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E. STENGEL ET AL
LINING FOR EARTH CONSTRUCTIONS

2,659,210

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2 Sheets-Sheet 1

Fig. 1

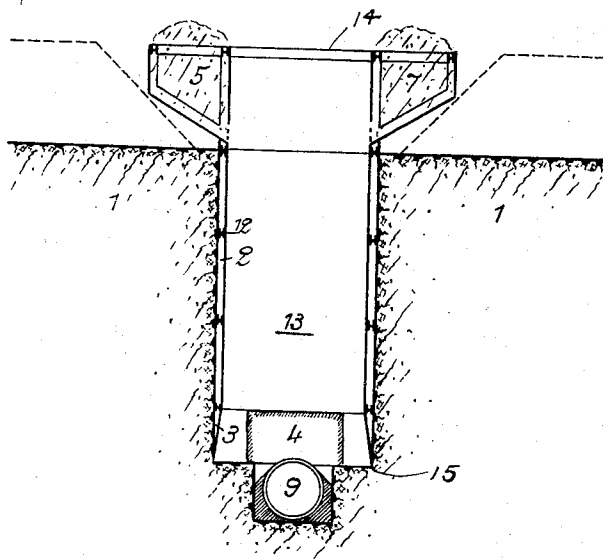
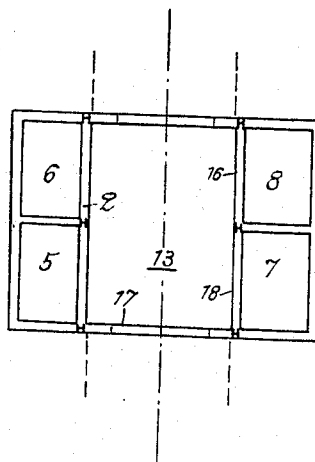


Fig. 2



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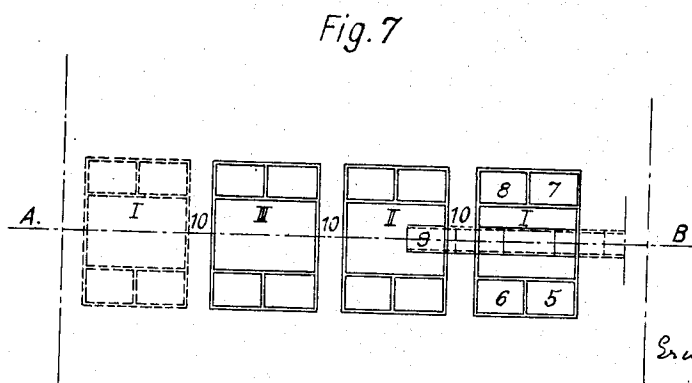
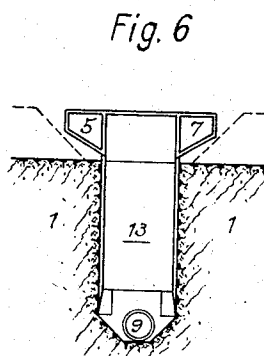
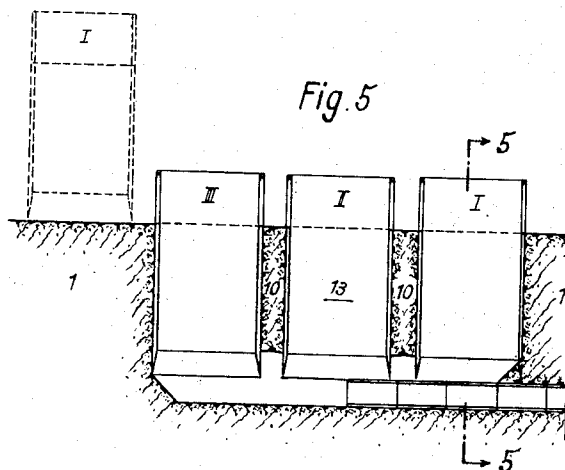
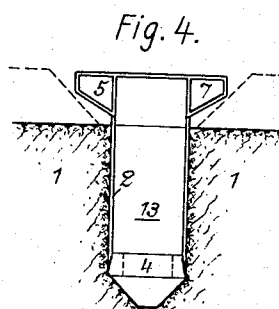
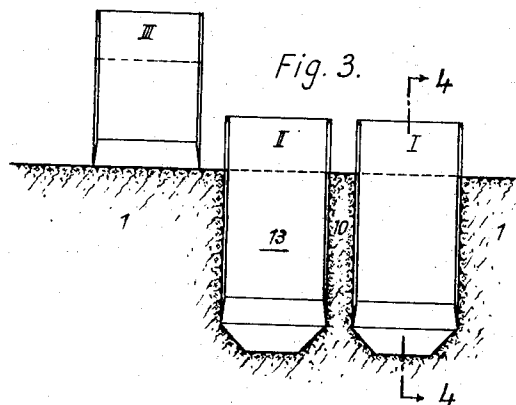
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LINING FOR EARTH CONSTRUCTIONS

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5 Claims. (Cl. 61—41)

1

2

The present invention relates to a lining for earth constructions and to a method for making furrows by means of such linings, which are suitable for laying pipe lines, cables and the like.

It is an object of the present invention to provide a lining which does not consume a great amount of material.

It is another object of the present invention to reduce the wear and tear of the lining.

It is a further object of the present invention to reduce appreciably the labor in carrying out earth constructions of the kind described.

It is another object of the present invention to allow a mechanical excavation of the earth.

The invention comprises in combination a body having side walls and open upper and lower ends, and two apertures arranged oppositely to each other adjoining the lower ends of the side walls. The body can be metallic and rectangular in cross section. Preferably the apertures can be closed.

In a preferred embodiment of the present invention containers for receiving a load are arranged at the open upper end of the body.

Preferably the body has double walls and is tapered near its lower end.

The invention consists also in a method for making a furrow comprising the steps of lowering into the ground a first lining having two opposite apertures adjoining the lower edge of the first lining, and lowering into the ground a second lining having two opposite apertures adjoining the lower edge of the second lining, the linings being separated by a distance apart and having their apertures arranged in alignment with one another.

Preferably a third lining is lowered into the ground having two opposite apertures adjoining the lower ends of the lining. Preferably the earth is excavated between the apertures of the linings and an appliance such as a pipeline or cable is laid under the lower part of the linings and in the excavations.

In a preferred method according to the invention, the first lining is withdrawn from the ground after the lowering of the second lining and lowered into the ground once more at the opposite side of the second lining.

Obviously by the new method according to this invention a considerable saving of material and labor is accomplished. The bodies do not need any driving into the earth. The digging work is considerably reduced since the linings can be introduced into the earth at distances up to one meter apart, an excavation of the earth being required only within the linings and between the apertures. This work can be done almost entirely mechanically.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construc-

tion and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a sectional elevation through a lining according to the present invention and the surrounding earth;

Fig. 2 is a plan view of the lining shown in Fig. 1;

Fig. 3 shows in sectional elevation a practical application of the lining shown in Fig. 1;

Fig. 4 is a section along the line 4—4 of Fig. 3;

Fig. 5 is a sectional elevation of another stage of the method of the present invention;

Fig. 6 is a cross section along 5—5 of Fig. 5; and

Fig. 7 is a plan view of the arrangement shown in Fig. 5.

Referring now to the drawings and first to Fig. 1, a lining 13 is shown having a body 2 lowered into the ground 1. The body 2 is open at its upper and lower ends 14 and 15 and has double walls preferably consisting of sheets made of steel provided with intermediate reinforcements 12 consisting of iron bars or the like. The body 2 has preferably a rectangular cross section with wide and narrow sides 16 and 17 as shown in Fig. 2. The lower portion 3 of the body 2 is tapered in order to facilitate the lowering of the lining 13 into the ground 1. Apertures 4 are provided adjoining the lower edge 15 of the narrow side walls 17 of the body 2; the apertures 4 being arranged oppositely to each other and being provided with means (not shown) for closing them such as trap doors or sliding doors.

At the upper end 14 of the body 2 containers, 5, 6, 7, 8 (see also Fig. 2) are provided which are loaded as required for instance with earth so that the bodies 2 have sufficient weight for being lowered into the ground 1 even to greater depth. If desired the body 2 has a single wall in the part adjoining the containers 6—8. At the inner side of the walls 18 of the containers are provided openings (not shown) which can be closed by means of sliding doors (not shown) and serve for emptying the containers into the furrows after the bodies 2 have reached their lowermost position. A pipe 9 is shown in Fig. 1 which is laid at the bottom of the furrow.

Figs. 3 to 7 show the practical application of the lining shown in Figs. 1 and 2. A—B (Fig. 7) indicates the central plane of the furrow. The bodies are denoted in Figs. 3 to 7 with I, II, and III, and they define one phase of the construction. According to Fig. 5 they are all lowered into the ground 1. In order to do that, they are arranged with their planes of symmetry coinciding with the central plane of the furrow, for instance by means of a hoist or crane (not shown)

3

so that they are arranged at a distance 10 apart which may amount to up to 1 meter.

Fig. 4 shows a cross section of the lining I and shows the position of the apertures 4 which are arranged in the narrow side 17 of the rectangular cross section of the bodies 2. The cross section is so chosen that the earth can be easily removed from the interior of the linings by means of an excavator after the lining has been placed on the ground as shown for lining III in Fig. 3. The lining sinks automatically down into the ground according to the progress of the excavation. When an appreciable depth is reached, the weight of the lining is counteracted by the friction against the earth surrounding the lining. In order to overcome the friction the weight of the lining is increased by filling the containers 5—8 with earth or sand.

Finally the linings have the position shown in Fig. 5 in full lines in which the earth is excavated between the apertures 4 underneath the separating sections 10 of the ground and the pipe line 9 or cable is laid. If this laying of the pipe line has progressed as far as shown in Fig. 5, the first lining I is withdrawn and placed on top of the ground 1, as shown in Fig. 5 by dotted lines, and lowered again. Thus it will be seen that while the work for laying the pipe line in sections II and III is progressing, the lining I is once more lowered into the ground. When the pipe line 9 reaches the space underneath the lining III the lining II can be withdrawn and lowered once more in front of the lining I. Thus, it will be seen that in this way an almost uninterrupted operation for laying the pipe line 9 is accomplished.

If the depth of the furrow under construction is great the lining is preferably made in two parts of which the lower part with the apertures 4 is lowered into the ground and then prolonged by the upper part provided with the containers 5—8. The parts are joined and further lowered together.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of linings for earth constructions differing from the types described above.

While I have illustrated and described the invention as embodied in linings for making a furrow, I do not intend to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of my invention.

Without further analysis, the foregoing will so fully reveal the gist of my invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What we claim as new and desire to secure by Letters Patent is:

1. A lining for earth construction comprising, in combination, an elongated tubular casing of rectangular cross section having opposite open top and bottom ends being made of metal and being formed with a pair of opposite cut outs located in two opposite sides thereof and extending inwardly from the edges of said sides at said open bottom end of said tube.

2. A lining for earth construction comprising,

4

in combination, an elongated tubular casing of rectangular cross section having opposite open top and bottom ends being made of metal and being formed with a pair of opposite cut outs located in two opposite sides thereof and extending inwardly from the edges of said sides at said open bottom end of said tube; and a plurality of open-top chambers located at said top end of said casing on the outside thereof for receiving material to provide a weight on said tube.

3. Construction apparatus consisting of an elongated tubular casing of rectangular cross section, having opposite open top and bottom ends, being made of metal and being formed with a pair of cutouts located opposite to each other and extending inwardly from an edge of said casing at said bottom end thereof, said casing having a diminishing thickness in the region of said edge, said thickness diminishing toward said edge so that the latter is of a lesser thickness than the remainder of said casing.

4. Construction apparatus consisting of an elongated tubular casing of rectangular cross section having opposite open top and bottom ends and being formed with a pair of cutouts located opposite to each other and extending inwardly from an edge of said casing at said bottom end thereof, said casing having the walls thereof made of metal sheets which are spaced from each other.

5. A process for continuously laying elongated sections of pipes, cables, or the like beneath the ground surface, comprising the steps of arranging a plurality of elongated tubular casings, having opposite cut-outs extending inwardly from one of the ends thereof, successively in a series along a predetermined path in spaced relation to each other with said one end of said casings contacting the ground and with all of said cut-outs aligned with each other along said path; successively sinking said series of casings, from the first casing of the series to the last casing of the series, into the ground; excavating the interior of the first sunk casings of the series; forming in the ground a passage extending through adjacent cut-outs of the first and second casings of the series; laying in the thus formed passage an elongated section extending from said first to said second casing through said passage in the ground; removing said first casing from the ground and locating it at the end of the series so that said first casing becomes a new last casing of the series and so that said second casing becomes a new first casing of the series; and repeating with each thus newly formed first casing of the series the operations performed with the original first casing of the series so as to continuously set the elongated sections into the ground.

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