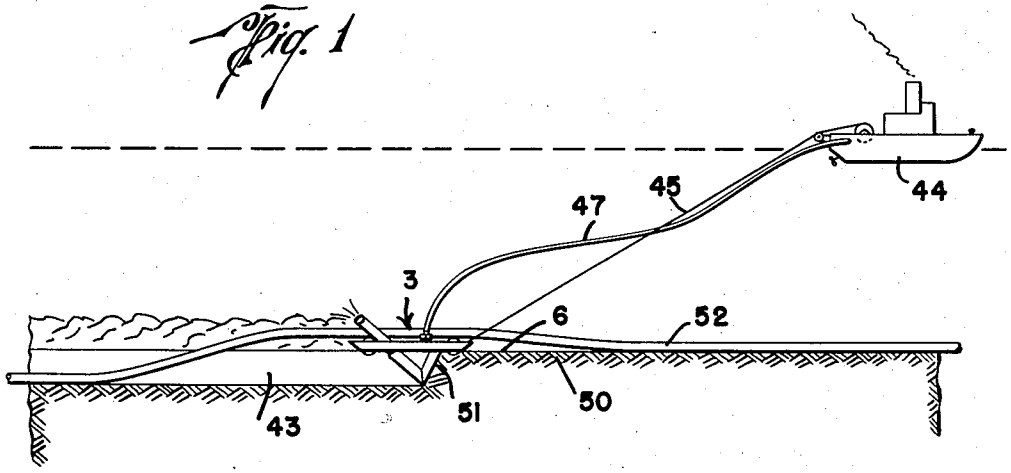
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PIPE LAYING DEVICE

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Fig. 1



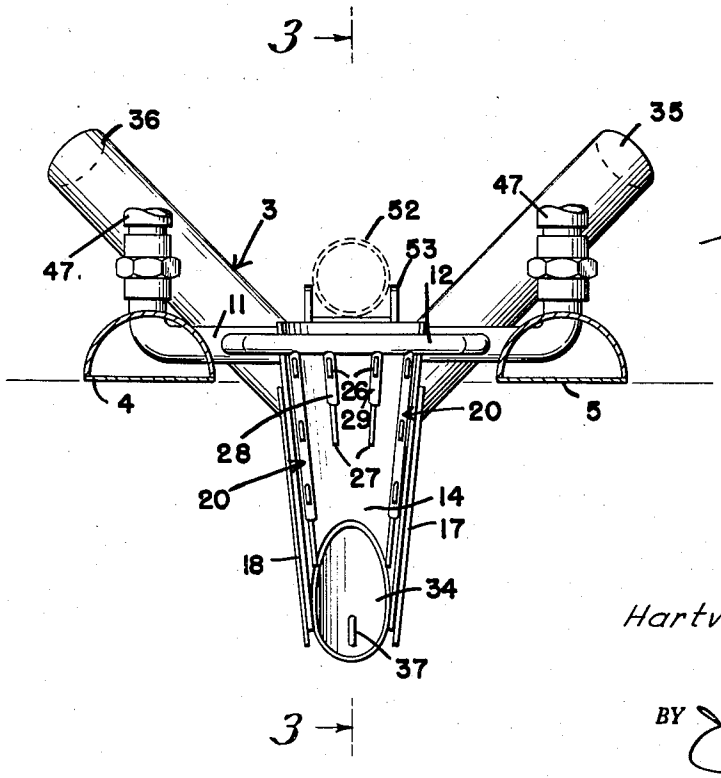


Fig. 2

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Fig. 3

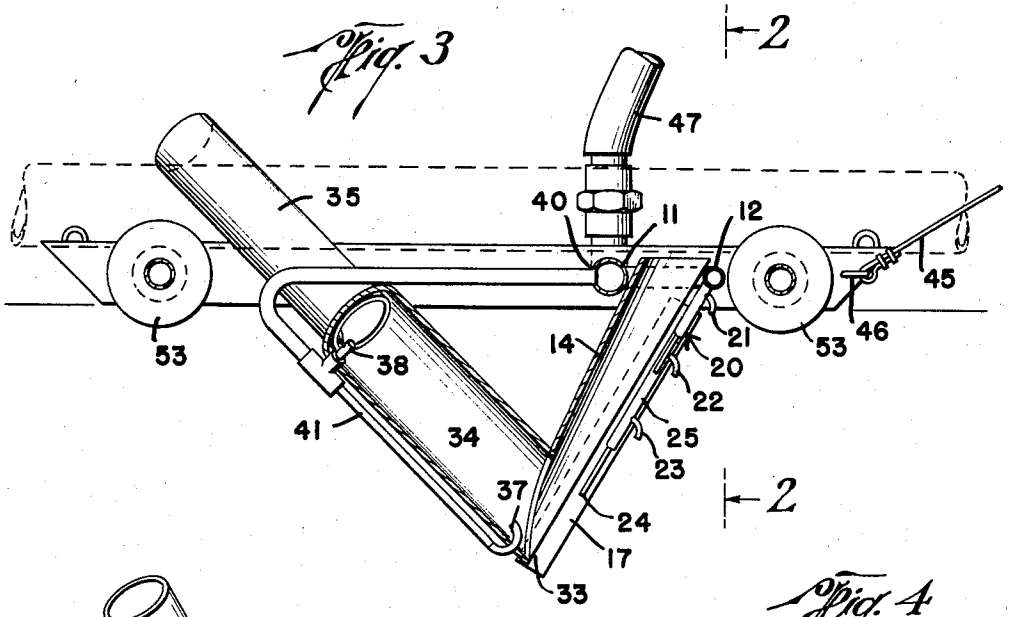
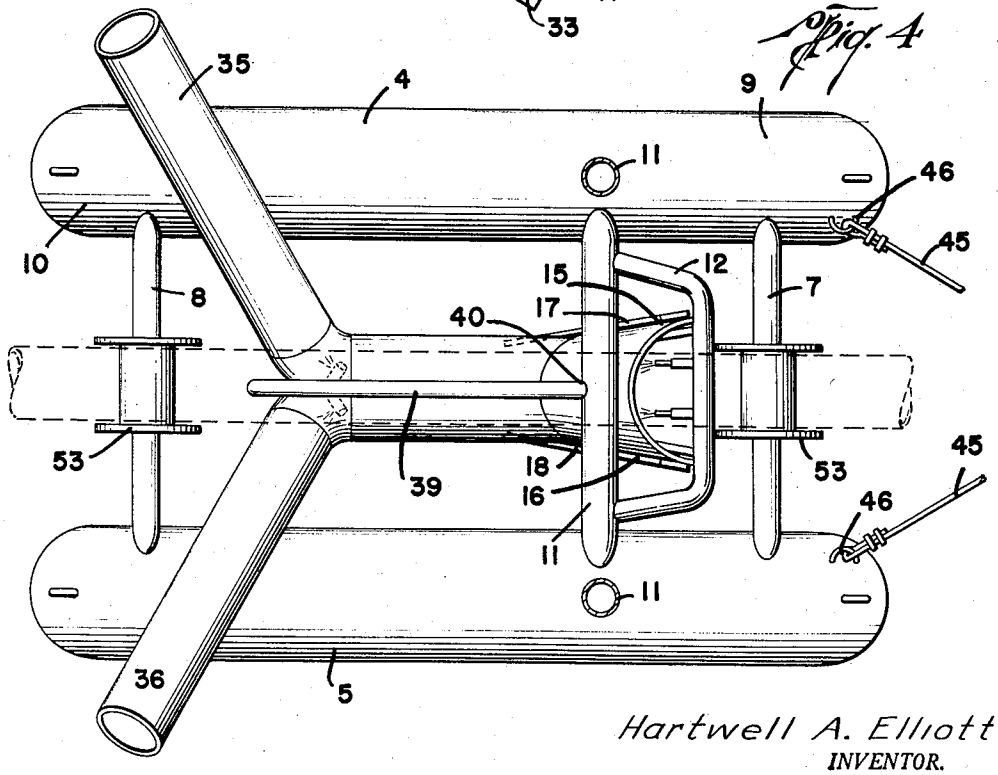


Fig. 4



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2,879,649

PIPE LAYING DEVICE

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Application August 21, 1953, Serial No. 375,723

8 Claims. (Cl. 61—72)

The present invention relates to a machine for digging a treach in a water covered area.

Where pipe is to be laid in water covered areas, such pipe must be submerged in order to eliminate it as a navigational hazard. Various devices have been proposed for digging a ditch in a water covered area whereby a pipe line may be laid in such ditch; however, such devices have proved unsatisfactory in that no suitable means has been provided for discharging the formation cut from the ditch in a suitable manner.

In more detail, the specific problem arises in that as the trench is being dug, suitable provision must be made for discharging the formation so that it will not settle back into the ditch before the pipe is laid therein. From practical observations that I have made, I have determined that in most instances the material or formation from the trench being dug settles back into the trench as it is dug and before the pipe can be laid in the trench. Therefore, the pipe rests, exposed on the top layer of dirt on the formation and the trenching effort has been in vain.

Also, great difficulty is encountered in that the trench walls tend to cave in as they are being formed and this causes filling of the ditch.

The present invention is directed to a construction that provides an arrangement whereby the formation cuttings from the trench may be discharged so as not to fall back into the newly dug trench.

The present invention also provides a construction wherein support is given to the side walls of the trench as such trench is being dug whereby caving of such side walls is inhibited.

Still another object of the invention is to provide a trenching machine including a pair of horizontally disposed skids, a downwardly and rearwardly extending scoop between said skids, jet means in front of said scoop, and means for conducting pressure fluid to said jet means whereby formation may be moved as the trenching machine is moved therealong.

Still another object of the invention is to provide a trenching machine including a pair of horizontally disposed skids, a downwardly and rearwardly extending scoop between said skids, jet means in front of said scoop, and means for conducting pressure fluid to said jet means whereby formation may be moved as the trenching machine is moved therealong, and a discharge means connected to the scoop at the lower end thereof for receiving and discharging the formation cut by the trenching machine.

Another object of the invention is to provide a trenching machine including skids, scoop means connected between said skids and extending downwardly therefrom, jet means mounted adjacent the forward end of said scoop, a discharge tube connected to the lower end of said scoop for receiving cut formation and means for conducting pressure flud to said jet means for cutting the formation out and urging it down towards said discharge tube as the trenching machine is moved along.

Another object of the invention is to provide a trenching machine including skids, scoop means connected between said skids and extending downwardly therefrom, jet means mounted adjacent the forward end of said scoop, a discharge tube connected to the lower end of said scoop for receiving cut formation and means for conducting pressure fluid to said jet means for cutting the formation out and urging it down towards said discharge tube as the trenching machine is moved along, and additional jet nozzles and conduit means connected therewith mounted so as to aid in moving cut formation through said discharge tube.

A further object of the invention is to provide a machine for digging a trench under water which machine includes a pair of horizontally disposed skids, scoop means extending downwardly between said skids and providing a support for the wall of the ditch as it is dug, jet means adjacent the forward end of said scoop and extending downwardly along each edge thereof, conduit means connected to said jet means for supplying fluid pressure thereto whereby a trench may be dug by the pressure fluid discharging from the jets, discharge means connected to the lower end of the scoop for receiving the formation cut by the jet means as the trench is dug, whereby such cut formation may be discharged to the side of the path of the moving trenching machine.

Other objects and advantages of the invention will become more readily apparent from a consideration of the following description and drawings, wherein:

Fig. 1 is a view illustrating the trenching machine being towed in a water covered area and forming a ditch therein, with a pipe being supported on the trenching machine for lowering into the ditch as it is dug;

Fig. 2 is a front view of the preferred embodiment of the machine;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2 showing the preferred arrangement of the scoop, jet and discharge means; and

Fig. 4 is a top plan view showing the preferred arrangement of the various parts.

In Fig. 2 the invention is illustrated generally by the numeral **3** and is shown as including the horizontally disposed spaced skids **4** and **5** which may be formed in any suitable fashion.

The skids are adapted to ride along the submerged surface as shown at **6** in Fig. 1 and provide a support means for the trenching machine. If desired, suitable braces such as illustrated at **7** and **8** may be connected between the skids at the front **9** and the rear **10** respectively of such skids. Suitable conduit means **11** are connected to the skids and provide a means for conducting pressure fluid to the jet means as will be discussed more fully hereinafter. The conducting means **11** includes the forwardly extending yoke portion **12** as more clearly illustrated in Figs. 3 and 4 of the drawings.

Scoop means **14** are arranged between the skids **4** and **5** and may be connected to the conduit **11** and its forwardly extending portion **12** as shown in Figs. 3 and 4 of the drawings. The scoop is inclined rearwardly and extends downwardly between the skids as shown in the drawings, and if desired, the edges **15** and **16** of the scoop may be reinforced with removable members **17** and **18**, whereby such members may be replaced from time to time as they become worn.

The edges **15** and **16** of the scoop **14** converge towards each other as more clearly shown in Fig. 2 of the drawings. The scoop edges provide a support means for the wall of the trench as it is dug and thereby tends to eliminate caving tendencies of such wall.

Mounted adjacent the front part of the scoop **14** and along each edge **15** and **16** are the jet means, denoted generally by the numeral **20**. The jet means extends

downwardly along the edges 15 and 16 and includes the jet nozzles 21, 22, 23 and 24, and the conduit 25 along which conduit the nozzles are spaced. The conduit 25 communicates with the yoke 12, which in turn communicates with conduit 11 whereby pressure fluid may be supplied therethrough and ejected from said nozzles so as to act on the formation immediately in front of the scoop. The jetting action of the fluid cuts the formation and forms a trench therein. If desired, additional jets 26 and 27 may be arranged in conduits 28 and 29 so as to cut out that part of the formation between the jet means 20.

It is to be noted in the form illustrated in the drawings that the jet nozzles 21, 22, 23, 24 of the jet means 20 are directed generally in a downward direction so that as the formation is cut by such jetting action, it is moved downwardly towards the lower end 33 of the scoop means 14. Connected to the lower end of the scoop 14 is a discharge means 34 which may be in the form of a tube. The discharge tube 34 extends upwardly from its connection with the scoop and may be divided into two diverging portions 35 and 36. In order to aid the cut formation in moving through the discharge tube 34, jet nozzles 37 and 38 may be arranged in such discharge tube so as to exert a force against the cut material or formation so as to urge it through the tube and out over the skids 4 and 5 through the diverging portions 35 and 36. Pressure fluid may be supplied to the jet nozzles 37 and 38 by means of a conduit 39 that is connected at 40 to the manifold 11. The tube 39 may extend rearwardly as illustrated in Fig. 3 of the drawings and downwardly as shown at 41 whereby it may be connected to the jet nozzles 37 and 38 which extend into the discharge tube 34.

From the foregoing description of the direction of the jets, it can be seen that first of all, the formation is cut by the discharge from the jet nozzles of the jet means 20 adjacent each side of the scoop 14. The formation between the edges of the scoop 14 is cut by the discharge from the jet nozzles 26 and 27. Such cut formation is urged downwardly towards the lower end of the scoop where it is picked up by the discharge tube 34 and thence moved through such tube by the directed jets 37 and 38.

Since the jet means 20 is arranged inside of and in front of the scoop, the edges 15 and 16 of such scoop act as a support for the newly formed wall 43 of the ditch. Thus, as the machine is moved along and as new wall is cut, the jets will not act against the newly cut wall so as to cause caving thereof as is the case with the devices heretofore used.

Attention is also directed to the arrangement of the discharge means 34 and its diverging portions 35 and 36, which in cooperation with the jet nozzles moves the cut formation to the side of the path to be taken by the trenching machine. Thus, cut formation is discharged so that it will not fall back into the trench before the pipe is laid therein.

While it is believed that the operation of the invention is apparent by reason of the foregoing, to further amplify and illustrate, it will be assumed that the invention is connected to a boat 44, by any suitable means such as the line 45 engaging the tow lugs 46 on each of the skids 4 and 5. Fluid under pressure is supplied through the line 47 to the manifold 11 where such fluid may be discharged through the various jets as previously discussed. Movement of the pressure fluid through the jet means 20 causes a trench to be dug in the water covered formation 50 as illustrated at 51. The side portions 15 and 16 of the scoop provide a support for the walls 53 of such trench as it is dug and the cut material or cut formation is discharged through the pipe 34 and the portions 35 and 36 to either side of the trenching machine as it is moved along.

If desired, suitable dolly means as illustrated at 53 may be provided to support the pipe line, illustrated at 52, whereby such pipe line may be laid in the ditch as it is dug.

Broadly, the invention relates to a trenching machine and more particularly to a trenching machine which provides a means for supporting the walls of the trench as it is dug and for discharging the cut formation so that it will not fall back into the trench before the pipe is laid therein.

What is claimed is:

1. A trenching machine for cutting a ditch in a submerged surface of a water covered area comprising, a pair of horizontally disposed skids for supporting the machine as it moves along on the submerged surface, an inclined scoop positioned between said skids, said scoop including side edges extending downwardly between said skids, said side edges converging toward the lower end of said scoop, jet means positioned adjacent the inside leading edge and on each side of said scoop, said jet means extending downwardly in said scoop and a discharge tube connected to the lower end of said scoop for conducting material cut by the machine, said tube extending upwardly from its connection with said scoop and including a portion extending beyond said side edges for guiding the material from said tube beyond the edge of the ditch.

2. A trenching machine for cutting a ditch in a water covered formation comprising, a pair of horizontally disposed skids for supporting the machine as it moves along on the formation, an inclined scoop positioned between said skids, said scoop including side edges extending downwardly between said skids, said side edges converging toward the lower end of said scoop, jet means positioned adjacent the inside leading edge and on each side of said scoop, said jet means extending downwardly of said scoop, discharge means connected to said scoop for receiving formation from said scoop, said discharge means including portions extending beyond said side edges for guiding the material from said discharge means beyond the edge of the ditch, and jet nozzles in said discharge means for urging the formation moved by said first mentioned jet means in cutting the ditch through said discharge means.

3. A trenching machine for cutting a ditch in a water covered formation comprising, horizontally disposed skids for supporting the machine as it moves along on the formation, a scoop positioned between said skids, said scoop including side edges extending downwardly between said skids, said side edges converging toward the lower end of said scoop, jet means adjacent the inside forward part of said scoop, said jet means extending downwardly in said scoop conduit means connected to said jet means for supplying a fluid under pressure whereby the formation may be moved by such pressure fluid discharged through said jet means, and a discharge means connected to said scoop, said discharge means including a portion extending beyond said side edge for guiding the cut formation beyond the edge of the ditch.

4. A trenching machine for cutting a ditch in a water covered formation comprising, skid means for supporting the machine as it moves along on the formation, scoop means positioned between said skid means, said scoop including side walls extending downwardly between said skid means, said side walls converging toward the lower end of said scoop means, jet means adjacent the inside forward part of said scoop, said jet means extending downwardly in said scoop means, conduit means connected to said jet means for supplying a fluid under pressure whereby the formation may be moved by such pressure fluid discharged through said jet means, discharge means connected to said scoop means at the lower end thereof and extending upwardly therefrom, and including diverging portions extending beyond said side for guiding the cut formation beyond the edge of the ditch, jet nozzles in said discharge means and a conduit connected to said jet nozzles for supplying fluid pressure to

said discharge means for aiding in moving the formation through said discharge means.

5. In a trenching machine for cutting a ditch in a water covered formation wherein skid means are provided for supporting the machine as it moves along on the formation, scoop means carried by the skid means, said scoop including side edges extending downwardly, said side edges converging toward the lower end of said scoop, jet means in said scoop means, said jet means extending downwardly in said scoop means, and discharge means connected to said scoop means, said discharge means extending from its connection with said scoop means and beyond said side edge for guiding the cut formation beyond the edge of the ditch.

6. A trenching machine for cutting a ditch in a water covered formation comprising, horizontally disposed skid means for supporting the machine as it moves along on the formation, scoop means positioned between said skid means, said scoop means including side edges extending downwardly to support the sidewalls of the ditch as it is formed, said side edges converging toward the lower end of said scoop means, a plurality of jet means inside said scoop, said jet means extending downwardly in said scoop means, discharge means connected to said scoop means, means for conducting pressure fluid to said jet means whereby the formation may be moved thereby, said scoop and discharge means cooperating to discharge such moved formation through said discharge means, said discharge means extending from its connection with said scoop means and beyond said side edges for guiding the cut formation beyond the edge of the ditch, jet nozzles adjacent said discharge means for aiding in moving formation through said discharge means, and additional means on the machine for receiving pipe to be laid in the ditch as the machine is moved along the formation.

7. A trenching machine for laying tubular members in a ditch as it is dug in a submerged surface of a water covered area including, means for supporting the machine as it moves along on the submerged surface, scoop means extending below said positioning means, said scoop means including side edges extending downwardly between said positioning means, said side edges converging

toward the lower end of said scoop means, jet means mounted in said scoop means, said jet means extending downwardly in said scoop means to cut the submerged surface to form a ditch therein, and discharge means connected to said scoop means and extending upwardly from said connection and extending outwardly beyond said side edges for conveying the cut submerged formation beyond the edge of the ditch.

8. A trenching machine for laying tubular members in a ditch as it is dug in a submerged surface of a water covered area including, means for supporting the machine as it moves along on the submerged surface, scoop means extending below said positioning means, said scoop means including side edges extending downwardly between said positioning means, said side edges converging toward the lower end of said scoop means, jet means mounted in said scoop means, said jet means extending downwardly in said scoop means to cut the submerged surface to form a ditch therein, and discharge means connected to said scoop means and extending outwardly from said connection beyond said side edges for conveying the cut submerged formation beyond the edge of the ditch, and additional means on the machine for receiving tubular members to be laid in the ditch as the machine is moved along the formation.

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