

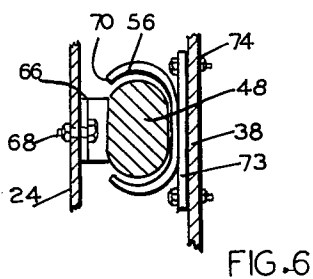
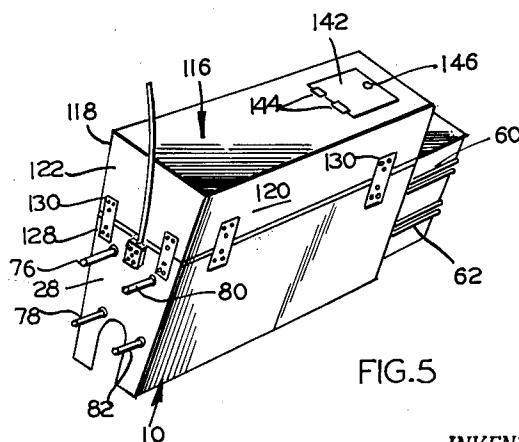
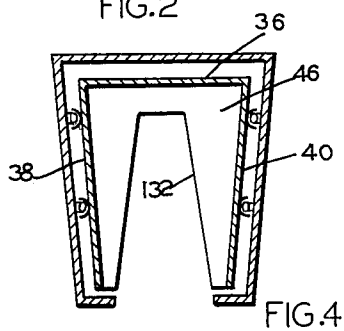
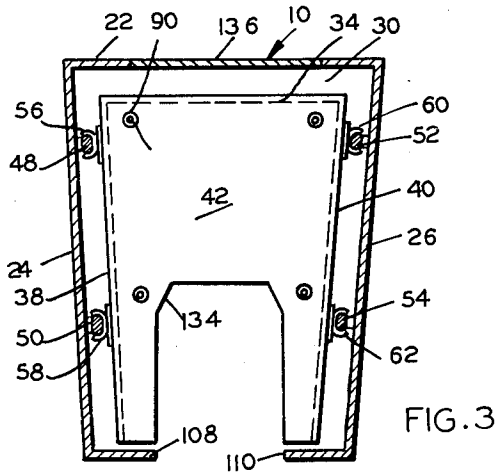
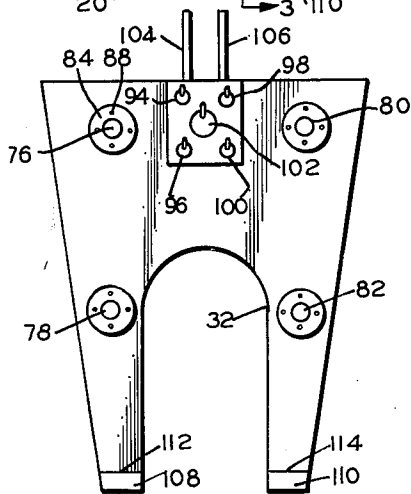
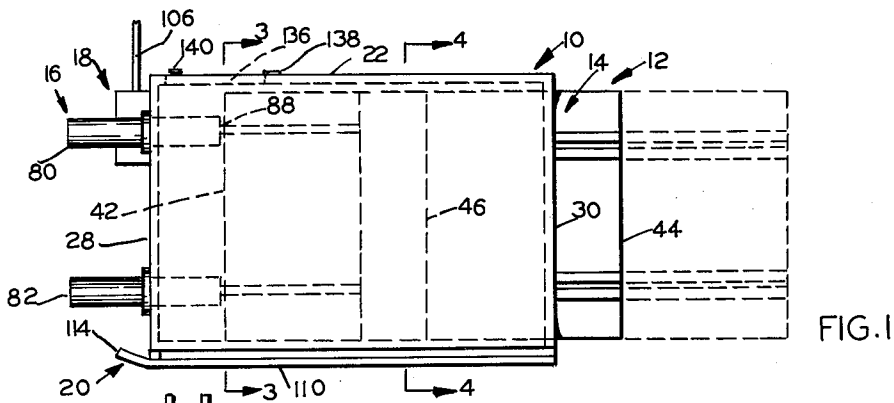
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3,089,310

TRENCH SHORING MACHINE

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3,089,310

TRENCH SHORING MACHINE

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4 Claims. (Cl. 61-41)

The present invention relates to improvements in trench shoring means and more particularly to a trench shoring machine.

Heretofore, when a trench or the like has been dug, it has been necessary to protect the workers therein from cave-ins and the like, while laying pipe in the trench and before refilling of the trench. Such additional construction work is costly in material, time and labor, especially when it is considered that the structure must be torn down preparatory to refilling of the trench.

Accordingly, it is a primary object of the present invention to provide a shoring machine for trenches which can be repeatedly used so as to eliminate the repeated construction of retaining or shoring walls.

Another object of the present invention is to provide a novel shoring machine which can be continuously used in a trench while laying pipe therein, the shoring machine being self-propelled along the length of the trench as refilling of the trench succeeds laying of the pipe.

A further object of the present invention is to provide a novel trench shoring machine which is adaptable to varying depths.

Still another object of the present invention is to provide a novel trench shoring machine which is of simple construction, easily fabricated, yet sufficiently rugged for the type of usage for which it is normally subjected, and yet which is relatively inexpensive when compared to the costs of erecting and disassembling of conventional shoring walls.

Various other objects and advantages will become apparent from the detailed description to follow.

In the drawings:

FIGURE 1 is a side elevational view of my novel trench shoring machine, showing the normal retracted relationship in full lines and the extended relationship in dotted lines;

FIGURE 2 is a front elevational view of the machine of FIGURE 1;

FIGURE 3 is a transverse sectional view taken substantially on the plane of line 3-3 in FIGURE 1;

FIGURE 4 is a transverse sectional view taken substantially on the plane of line 4-4 in FIGURE 1;

FIGURE 5 is a perspective view showing the machine of FIGURE 1 with a height extension box mounted thereon; and

FIGURE 6 is an enlarged detailed sectional view showing a guide channel and guide rail assembly.

Referring more particularly to the drawings, wherein like numerals apply to like parts throughout, and having reference first to FIGURE 1, it will be seen that I have provided a novel trench shoring machine which is comprised of a pair of telescopically associated members 10 and 12 with means 14 for guidingly coupling the inner and outer telescopic members, power operated means 16 for effecting relative telescoping of the members 10 and 12, and control means 18 for controlling operation of the power operated means 16 when desired. The machine further includes the provision of supporting means 20 for the outer member 12.

The outer member 10 is comprised of a top wall 22 joining inclined side walls 24 and 26 and end walls 28 and 30. The walls 22, 24, 26 and 28 are preferably of steel plate which can be welded together or of bolted construction if so desired. The end wall 28 is formed with an opening at 32 providing access into the machine. The rear wall 30 is formed with an opening correspond-

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ing to the size of the inner member 12 as shown at 34 in FIGURE 3.

The inner member 12 is of generally the same shape as the outer member 10, although slightly smaller, and includes a top wall 36 joining inclined side walls 38 and 40, end walls 42 and 44, and the intermediate partition 46.

The means 14 for guidingly supporting the inner member 12 for telescoping movement with respect to the outer member 10 includes the pair of rails 48 and 50 rigidly mounted on the side wall 24 of the outer member 10 and the pair of rails 52 and 54 also rigidly mounted on the side wall 26 of the outer member 10. A pair of rail-receiving guide channels 56 and 58 are mounted on the side wall 38 of the inner member 12 while the rail-receiving guide channels 60 and 62 are rigidly mounted on the side wall 40 of the inner member 12. As shown in FIGURES 1, 3 and 4, the guide channels and the guide rails are longitudinally mounted on their respective walls and rigidly supported in spaced parallel relation with each guide rail being slidably received within a respective guide channel for support of the channels and therefor the inner member 12 thereby.

Reference is made to FIGURE 6 which shows the details of the rail and channel assembly 48, 56. As there shown, the rail 48 is preferably formed of elongated bar of rigid stock such as steel which is secured to the side wall 24 by means of a bracket 66 secured to the wall 24 by means of the bolts and nuts at 68 at spaced portions along the length of the bar 48. The guide channel 56 is of hollow pipe-like form partially cut away as at 70 and secured to the wall 38 by means of the attachment brackets 72 at spaced intervals along the length of the guide channel 56. Again, bolts and nuts as at 74 may be utilized.

The power operated means 16 for effecting relative telescoping movement between the inner and outer members 10 and 12 includes four cylinders 76, 78, 80 and 82. Each of the cylinders is secured to the front wall 28 of the outer member 10 by means of a flange as at 84 and the bolts 86 therethrough. Because of the required length of the cylinders and the desired stroke, the cylinder can be mounted with a portion projecting from the front wall 28. However, if desired, the cylinders can be completely mounted within the outer member 10 and connected with some inner portion of the inner member rather than the adjacent end of the inner member so as to give the desired length of stroke to the cylinder and, therefore, the desired amount of extension of the inner member 12 with respect to the outer member 10, as will be understood. The cylinder 76 has a plunger 88 which is connected to the front wall 42 of the inner member 12, preferably by means of a flange as at 90 in FIGURE 3. The four cylinders 76, 78, 80 and 82 are preferably identical and so located as to evenly urge movement of the inner member 12 with respect to the outer member 10. Also, the cylinders are double acting. In other words, fluid pressure can be fed to the cylinders either to force the plungers out and thus effect extension of the inner member 12 with respect to the outer member 10, or the plungers can be positively retracted to return the inner member to a nested relationship with respect to the outer member 10.

The control means for the power operated cylinders 76, 78, 80 and 82 includes the assembly 18 which is comprised of a control box 92 which has four valves 94, 96, 98 and 100 of identical construction and another valve 102 of different construction. The valves 94, 96, 98 and 100 have operating handles which can be turned in one direction to feed pressure to a respective cylinder to effect operation thereof in one direction while turning of the handle in the opposite direction feeds pressure to reverse the operation of the piston in the respective cylinder.

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Thus, individual control of the cylinders is effected by such valves 94, 96, 98, and 100. Usually, however, it is desired to simultaneously operate all four cylinders. The large valve 102 couples operation of the four cylinders.

The master valve 102 has a handle which when moved in one direction feeds pressure to the four cylinders for operation in one direction while movement of the handle in an opposite direction feeds pressure to the cylinders to reverse the pistons of the cylinders to move in an opposite direction.

The pipes 104 and 106 are provided to connect the valves to the source of fluid pressure, preferably hydraulic.

The supporting means 20 for the outer member 10 is comprised of a pair of skids or runners 108 and 110 which are rigidly secured to the bottom of the outer member 10 and have upturned ends as at 112 and 114.

Where a trench is of substantially greater depth than the height of the above described shoring machine, a height extension box 116 can be provided. The extension box 116 is preferably of hollow form constructed of side walls 118, 120 and end walls 122 and 124 joined by the top wall 126. The box 116 has a taper corresponding to the taper of the outer member 10 and the box 116 is joined to the outer member 10 by means of a plurality of attachment plates 128 which are secured to the number 10 and box 116 by means of a plurality of bolts 130.

The inner member 12 is formed with the partition 46 which has the opening 132 formed therein aligned with the front opening 32 in the outer member 10 and openings at 134 in the front and rear walls 42 and 44 of the inner member 12. Thus, workers have access to the interior of the inner and outer members 10 and 12 for the purpose of laying pipe while being protected by the shoring machine. After a length of pipe has been laid, the cylinders of the power operated means 16 are operated by the control means 18 so as to effect relative extension of the inner and outer members 10 and 12. Inasmuch as the inner member 12 is engaged against fill in the trench where the pipe has already been laid, this will force the outer member 10 to advance on the runners 20 and the machine will assume the extended relationship shown in dotted lines in FIGURE 1. The workers can then lay further pipe and upon reversed operation of the power operated cylinders 16, the inner member 12 will be retracted into the outer member 10 since it is supported by the outer member 10. The thus exposed pipe and trench can be covered and filled as will be obvious. This procedure is repeated throughout the length of the trench to the full safety of the workers. It will also be noted that the workers are protected from inclement weather in addition to the possibility of cave-ins.

It will be readily understood that the above described trench shoring machine can be provided with various modifications and additions. For example, additional hydraulic cylinders or the like can be provided for the purpose of lifting, leveling or holding the trench shoring machine with respect to the trench.

In order that access can be had to the interior of the machine from the top thereof, I provide a door 136, hinged to the top wall 22 at 138 and having a handle 140, adjacent the end wall 28. Where the extension box 116 is provided, the access door 142 is located at the opposing end of the machine to prevent earth and rock from falling directly through the two doors. The door 142 is hinged at 144 and has a handle at 146.

While the cylinders 76, 78, 80 and 82 are shown extending from the front of the machine, it will be understood that they and the control box 18 can be located entirely within the machine.

It is therefore believed that I have provided an improved construction which eliminates the necessity of sheathing trenches and otherwise fulfills the objects hereinbefore enumerated.

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As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, since the scope of the invention is defined by the appended claims rather than by the description preceding them, and all changes that fall within the metes and bounds of the claims or that form their functional as well as jointly cooperative equivalents, are therefore intended to be embraced by these claims.

I claim:

1. A trench shoring machine comprising a pair of telescopically associated members, each of said members being hollow and having side and top walls, said walls being rigid plates for engagement with earth forming a trench and protecting the same from cave-ins and the like, one of said members being an outer member and being adapted to receive the inner member therein in a nested relationship, said members having opposing wall surfaces, one of said members having guide channels and the other member having cooperating elements received in said channels for guided movement therein, said guide channels and cooperating elements being on said opposing wall surfaces and disposed to support said inner member by said outer member, a plurality of power operated cylinders operatively interconnecting said members, and control means for selectively simultaneously and individually effecting operation of said cylinders to effect relative movement of said members to an extended relationship and to return said members to their nested relationship, said inner member having an end wall rigidly joining said side and top walls thereof to provide a back fill, earth engaging wall whereby upon engagement between said end wall and back fill earth such relative movement can be effected.

2. A trench shoring machine comprising a pair of telescopically associated members, each of said members being hollow and having side and top walls, said walls being rigid plates for engagement with earth forming a trench and protecting the same from cave-ins and the like, one of said members being an outer member having bottom skids and adapted to receive the inner member therein in a nested relationship, said members having opposing wall surfaces, one of said members having guide channels longitudinally mounted thereon, the other of said members having guide rails longitudinally mounted thereon and slidably associated within said guide channels, said guide channels and cooperating elements being on said opposing wall surfaces and disposed to support said inner member by said outer member, and power operated cylinders operatively interconnecting said members, and control means for selectively effecting operation of said cylinders to alternately effect relative extension of the members and return to their nested relationship, said inner member having an end wall rigidly joining said side and top walls thereof to provide a back fill, earth engaging wall whereby upon engagement between said end wall and back fill earth such relative movement can be effected.

3. A trench shoring machine comprising a pair of telescopically associated members, each of said members being hollow and having side and top walls, said walls being rigid plates, for engagement with earth forming a trench and protecting the same from cave-ins and the like, one of said members being an outer member having bottom skids and adapted to receive the inner member therein in a nested relationship, said members having opposing wall surfaces, guide channel means, guide rail means, said opposing wall surfaces having said guide channel means and said guide rail means cooperatively mounted thereon for relative slidable movement and to support said inner member by said outer member, said outer member being adapted to receive the inner member therein in a nested relationship, and power operated means opera-

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tively interconnecting said members to effect relative movement thereof to an extended relationship and to return said members to their nested relationship, said inner member having an end wall rigidly joining said side and top walls thereof to provide a back fill, earth engaging wall whereby upon engagement between said end wall and back fill earth such relative movement can be effected.

4. A trench shoring machine comprising a pair of telescopically associated members, each of said members being hollow and having side and top walls, said walls being rigid plates for engagement with earth forming a trench and protecting the same from cave-ins and the like, one of said members being an outer supporting member having bottom skids and adapted to receive the inner member therein in a nested supported relationship, said outer member having guide rails longitudinally rigidly mounted on the inside thereof, said inner member having cooperative guide channels longitudinally mounted on the outside

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thereof and slidably receiving said guide rails therein to support said inner member thereon, and power operated means interconnecting said members to alternately effect relative extension of the members and return to their nested relationship, said inner member having an end wall rigidly joining said side and top walls thereof to provide a back fill, earth engaging wall whereby upon engagement between said end wall and back fill earth such relative movement can be effected.

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