

Oct. 13, 1959

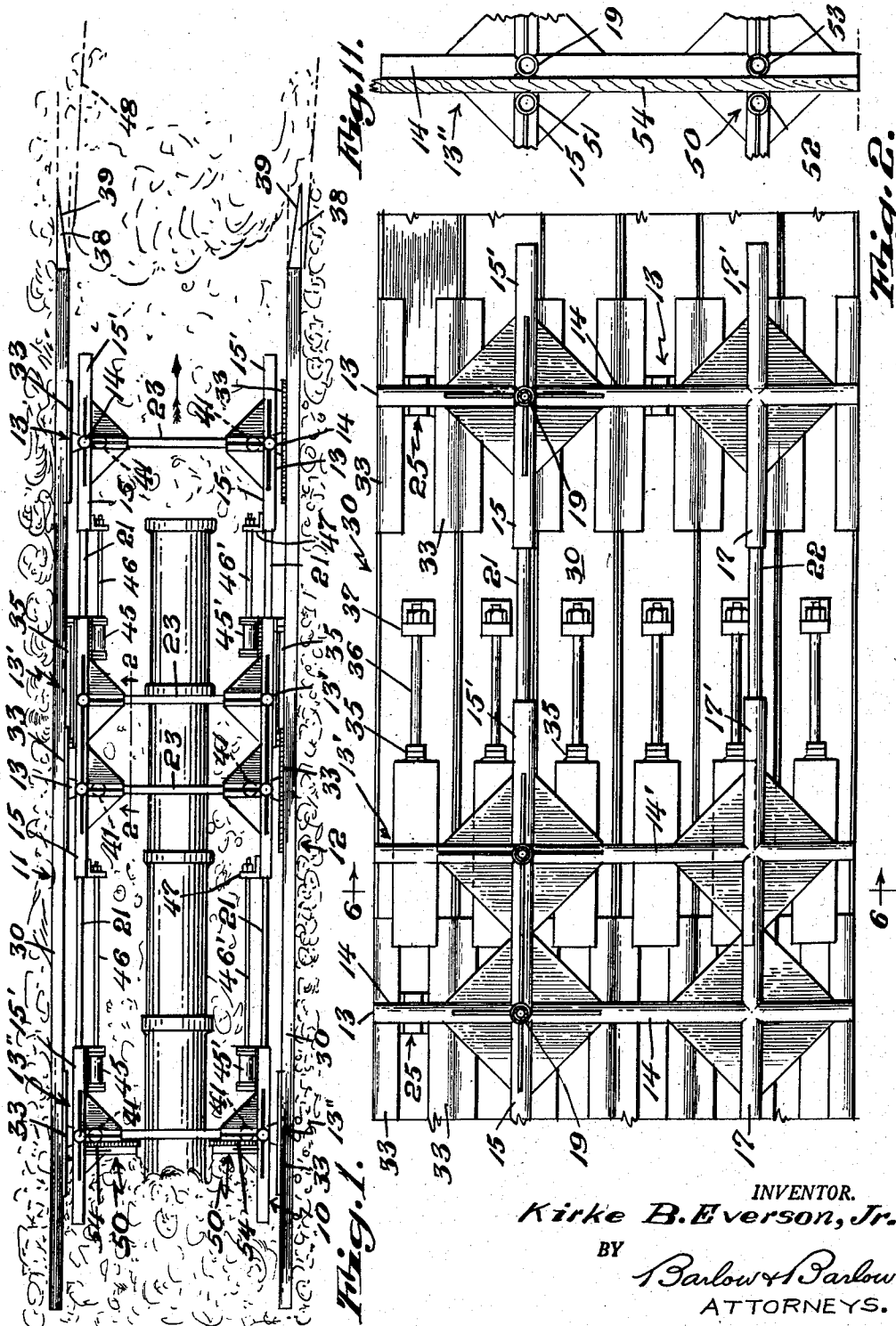
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2,908,140

TRENCH SHORING APPARATUS

Filed June 14, 1955

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TRENCH SHORING APPARATUS

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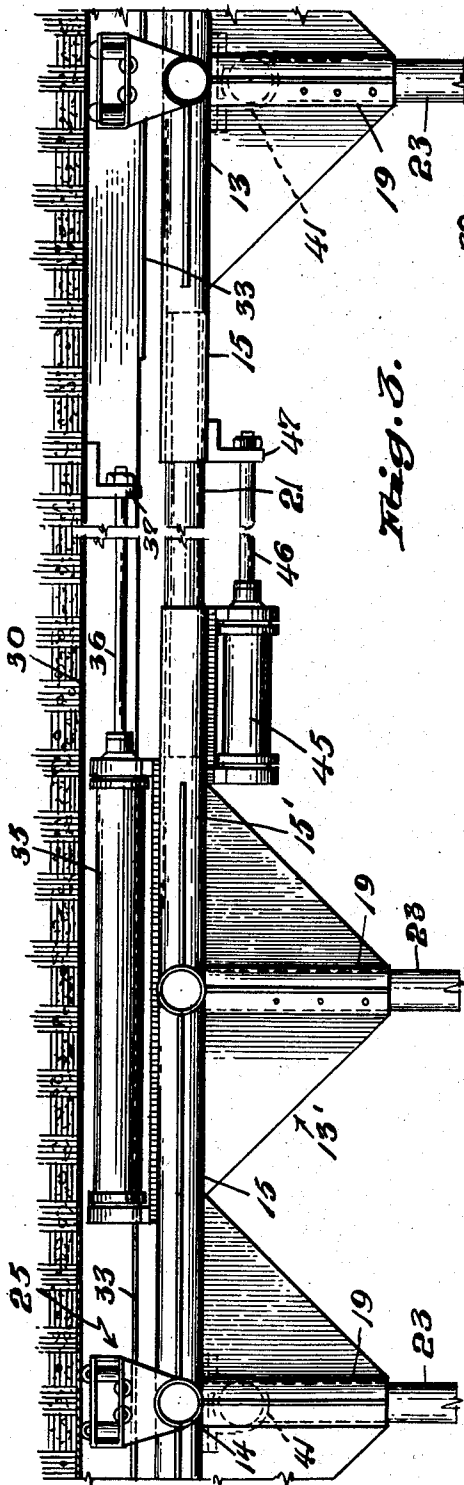


Fig. 3.

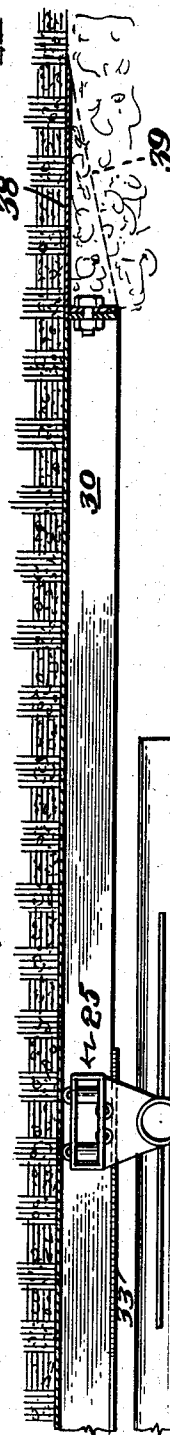


Fig. 5.

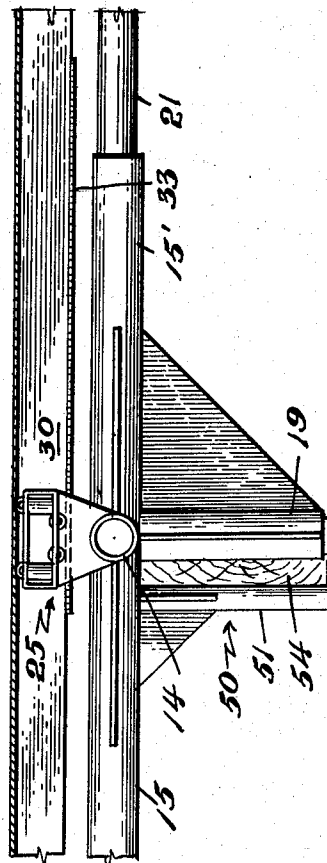


Fig. 4.

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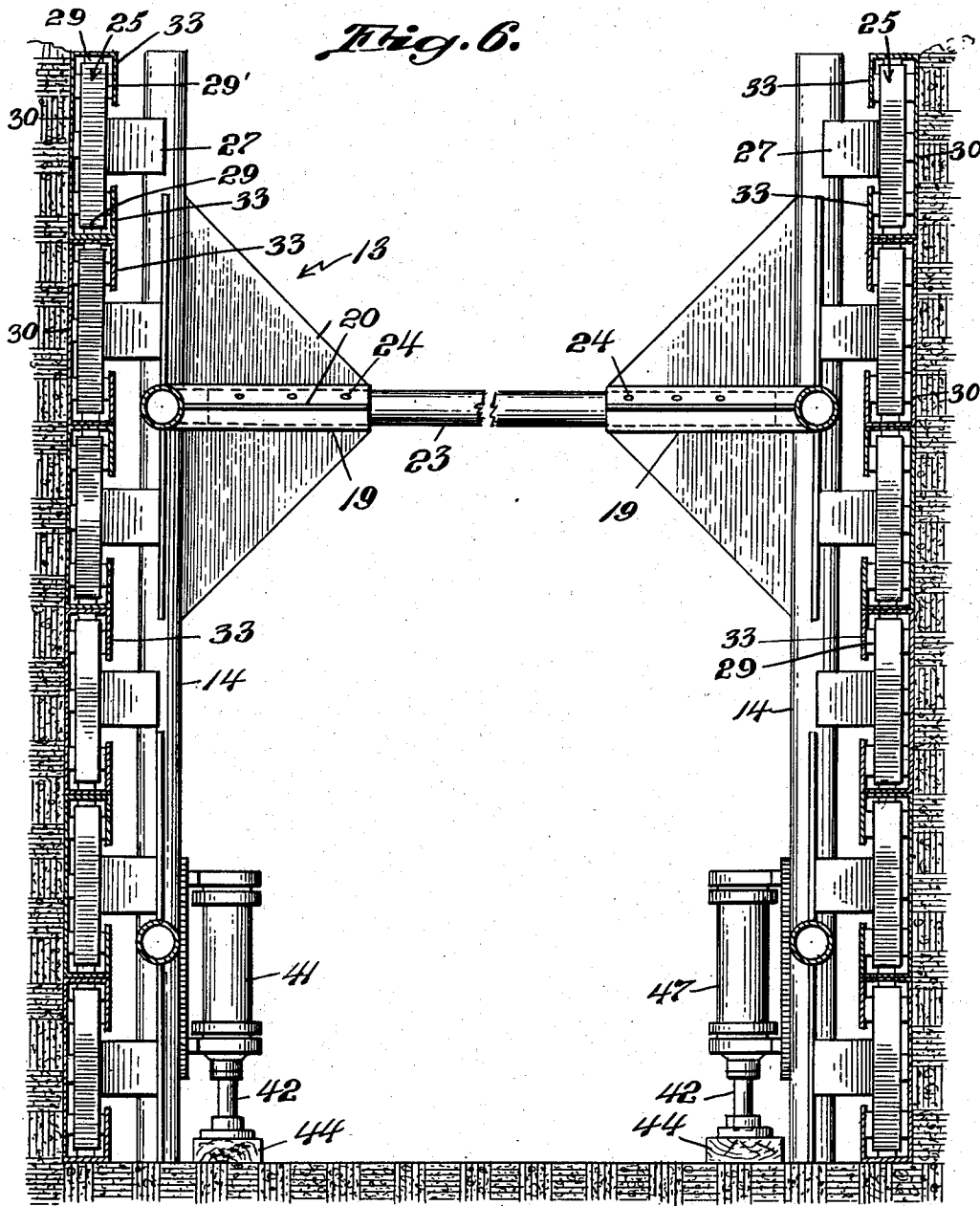
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Fig. 7.

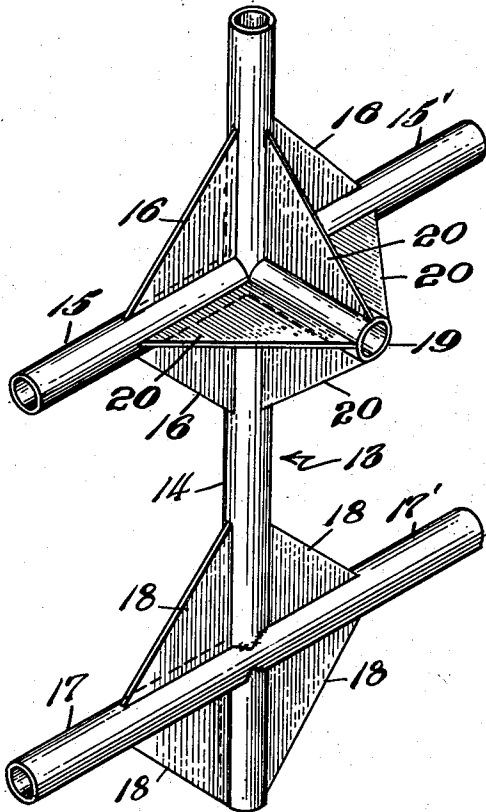
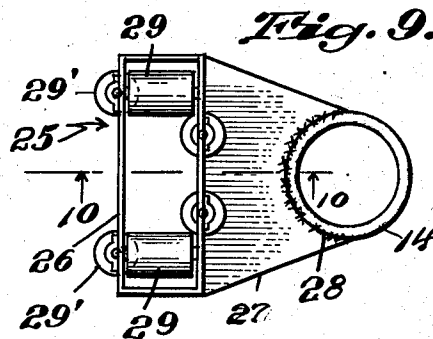
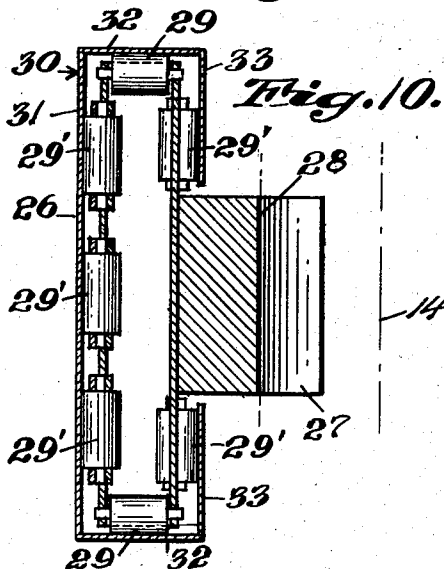
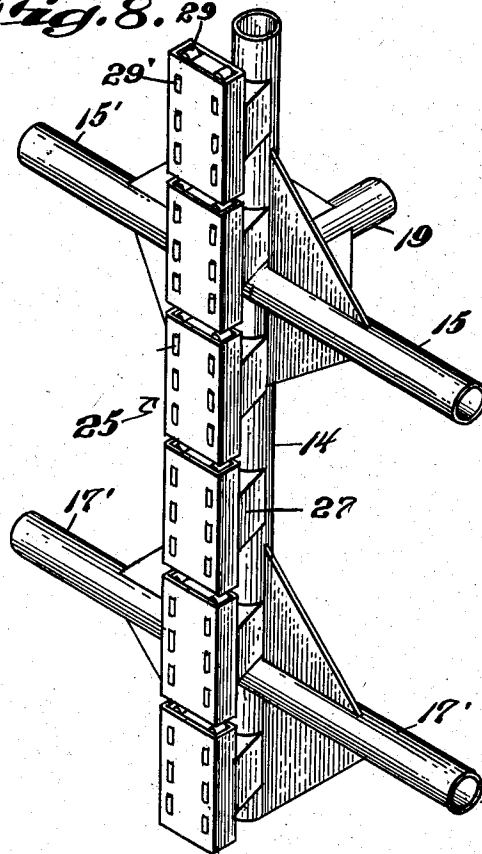


Fig. 8.



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TRENCH SHORING APPARATUS

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5 Claims. (Cl. 61—41)

The invention relates to a trench shoring apparatus. An object of the invention is to provide an apparatus of the above character wherein shoring or trench lining members will be advanced so as to follow and line the sides of the trench as the excavating thereof proceeds.

Another object of the invention is to provide an apparatus of the above character so constructed as to be readily assembled at the location of use and dismantled for transportation and storage thereof.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a plan view of a trench shoring apparatus embodying my invention;

Figure 2 is a side elevational view on a larger scale of a fragmentary portion of a side of the apparatus as viewed in the direction of the arrows on line 2—2 of Figure 1 with certain elements omitted;

Figure 3 is a plan view of a fragmentary portion of the side of the apparatus shown in Figure 2;

Figure 4 is a similar plan view but showing the leading end portion of the apparatus;

Figure 5 is a plan view of a fragmentary portion of the apparatus, showing its relation to a blocking member;

Figure 6 is a sectional view taken along line 6—6 of Figure 2;

Figure 7 is a perspective view of an upright section of the frame of the apparatus without the bearing members;

Figure 8 is a similar view looking at the opposite side of the section of Figure 7 and showing bearing members secured thereto;

Figure 9 is a plan view of a bearing shown in Figure 8;

Figure 10 is a sectional view taken along line 10—10 of Figure 9; and

Figure 11 is an elevational view of a fragmentary portion of an end upright of the apparatus.

In carrying out my invention, I provide a rigid frame on which is mounted a plurality of roller bearings which serve as tracks for supporting and advancing horizontally extending shoring or trench wall lining members. These lining members are fabricated of sheet metal into channels within the walls of which are received the said roller bearings. These channels are individually advanced by means of hydraulic cylinders during the excavating of the trench and are made of a length to afford ample time for workmen to lay pipe or conduit and seal the joints prior to the trailing end of the lining members passing and exposing the sides of the trench at a given location. Thus, the shoring of the sides of the trench continues

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during the excavation thereof, and the speed of advancement of the apparatus is limited only by the speed of the excavation. The hydraulic cylinders are intended to be actuated in a known manner and controlled in a manner whereby a single cylinder may be actuated or a plurality thereof may be actuated simultaneously. The apparatus is so constructed that the supporting frame is propelled forwardly along the trench by the hydraulic cylinders which are used for advancing the lining members. The apparatus is adjustable as to width and for defining the path of movement of the lining members.

The invention is shown embodied in an apparatus illustrated in the drawings which comprises a frame 10 preferably made of telescoping tubular material, as by way of example steel tubing and/or iron pipe fabricated in a manner so as to be easily dismantled for transportation and storage and for assembling at the location of use. The frame 10 is generally rectangular and has side portions 11, 12 which are composed of similar upright units 13 (see Figure 7) having a tubular post 14 with horizontally extending tubular sections 15, 15' hereinafter to be referred to as pipe sections at the upper portion thereof secured as by welding, the connection being reinforced by gusset plates 16 also welded in position. These sections 15, 15' of the spaced units are in line with each other and extend from opposite sides of the post in the longitudinal direction of the frame. Similar pipe sections 17, 17' are similarly disposed and secured at the lower end portion of the post 14 and reinforced by gusset plates 18. There is also secured at the upper portion of the post 14 a pipe section 19 which extends in the plane of sections 15, 15' but at right angles thereto. This section 19 is welded to the post and reinforced by gusset plates 20. Double uprights such as 13, 13' occur at some locations.

The upright units 13 are detachably connected to each other at their upper portion to form a side such as 11 or 12 by tubular stringers 21 which are telescopically received in adjacent sections 15, 15' and at their lower portions by similar tubular stringers 22 which are similarly received in adjacent sections 17, 17'. The side portions 11, 12 are joined to each other only at their upper portion (see Figure 6) by tubular ties 23 which are telescopically received in opposite pipe sections 19 of the said sides and detachably secured in adjusted position by appropriate conventional fastenings 24.

Each upright with the exception of the portion 13' of the double upright carries a plurality of bearing members designated generally 25 (see Figures 6, 8, and 9) comprising a generally rectangular hollow body 26 open at the ends and having a right angularly extending bracket 27 in which there is formed a semicircular recess 28 extending inwardly from the outer end extremity. The body 26 carries a plurality of rotatable bearing rollers 29 at each end and a plurality of similar rollers 29' along the opposite sides of the face thereof. The bearings 25 are positioned on the outer side of the post 14, one above the other, as seen in Figures 6 and 8, and welded thereto, the recess 28 being made on the radius of post 14 and received thereon, as shown in Figure 9.

The frame 10 thus far described forms a rigid support and roller guide for trench lining members 30 which in the present instance are fabricated from sheet metal into general channel form. The gauge of the sheet metal is chosen to provide a rigid wall lining and yet sufficiently flexible to permit members 30 to flex and be directed

other than in a straight path as will hereinafter appear. These are mounted and supported on the bearings 25, the side 31 (see Figure 10) engaging the rollers 29' and the side 32 the rollers 29. The sides 32 of adjacent members 30 substantially contact each other. Each member 30 is provided at spaced intervals with a pair of oppositely disposed lips 33 which extend inwardly from the sides 32 into engagement with the rollers 29' at the rear side of bearings 25. There is a pair of lips 33 at the location of each post 14 carrying bearings 25 and these lips are of a greater length than the distance of travel of the members 30 so in all positions of advancement of the members 30 the said lips will remain engaged with the bearings 25.

It will be apparent from the foregoing description that the apparatus has a frame which is adjustable as to width and which is enclosed at the outer vertical sides thereof with closely adjacent trench lining members 30, each slidably mounted for lengthwise movement relative to frame 10 on a roller guide or bearing at each post.

There is fastened to posts 14' of portion 13' (see Figure 2) of the double unit a hydraulic cylinder 35 for each member 30. These cylinders extend in the space between the members 30 and the post 14' and are of the double acting type wherein the piston thereof is reciprocated in both directions by hydraulic fluid. The connecting rod 36 of the piston is attached to an abutment 37 projecting from the adjacent liner member 30. Upon actuation of the hydraulic cylinder 35 in a known manner, the thrust of connecting rod 36 on abutment 37 will move member 30 along bearings 25.

In using the apparatus, a length of trench is excavated and the assembled apparatus lowered therein, the width of the apparatus having been adjusted for the width of the trench. A back filling of soil may now be made against the members 30 which will usually provide sufficient frictional contact with the members 30 to oppose the rearward thrust of the cylinder 35. The leading ends of the members 30 on one side will be in line with each other. It is contemplated to advance the members 30 during the excavation of the trench one at a time. In order to ease the advance of the members 30 into the excessive soil which may remain at the sides of the trench or to advance the members 30 ahead of the excavation, a nose piece 38 (see Figures 1 and 4) which is made in channel form in continuation of members 30 but of much heavier material is secured in appropriate manner to the leading edge of members 30. The nose piece 38 is cut inwardly to a chisel edge as at 39. The nose 38 is made of a length equal to the distance of advancement of member 30 at each advance stroke of the cylinder 35 and will shear the excessive soil out of its path of travel or may be moved into the soil a distance slightly in advance of the excavation depending upon the nature of the soil encountered.

In operation, the cylinders 35 will be connected to a suitable power source (not shown) and controlled by known valve means to actuate each cylinder independently so that each member 30 may be advanced to follow the excavating of the trench or slightly ahead thereof to line the walls of the trench with members 30. When all the members 30 have been advanced the predetermined distance (the length of the stroke of the cylinders 35), all the cylinders 35 are actuated simultaneously in the reverse order. The frictional contact of members 30 against the sides of the trench will result in an opposing force much greater than the opposing force of the frame 10 to the rearward thrust of the cylinders 35 and the frame 10 will advance along the members 30 as a track upon the reverse stroke of the hydraulic pistons.

The apparatus is adjusted to the grade of the trench by means of hydraulic cylinders 41 (see Figure 6) which are secured to the lower portion of the posts 14 of all but the unit 13' of the double upright units. The piston rod 42 is adapted to engage against a block 44 positioned on

the floor of the trench whereby upon actuating of the cylinders 41, the thrust of the rod 42 against block 44 will raise the apparatus and thus the apparatus may be leveled to the grade of the trench. In some instances the trench may extend on a curvature; to provide for such condition, a hydraulic cylinder 45 (see Figures 1 and 3) is secured to a pipe section 15' of one upright 13' of the double unit and to unit 13'', and its connecting rod 46 is attached to an abutment 47 on an adjacent section 15' of a next upright 13. A similar cylinder is similarly attached to the pipe section 17, 17'. Thus, upon actuating of said cylinders 45, the spacing between sections 13 may be changed. As by way of example, assume the trench to follow a curved path graphically indicated by broken lines 48 at the right of Figure 1, the cylinders 45 would be actuated to increase the spacing between sections 13, the stringers 21, 22 being slidably related to the uprights connected thereby. The cylinders indicated 46' on the other side of the apparatus would be actuated in a direction to decrease the spacing between its sections 13. This adjustment of the frame 10 will cause the members 30 to be advanced along the path indicated in broken lines 48.

It will be apparent that the height of the apparatus may be increased by superimposing sections 13 one on the other and securing one to another in a rigid manner by a length of tubular section (not shown) frictionally received in the adjoining ends of the posts 14 of the said superimposed sections 13.

At the start of an operation, the back fill placed at the sides of the apparatus may not in some instances result in sufficient frictional engagement on the apparatus to provide the necessary opposing force to the forward thrust of the pistons in cylinders 35. In order to provide for such condition, abutments indicated generally 50 (see Figures 1 and 11) are provided at the upper and lower portion of upright section indicated 13'' of each side 11 and 12. These abutments (see Figures 5 and 11) are formed by lengths of pipe sections 51, 52, and 53 attached as by welding to each of said sections 13''. A plank or the like 54 may be inserted in the space between pipe section 51 and adjacent pipe section 19 to extend in the space between pipe sections 52 and 53. The trench may now be back filled at the rear of planks 54, which back fill against the planks will result in providing the necessary resistance to rearward movement of the apparatus upon forward thrust of the cylinders 35 against members 30.

I claim:

1. A trench shoring apparatus comprising a frame adapted to be moved along the trench floor, said frame having two vertical sides with transverse horizontal supporting stringers therebetween, each side comprising a plurality of guide means horizontally aligned in a plurality of horizontal rows one above the other, a trench lining member supported on each guide means and adapted for horizontal movement relative thereto and a motor means for each lining member coupled to the adjacent side of the frame and to one of said members.

2. A trench shoring apparatus according to claim 1 wherein said lining members are metal channels having side and bottom walls supported in said guides with the bottom wall face thereof facing outwardly.

3. A trench shoring apparatus according to claim 1 wherein said motor means are hydraulic cylinders.

4. A trench shoring apparatus according to claim 1 wherein said sides comprise a plurality of tubular upright sections and said stringers are tubular with telescopically related portions.

5. A trench shoring apparatus comprising an open frame having opposite side portions held in spaced relation to each other by transverse stringers, each side portion provided with a plurality of upright sections, a plurality of horizontal rows of roller bearings secured to said uprights in superimposed relation with the bearings on one upright horizontally aligned with the bearings on the

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other uprights, a trench lining member supported and slidable along the bearings of each row, said lining members being of a length to extend a substantial distance beyond the frame, and a hydraulic cylinder for each of said lining members each cylinder secured to an upright section with the piston rod thereof attached to an adjacent lining member, each of said cylinders connected to a source of pressure whereby actuation of said cylinders will cause a relative movement between said frame and a member.

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