Oct. 21, 1969 E. TORTI 3,473,336

ADJUSTABLE TRENCH SHORING MACHINE

Filed May 18, 1967 3 Sheets-Sheet 1

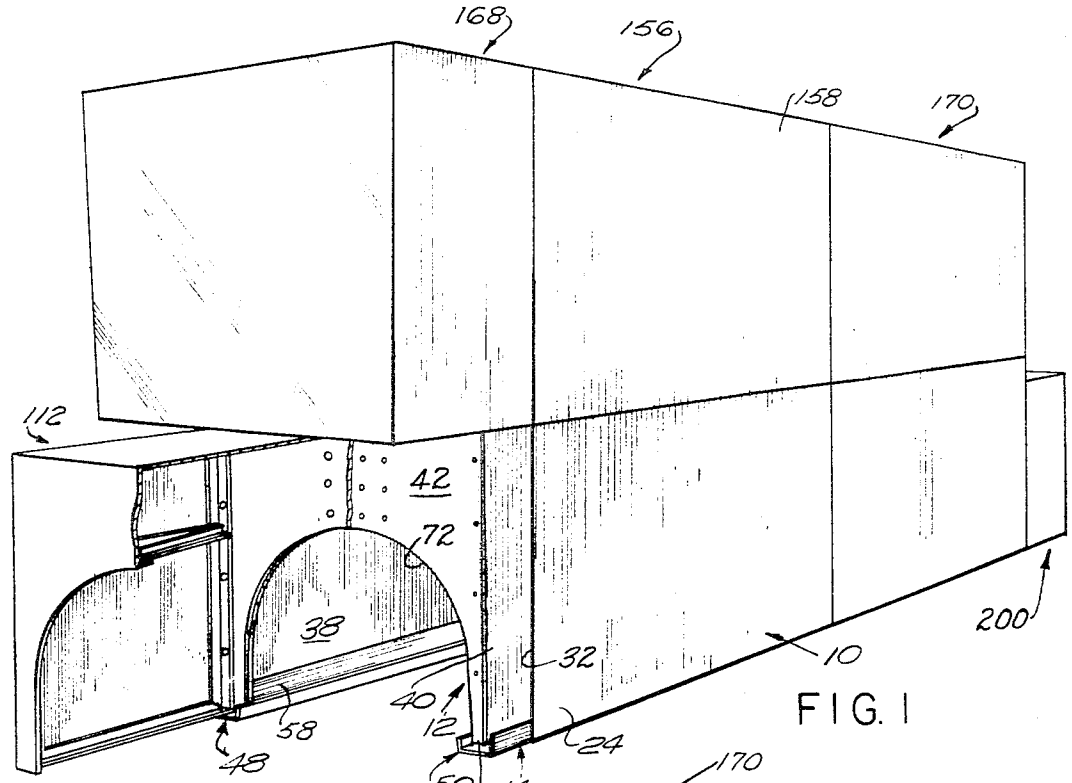


FIG. 1

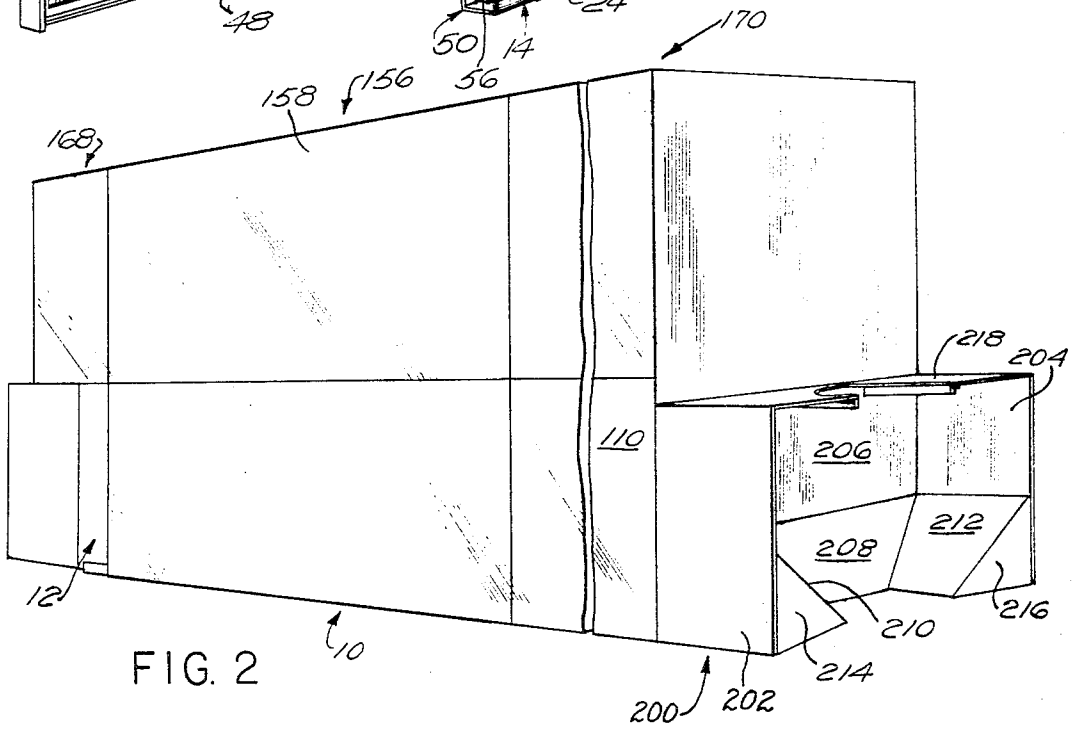


FIG. 2

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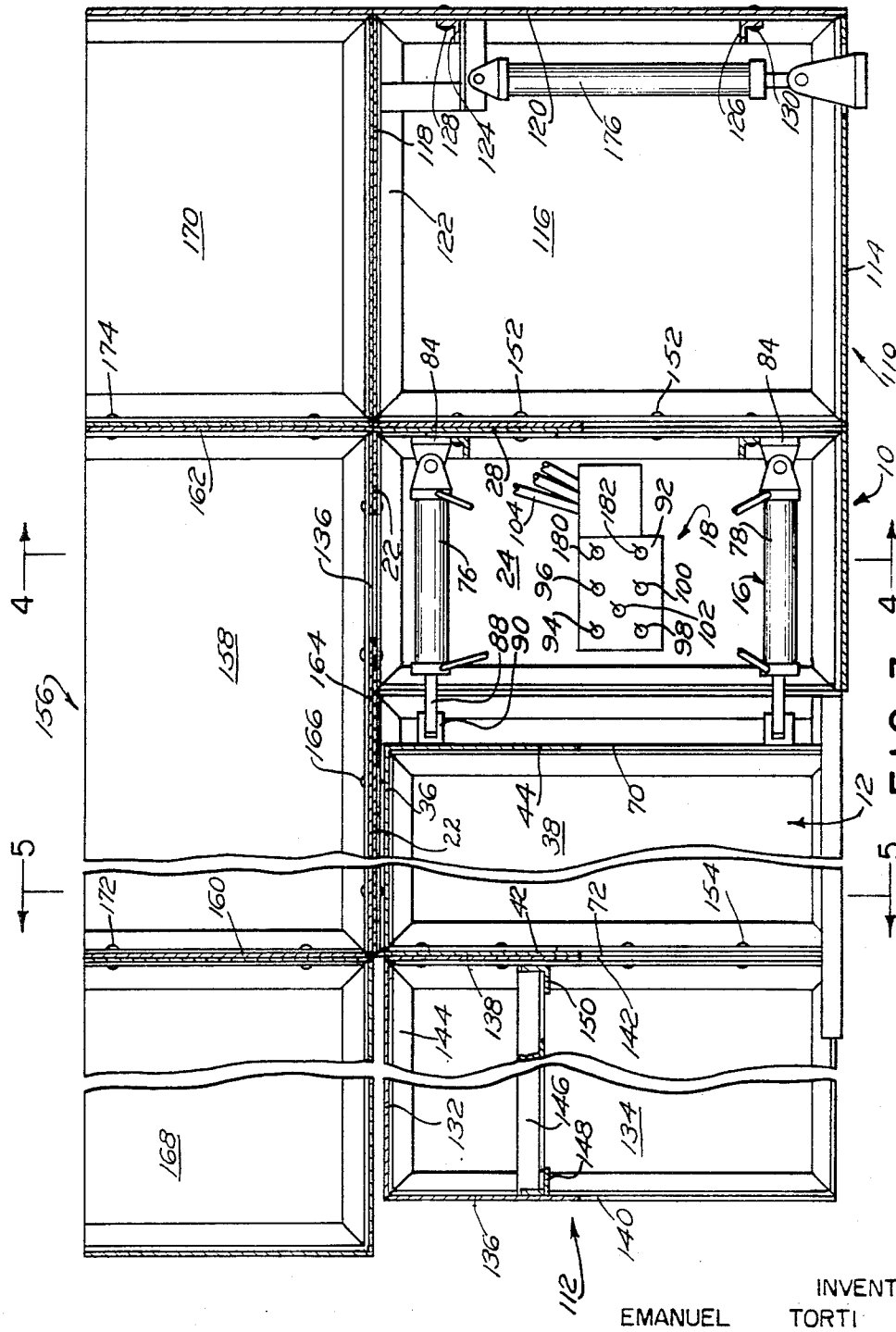


FIG. 3

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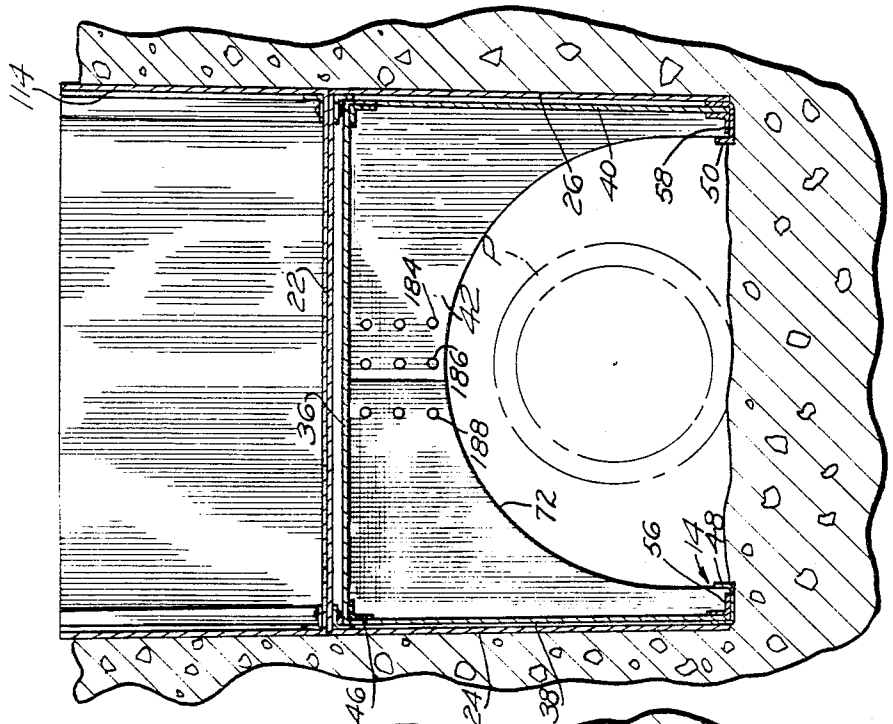


FIG. 5

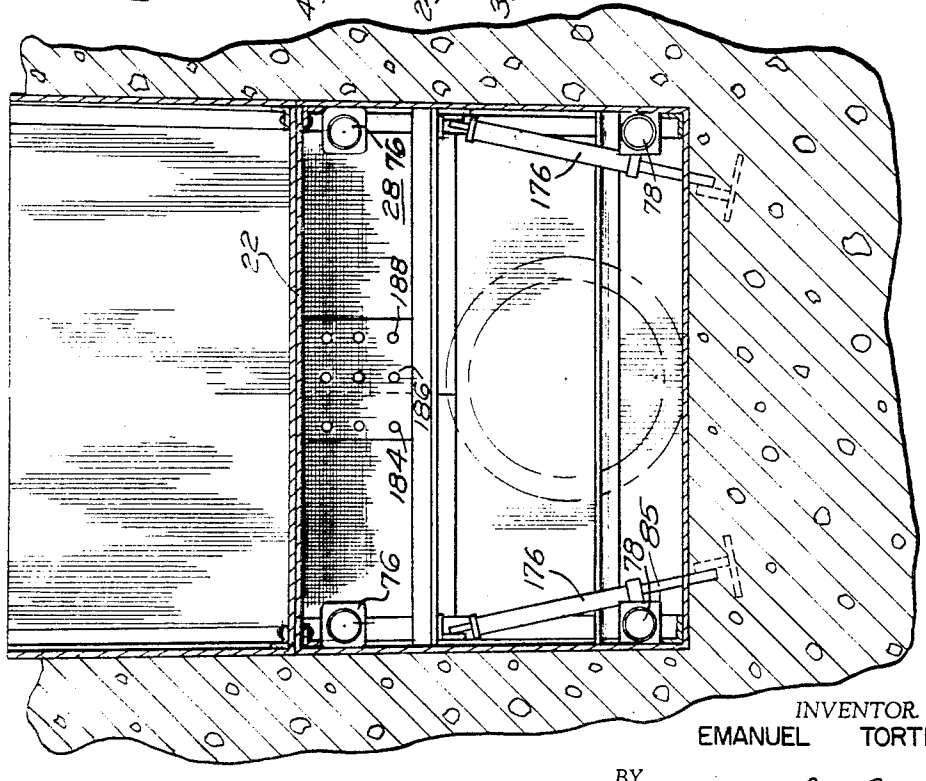


FIG. 4

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ADJUSTABLE TRENCH SHORING MACHINE

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Int. Cl. E21d 5/00
U.S. Cl. 61—41 1 Claim

ABSTRACT OF THE DISCLOSURE

A trench shoring machine comprising telescoping sections with means for extending and retracting one section with respect to the other whereby the machine is self-propelled along the length of the trench, said machine comprising additional sections that may be added to increase the height and length of the machine, the machine being of variable width, and having improved means for slidably mounting the telescoping sections with respect to each other.

The present invention relates to improvements in trench shoring means and more particularly to a trench shoring machine and constitutes an improvement over my prior U.S. Patent No. 3,089,310.

A primary object of the present invention is to provide an improved shoring machine for trenches which can be repeatedly used so as to eliminate the repeated construction of retaining or shoring walls, and wherein the machine is adjustable to various size trenches.

Another object of the present invention is to provide an improved trench shoring machine which can be continously used in a trench while laying pipe therein, the shoring machine being self-propellable along the length of the trench and regardless of the incline of the trench and 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 adjustable in length and width.

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.

SUMMARY OF THE INVENTION

The instant invention comprises inner and outer sections that are slidably and telescopingly assembled with respect to each other, there being means for extending and retracting the inner section with respect to the outer section. The inner section has an end wall which engages backfill, whereupon when the sections are extended with respect to each other, the outer section will be caused to move in a direction away from the backfill, said outer section having, at its front or leading end, an excavator box which helps clean the trench bottom and sides to provide a work area for the excavating machine. When the inner section is retracted with respect

to the outer section, the outer section will remain stationary, and the inner section will move away from the backfill to its retracted position within the outer section. Means are provided for raising, lowering or tilting the forward end of the machine, and additional means are provided for selectively increasing the height and length of the machine. Also, means are provided for varying the width of the machine, whereby the machine may be easily adjusted to accommodate different-size trenches.

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

In the drawings:

FIGURE 1 is a perspective view of my novel trench shoring machine, with a length extension added thereto and partially broken away;

FIGURE 2 is a perspective view of the machine of FIGURE 1 as viewed from the other end;

FIGURE 3 is a longitudinal sectional view taken through the machine;

FIGURE 4 is a transverse sectional view taken substantially on the plane of line 4—4 in FIGURE 3;

FIGURE 5 is a transverse sectional view taken substantially on the plane of line 5—5 in FIGURE 3.

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 outer member **10** is comprised of a top wall **22** joining inclined side walls **24** and **26** and end wall **28**. The walls **22**, **24**, **26** and **28** are preferably of steel plate which are welded together, or of bolted construction if so desired. The end opposite to wall **28** is open at **32** providing sliding access of section **12** into the machine. Also suitable strengthening angle irons can be provided at the corner joints as at **46**.

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**. End walls **42** and **44** have openings **70**, **72** of a size to accommodate the pipe P being laid.

The means **14** for guidingly supporting the inner member **12** for telescoping movement with respect to the outer member **10** includes the channels **48** and **50** rigidly mounted on the bottom edges of the side walls **24** and **26** of the outer member **10**. A pair of channel engaging rails **56** and **58**, preferably angle irons, are mounted on the lower edges of side walls **38** and **40**. As shown in FIGURES 1, 3 and 5, 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 slidingly received within a respective guide channel for support of the inner member **12** thereby.

The power operated means **16** for effecting relative telescoping movement between the inner and outer members **10** and **12** includes four cylinders, two upper **76** and two lower **78**. Each of the cylinders is secured to the front wall **28** of the outer member **10** by means of a

flange as at **84** welded to the front wall. The cylinders are completely mounted within the outer member **10** and connected with wall **44** of the inner member so as to give the desired amount of extension of the inner member **12** with respect to the outer member **10**, as will be understood. The cylinders **76** have plungers **88** connected to the front wall **44** preferably by means of flanges as at **90** in FIGURE 3. The four cylinders **76** and **78** 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 **18** for the power operated cylinders **76** and **78** includes the control box **92** which has four values **94**, **96**, **98** and **100** of identical construction with operating handles which can be turned in one direction to feed pressure to a respective cylinder to effect operation thereof in one direction and turned in the opposite direction to feed pressure to reverse the operation of the piston in the respective cylinders. 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 center 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 pipe **104** is provided to connect the velves to the source of fluid pressure (not shown), preferably hydraulic.

Where it is desired to have a trench shoring machine of greater length, I provide an extension box **110** for the outer section **10** and an extension box **112** for the inner section. Box **110** is of simple box-like form including bottom wall **114** with side walls **116**, top wall **118** and end wall **120**. All walls are joined with angle irons as at **122** and with weld except wall **120** which is removable. Wall **120** is connected to angle irons **124**, **126** by bolts **128**, **130**. The walls **28** and **120** can be interchangeable as will be obvious so that only one wall is required on the outermost unit.

The extension box **112** is similar to section **12** and includes top wall **132**, side walls **134** and end walls **136**, **138**, the latter having pipe-accommodating openings at **140**, **142** and all walls being joined as by angle irons **144** and weld. Rigidifying angle irons are provided at **146**, **148**, **150**.

Extension box **110** is connected to outer section **10** by bolts and nuts as at **152** and box **112** is similarly connected to section **12** by bolts and nuts at **154**.

Where a trench is of substantially greater depth than the height of the above described shoring machine, a height extension box **156** can be provided. The extension box **156** is preferably of hollow welded form constructed of side walls **158** and end walls **160** and **162** joined by the bottom wall **164**. The box **156** is joined to the outer member **10** by means of a plurality of bolts and nuts **166** which are secured through the walls **22** and **164**. Similarly, boxes **168**, **170** are formed and are connectible to the middle box **156** as by bolts at **172**, **174**.

In some instances, a wider trench may be encountered. In this case I provide for transverse adjustment of sections **10** and **12**. This is accomplished by the provision of overlapping transverse wall sections as shown best in FIGURES 1, 4 and 5, with sets of bolt-receiving openings as at **184**, **186**, **188**.

The inner and outer members are formed with aligned interior openings whereby the 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 and the machine will assume an extended relationship. The workers can then lay further pipe and upon reversed operation of the power operated cylinders **16**, the lighter, inner member **12** will be retracted into 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.

In addition to the foregoing control I provide additional hydraulic cylinders at **176** for the purpose of inclining, tipping, lifting, leveling or otherwise holding the trench shoring machine with respect to the trench.

Thus by operating either or both of the cylinders **176** by their respective control valves **180**, **182** the trench shoring machine can be tilted from side to side or end to end to accommodate an uneven trench or to initiate lifting or lowering of the machine for passing up inclines or down declines.

In order that access can be had to the interior of the machine from the top thereof, I provide an opening **136** through walls **22** and **164**.

A further attachment to the machine includes the excavator box section **200** which includes the side walls **202**, **204** joined by backwall **206** to end box **110** as by bolts. Inclined panels **208**, **210** and **212** are welded to walls **206**, **202** and **204**, respectively, as shown in FIGURE 2, and rigidifying plates **214** and **216** join the forward edges of panels **210**, **212** to their respective side plates **202** and **204**. The excavator box provides a work area for the excavator machine (not shown) which digs the trench in advance of the trench shoring machine. The excavator box helps clean the trench bottom and sides.

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.

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 conjointly cooperative equivalents, are therefore intended to be embraced by the claim.

I claim:

1. A trench shoring machine comprising a first section adapted to be supported by the earth at a trench bottom and having side walls rigidly maintained in spaced relation for shoring trenches and the like, said side walls having inwardly extending flanges adjacent their bottom edges defining trackways, a second section telescopingly carried by said first section and having spaced side walls with inwardly extending flanges at their lower edges defining rails slidably received by said trackways, said second section having a first end wall adapted to abut any backfill, first operating means for slidably extending said second section relative to said first section when said second section is abutting backfill, said first operating means being operable to retract said second section relative to said first section, second operating means located adjacent the opposite end of said second section for selectively raising, lowering and tilting said machine, said first section having a front end at the opposite extremity of the machine from said first

end wall, said second section having a second end wall spaced from said front end, said first and second operating means both being located in said space, and an excavator box secured to the front end of said first section, said box comprising side walls in substantial alignment with the side walls of said first section and a back wall secured to said front end, said box being open at its front and having inclined panels secured to the inner surfaces of said side and back walls, said panels being inclined downwardly and inwardly to define inclined planes at the lower portions of said walls.

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JACOB SHAPIRO, Primary Examiner

U.S. Cl. X.R.

52—67; 61—85