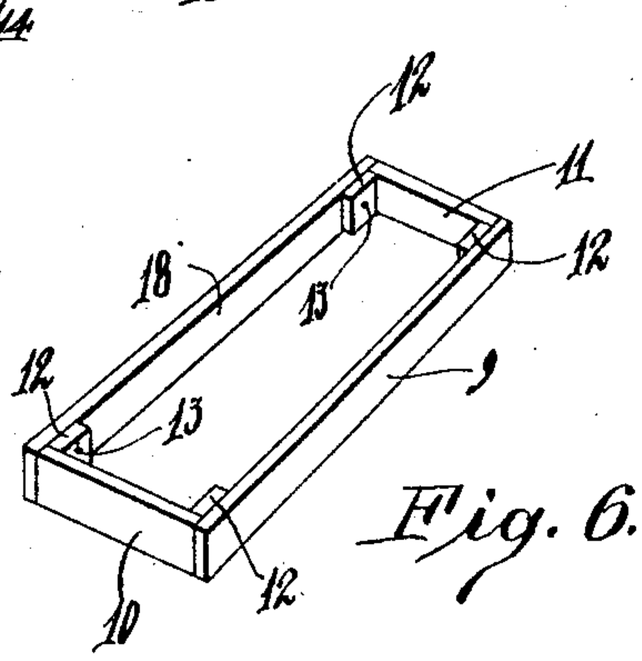


Fig. 6.

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UNITED STATES PATENT OFFICE.

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METHOD AND MEANS FOR CONSTRUCTING TRENCHES.

Application filed June 15, 1925. Serial No. 37,197.

This invention relates to a method and means for constructing trenches and is particularly adapted to the construction of a trench in treacherous ground, that is to say, ground which is composed all or in part of loose material apt to cave in as the ditch is deepened.

Hitherto, in constructing a ditch in ground having a tendency to cave in on the ditch, the art has had considerable difficulty in properly bracing the walls of the ditch so that there is no danger of the bracing collapsing. The methods heretofore used have been very expensive and unsafe to the workers in the ditch.

It is an object of the present invention to provide a method and means for constructing a trench by which the trench may be constructed with a minimum removal of material from the trench; by which the trench may be walled as the same is deepened in a manner not interfering with the construction or operations in the trench, and in a manner providing a positively braced wall eliminating the dangers or hazards of the hitherto constructed trench walls; by which the walling of the trench may be carried out through the use of inexpensive materials which may be recovered or removed from the trench after completion thereof and used again in further portions of the same or other trenches; and by which the trench or ditch may be constructed in a plurality of sections, the construction of each section being substantially independent of the others.

Various other objects and advantages of the present invention will be apparent from a description of a preferred method and means for the construction of trenches or ditches embodying the invention, for which purpose reference is made to the accompanying drawings illustrating an example of a preferred method and means embodying the invention.

In the drawings:

Fig. 1 is a plan view of a ditch or trench in the process of construction.

Fig. 2 is a perspective of certain interlocking walling members employed in the construction of a trench as illustrated in Fig. 1.

Fig. 3 is a longitudinal section through the trench taken on the line 3—3 of Fig. 1.

Fig. 4 is a transverse section taken on the line 4—4 of Fig. 1;

Fig. 5 is a transverse section taken on the line 5—5 of Fig. 1.

Fig. 6 is a perspective of a set of lower, non-interlocking walling members.

Referring to the drawings, the trench is constructed in a plurality of adjacent or successive sections, such as indicated at 1, 2 and 3 of the drawings, the method and means of construction of each of the successive sections being the same, and the construction of each section being largely independent of the work of construction or use of the adjacent or successive sections.

In the construction of the ditch or trench, the upper portion of the ditch or trench is walled with horizontal members or timbers, of which 4 and 5 represent side walling members and 6 and 7 represent end walling members for the section, said members each having diagonally opposed corners cut away as indicated at 8 so that the members when fitted together interlock. These interlocking walling members are placed against the sides of the formed ditch as fast as the ditch is deepened to permit their installation, each successively lowered set of interlocking walling members of the ditch section being placed under the preceding higher set of interlocking or walling members when the ditch has been sufficiently deepened to permit the insertion of such members. It is understood that in these operations the sets of walling members are not fixed together at the top of the ditch before they are placed in position, but that the members themselves are individually placed in position. Thus, at all times during the deepening of the trench, the upper portions of the trench are walled to positively eliminate danger of collapsing of the trench. It will be observed that due to the recesses 8 forming the interlock between these interlocking walling members, each of the side members 4 and 5 are braced by the end members 6 and 7 against collapsing in on the trench; likewise the end members 6 and 7 are braced by the side members 4 and 5.

The construction of the trench in this manner proceeds with the removal of only such material from the trench as is necessary to form the desired size of trench. The section 1 of the trench in Fig. 1 is indicated as in this stage of construction. The upper portion of each section of the trench is indicated as having been constructed in a similar manner, and the separate sections

of the trench are formed in succession, so that their lower portions are adapted to be opened to form a connected trench or ditch.

The lower portion of the trench is preferably constructed in a different manner than the upper portion of the trench so as to permit the adjacent sections of the trench to be readily connected at their lower ends and thus permit the laying of pipe through each ditch section at its lower end.

It is understood that the invention is not limited to the laying of pipe, but the trench is thus placed in condition for the various construction operations such as the forming of concrete structures throughout the trench or for any other purpose.

It is understood that the deepening of the trench through the use of the interlocking walling members may proceed any desired distance until the depth of the trench is reached, wherein it is desired to provide for inter-connection between the ditch sections. When this point in the construction of the trench sections is reached, the trench or ditch sections are therebelow deepened, accompanied by the insertion of a set of walling members such as illustrated in Fig. 6, a set of such walling members being inserted in place as soon as the deepening of the trench permits.

In Fig. 6, side walling members are indicated at 18 and 9, and end walling members at 10 and 11, these members being indicated as merely straight cut timbers intended to be horizontally laid and without an interlock between the end members 10 and 11 and the side members 18 and 9. The end members 10 and 11, however, are indicated as of such length that they may be placed between the members 18 and 9 and thus brace said members against collapsing. The end members 10 and 11 are held in place against collapsing into the trench by cleats 12, most simply formed of a block of wood held by spikes 13 driven into the side members 18 and 9 so that the cleats engage the inner sides of the end members 10 and 11 and hold the same in place. The lower section of the trench is thus completed through the use of such non-interlocking walling members to the desired depth.

Each section of the trench may be left in its completed condition as long as desired while further additional sections of the trench are being constructed. Thus the construction of the trench may precede considerably the opening of adjacent trench sections for the laying of pipe or other purposes without danger of any of the sections collapsing.

When it is desired to inter-connect various ditch sections, a supplemental bracing is applied to the side members 18 and 9 of the non-interlocking walling members to permit the removal of cleats 12 and end non-interlocking walling members 10 and 11. The side members may be braced in any desired manner by any desired means, but preferably such bracing is accomplished by driving vertical stays 14 into the ground formation adjacent the ends of the trench sections (pointed timbers being suitable for this purpose). These stays should be of a height sufficient, when driven into the ground the desired depth, to extend slightly above the upper non-interlocking side wall members. These side stays 14 are then preferably additionally braced by bracing members 15 engaging opposed stays 14, these members preferably being notched as indicated at 16 to fit partially over the top of the stays 14.

After the istallation of such supplemental bracing, the cleats 12 are removed and the end members 10 and 11 of the non-interlocking walling members likewise removed, thus interconnecting the lower end of the adjacent sections of the ditch, after which pipe such as 17 may be laid through the ditch, or concrete or brick structures may be completed in the trench or any other desired structure built or laid in place.

Subsequently, if desired, the ditch may be filled in upon the laid pipe 17, and while the ditch is being filled in, all of the bracing means and walling members may be recovered from the ditch for further use. For this purpose, a reversal of the constructing process is carried out, the supplemental bracing being removed and the side members 18 and 9 of the non-interlocking walling members removed, and then each set of interlocking members removed from the lower end.

It is found that the construction of trenches in this way by the method and means herein described may proceed in treacherous ground, such as beach sand, without danger of any collapsing of the walling by the adjacent ground being jarred and with safety to the workers in the trench or ditch, and at a relatively low cost, the method and means for constructing the trenches herein described requiring the removal in such formations of but one-quarter of the material required to be removed when no walling is employed.

A very important advantage of the present invention is in the elimination of danger to the workers in the trench. With the methods and means of constructing trenches heretofore employed, the loss of life incident to the construction of the trench has been very large, due to collapsing of bracing employed with resulting caving in of the side walls. The present invention provides a positive elimination of such hazard.

While the method and means for constructing ditches or trenches herein described is

well adapted to accomplish the objects of the invention, it is to be understood that various modifications may be made without departing from the spirit of the invention, and that the invention includes all such modifications and substitutions as come within the scope of the appended claims.

What I claim is:

1. In means of the class described, an upper walling of sets of horizontally disposed side members and end members in interlocking relation, the sets being disposed one under the other, and a lower walling of horizontally disposed sets of side members and end members non-interlocked with the sets placed one under the other and with the end members of such lower walling sets placed to brace the side members, vertical stays placed against the side members, braces for said vertical stays, and cleats holding the end members of the lower walling sets in place.

2. A trench of the class described, comprising a plurality of successive trench sections each having their upper portions independently walled with horizontally disposed side members and end members interlocked and each having their lower portions walled with horizontally disposed sets of side members and end members non-interlocked with the end members of such lower sets placed to brace the side members, and a supplemental bracing applied to the side members of the lower sets whereby the end members of the trench sections are removable as desired to interconnect the successive trench sections.

3. In a method of constructing a ditch, the combination of operations comprising constructing the ditch in a plurality of successive sections, walling the ditch from the top downward as the ditch is deepened, the upper portion of the ditch being walled with timbers the end members of which are interlocked with side members and brace the same, the lower portions being initially walled with non-interlocking members, the end members being removable, then applying a supplemental bracing to the side walling members of the lower section, and removing the end sections to connect the adjacent sections with the lower end of the ditch.

4. In means of the class described, a trench walling comprising a plurality of successive trench walling sections, each of the sections consisting of an upper walling made up of timbers having their ends notched at opposite sides, the timbers being placed with their notches interfitting so that the timbers are interlocked and the side timbers brace the end timbers and the end timbers brace the side timbers, the lower walling of the trench sections being formed of timbers in which the end timbers brace the side timbers but the end timbers are not engaged by the end timbers and are therefore removable separately therefrom, whereby the lower portion of the trench sections may be connected together by removal of such lower end timbers while leaving a supporting bracing of the end timbers of the interlocking walling of the trench sections.

Signed at Los Angeles, California, this 8th day of June 1925.

CHARLES L. POWELL.