Aug. 22, 1939. R. ADLER 2,170,671

FLUME AND DITCH LINING

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Fig. 1

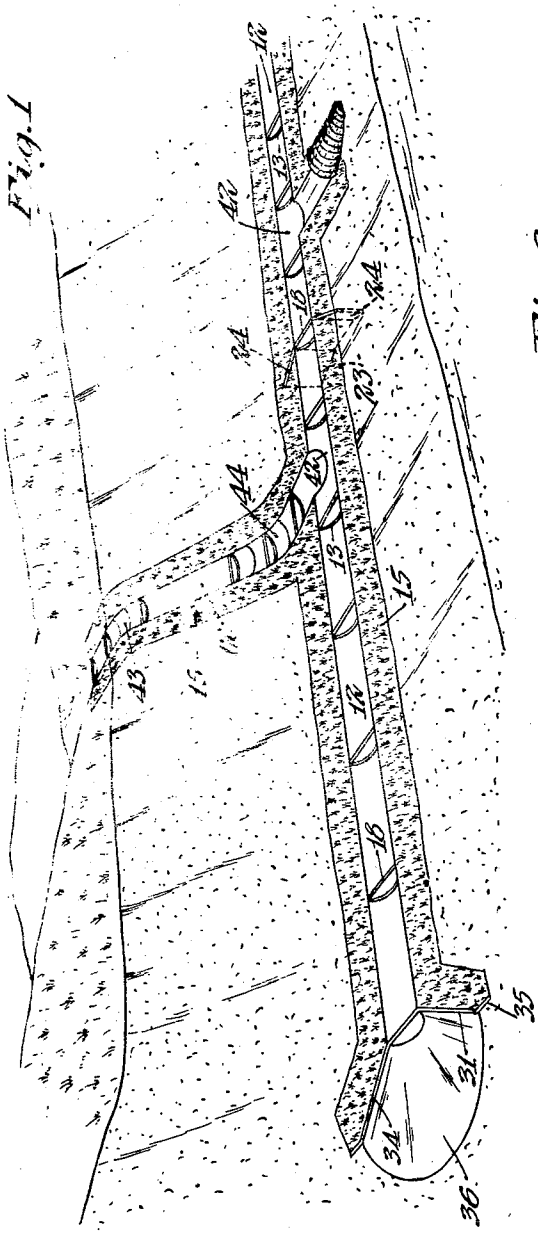


Fig. 2

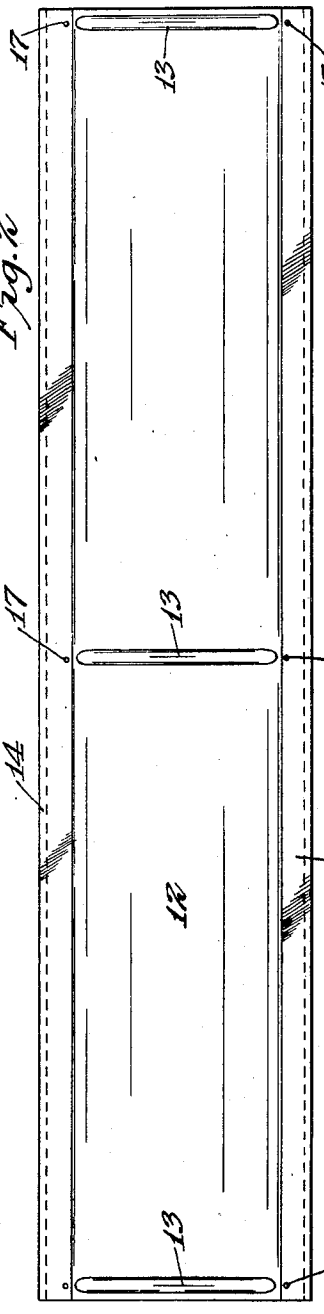


Fig. 3



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Fig. 4

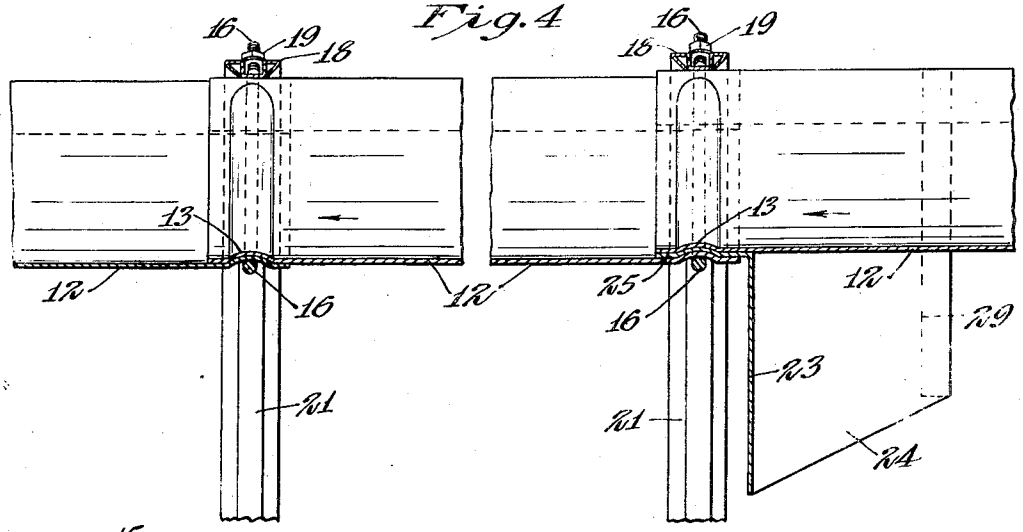


Fig. 5

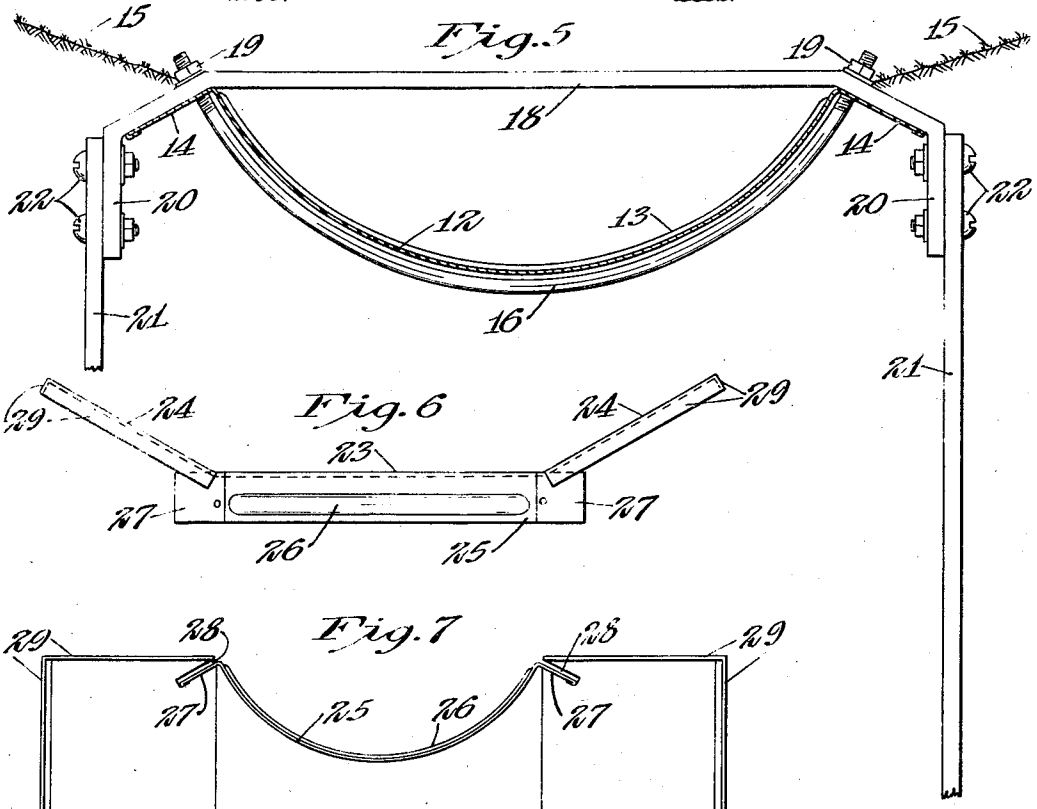


Fig. 6

Fig. 7

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Fig. 8

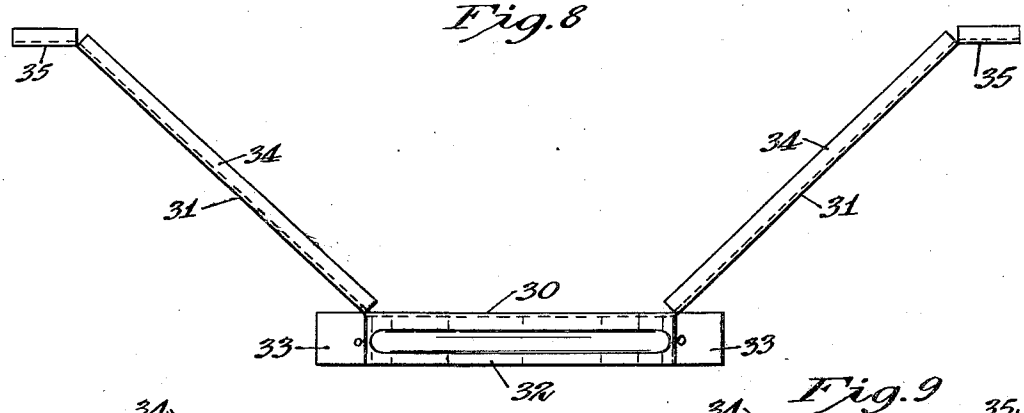


Fig. 9

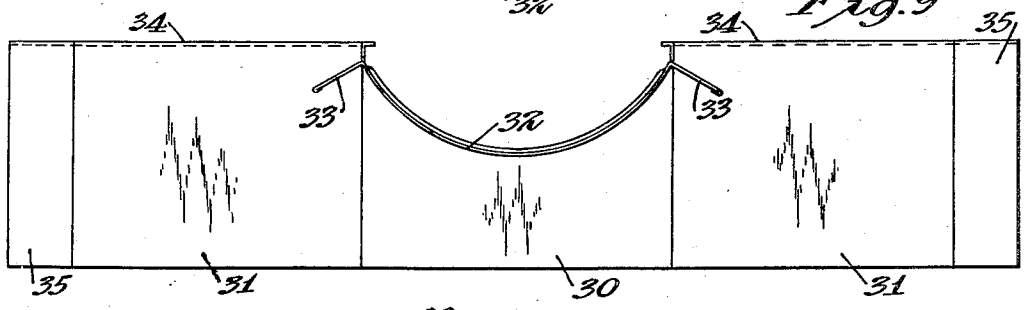


Fig. 10

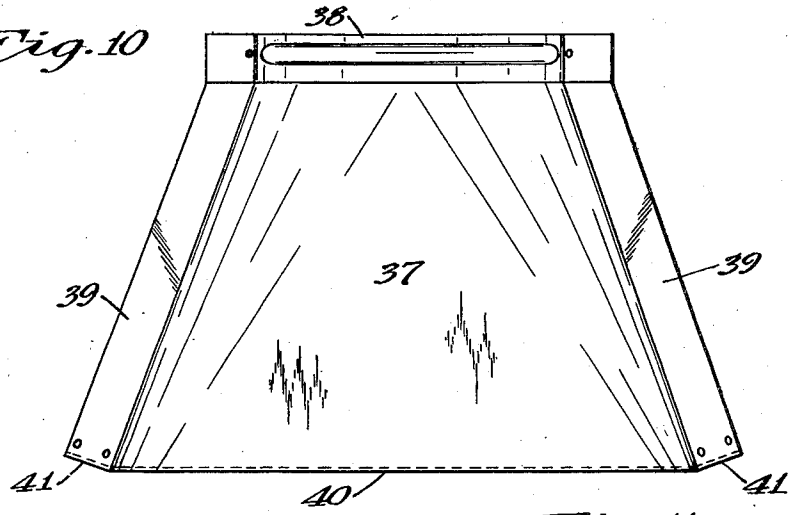
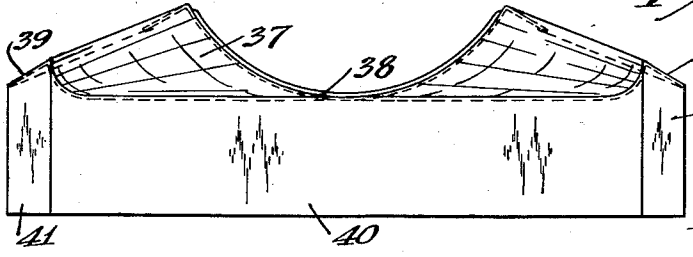


Fig. 11



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UNITED STATES PATENT OFFICE

2,170,671

FLUME AND DITCH LINING

Robert Adler, St. Paul, Minn.

Application June 18, 1938, Serial No. 214,497

8 Claims. (Cl. 61—14)

This invention relates to a sheet metal flume and ditch lining particularly although not exclusively adapted for use in controlling the flow of surface water and preventing washouts along the edges of the cuts, down the back slopes and along the ditches of newly graded roads.

It is an object of this invention to provide a novel water conduit of this class with means for effectively anchoring it in soft ground and for guarding against the undermining of the structure while directing surface water into the conduit.

Another object is to provide an open, sheet metal flume constructed in sections for convenient handling and having novel means for forming strong, water-tight joints between sections.

A further object is to provide a sheet metal flume and ditch lining with novel means for reinforcing and anchoring it at intervals.

A still further object is to provide a conduit of this class with novel inlets and outlets whereby the undermining or washing away of the soil beneath the conduit is effectively guarded against.

Other objects will appear and be more fully pointed out in the following specification and claims.

Referring to the drawings:

Figure 1 is a perspective view showing a typical arrangement of my improved flume and ditch lining on a back slope and along a ditch or cut;

Fig. 2 is a plan view of one of the straight sections of my flume;

Fig. 3 is a part side elevation and part longitudinal section of the flume shown in Fig. 2;

Fig. 4 is an enlarged longitudinal section showing typical joints, baffle wall and the reinforcing and anchoring means of my invention;

Fig. 5 is a cross section showing the flume as it is installed and before tightening of the tension rod;

Figs. 6 and 7 are plan and end views respectively of one of the baffle walls;

Figs. 8 and 9 are plan and end views respectively of one of the head walls for directing surface water into the flume, and

Figs. 10 and 11 are plan and end views respectively of one of the flaring outlet basins for the flume.

Referring particularly to Figs. 2, 3, 4 and 5, the flume proper is constructed from open channels 12 of arcuate cross sectional shape, formed at intervals with reinforcing beads 13 extending crossways. The channels are made in sections, each about ten feet in length and the curvature is such as to permit the nesting of one section in another. As best shown in Fig. 4, integral flanges 14 extend obliquely out and down from each of the longitudinal side edges of the channels 12. In use, these flanges afford baffles and anchorage, being covered by shallow fills 15 of earth which direct surface water into the channels. The extreme outer margins of the flanges 14 are preferably folded back upon the flanges for reinforcement and to eliminate excessive sharpness which might cause injury in the installation and handling of the channel sections.

Strong lap joints are formed at the junctions of the channel sections by overlapping and nesting the end beads 13 and by employing an arcuate tension rod 16 engaging the outer surface of the outer bead and confining the lap joint against a cross bar 18. Threaded ends are formed on the rod 16 and these ends are inserted through perforations 17 in the flanges 14 and project through perforations in the bar 18. Nuts 19 are tightened on the ends of the rod 16 and against the top of the bar 18 to draw the abutting surfaces of the channels 12 tightly together. The bar 18 projects obliquely downward across the upper surfaces of the flanges 14 and has downwardly projecting ends 20 for attachment to anchoring stakes 21. These stakes are driven into the ground and are secured to the ends 20 of the bar 18 by bolts 22 (Fig. 5). It will be evident that the rod 16, bar 18 and a pair of the stakes 21 extend in a common vertical plane with the beads 13 at the joint between channel sections and each channel 12 may also be reinforced and anchored intermediate its ends by a similar arrangement of arcuate rod, cross bar and stakes.

At an occasional joint along the flume, I place a baffle wall 23 (Figs. 4, 6 and 7). This wall extends vertically down from the joint and has integral wing portions 24 which project at the sides of the channels and obliquely in an upstream direction so that in the event that surface water tends to work under the side edges of the flanges 14, it is prevented from finding a channel along the flume and is directed into the flume when it meets one of these baffle walls. A short attaching strip 25, having a cross sectional shape like that of the channels 12, is welded to the upper edge of the wall 23. The strip 25 is formed with a bead 26 to fit in nesting relationship to the beads 13 of the joint and flanges 27 to overlap the flanges 14 of the channels 12. The wings 24 have slots 28 above the flanges 27 to receive the flanges 14 and these wings are also formed with laterally projecting flanges 29 along their upper and outer edges. The baffle wall is secured in place at a

joint, as indicated in Fig. 4 by confining the attaching strip 25 between the overlapping ends of the adjoining sections of the channels 12, with the tension rod 16 upon the exterior of the joint compressing the several arcuate, overlapping members together.

To direct water into the inlet end of the channel 12, I provide the head wall 30, shown in Figs. 8 and 9. This head wall is generally similar to the baffle wall 23 and has vertically extending wings 31 projecting at the side edges and obliquely in an upstream direction. An attaching strip 32 similar to the strip 25 is welded to the upper edge of the wall 30 and has integral flanges 33 perforated to receive the ends of one of the tension rods 16. The wings 31 have horizontal flanges 34 along their upper edges and vertical flanges 35 integral with their outer edges and extending perpendicular to the axis of the flume. The head wall is joined to the receiving end of one of the channels 12, as indicated in Fig. 1, and to further aid in directing water into the flume, a fan-shaped apron 36, preferably constructed from asphalt, is formed between the wings 31 and adjoining the outer, end surface of the head wall.

As shown in Figs. 10 and 11, I provide a flared outlet basin 37 constructed from sheet metal and having an integral strip 38, like the attaching strips 25 and 32, for securing the basin 37 to the outlet end of the flume. Flanges 39 project obliquely down and out from the side edges of the basin 37 and along the outlet extremity of this basin is a baffle wall 40 having wing extensions 41 to anchor the end and guard against the washing away or undermining of the earth beneath the apron. As shown in Fig. 1, to afford branch connections with the straight, main portion of the flume, I provide T-shaped sections 42 of the channel. Y-shaped, but otherwise similar, branches, not shown, are also provided for obliquely extending branch connections. To make the necessary connections at the top and bottom of a back slope or shoulder, elbow sections 43 and 44 are provided, respectively of longitudinally convex and concave shape.

In installing my improved flume, the ditch or other location is shaped to approximately the shape of the flume so that the side edges of the latter are at about the level of the ground or slightly below the surrounding ground. The flume is assembled in the ditch and the arcuate tension rods 16 are then placed and inserted in the perforations 17 and the cross braces 18 are attached and clamped by applying and tightening the nuts 19. As the next operation, stakes 21 are driven into the ground and bolted to the cross bars 18. Similar rods and brace bars 18 are employed in fastening the baffle walls 23, head walls 30 and outlet basins 37 to the appropriate sections of the channels 12. Upon the tightening of the nuts 19 the several joints are made fast and water-tight. Finally the back fills 15 are formed on the flanges 14 and 39.

These flanges along the side edges of the channels 12 afford wide shoulders or shelves to receive the fills 15, which are preferably sodded to retain them in place and to insure the prompt run-off of surface water into the flume. The baffle walls 23 may be placed at suitable intervals of from about ten to eighty feet. These baffle walls should be placed on the upper surfaces of the lower sections at the joints so that the upper sections may be placed in position easily and the joints completed by employing the tension rods 16. The top or overlapping channel section is applied over the tension rod so as to afford the necessary downstream lap. The brace bars 18 are constructed from heavy gauge sheet steel, rolled to give adequate rigidity and to provide the flat bearing surfaces for the flume and stakes. The latter may have a similar cross-sectional shape.

My improved flume and ditch lining has been found to be unusually effective in controlling the flow of water along newly graded roads and requires very little maintenance or repair work because of my improved means for preventing washouts or undermining at the several points where this is likely to occur under the various conditions found in practice. It will be noted that the flume proper has no perforations for bolts or other fastening means in the path of the water along the flume and water-tight joints are formed between sections by pressing the overlapping members together tightly in the embrace of the tension rods 16. By minimizing perforations, I guard against much of the usual deterioration from corrosion and rusting of the metal around the bolt holes which cannot, except at great expense, be protected by galvanizing, as in the case of the main surfaces of the sheet metal. My arrangement of the tension rods 16 secures the further important advantage of greatly facilitating the work of making the connections at the outer and lower surfaces which are inaccessible for the application of ordinary fastening means.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A flume for conducting surface water comprising, an open channel formed from sheet metal, integral flanges extending continuously from end to end of said channel and projecting substantially below and from the side edges of the same to be imbedded in the earth, said flanges being of such width and sufficiently imbedded to prevent the undermining of said channel by surface water and means for anchoring said channel in the earth.

2. A flume for conducting surface water comprising, an open channel formed from sheet metal, integral flanges extending continuously from end to end of said channel and projecting obliquely down and laterally from the side edges of the same to be imbedded in the earth and to direct water into said channel and means extending across said channel and downward at the sides thereof for anchoring it in the earth.

3. A flume for conducting surface water comprising, an open channel formed from sheet metal, integral flanges extending continuously from end to end of said channel and projecting laterally out and down from the side edges of the same to be imbedded in the earth and affording a baffle to guard against the undermining of the channel, rigid bars engaging the top of the channel and flanges, means securing said flanges to said bars and means for anchoring said bars in the earth.

4. A flume for use in newly graded earth comprising, an open channel formed from sheet metal, integral flanges extending continuously from end to end of said channel and projecting from the side edges of the same to be imbedded in the earth, rigid bars engaging the top of said channel at intervals and anchoring stakes driven into the earth and secured to said bars.

5. A flume for use in newly graded earth comprising, an open channel formed from sheet

metal, integral flanges extending continuously from end to end of said channel and projecting laterally from the side edges of the same to be imbedded in the earth, longitudinally spaced beads extending across said channel, rigid bars engaging the top of said channel above said beads and anchoring stakes driven into the earth and secured to said bars.

6. In a flume of the class described, open, channel-shaped, sheet metal sections having overlapping ends, flanges extending along the side edges of said sections to be imbedded in the earth said flanges projecting down and laterally from the upper edges of said sections, and means for securing said sections together at their junction comprising, a tension rod embracing the outer surface of the joint, a rigid bar extending across the top of the sections at the joint, said bar being perforated to receive the ends of said rod and means for tensioning said rod in engagement with said bar and with the overlapping ends of said sections.

7. A flume for conducting surface water comprising, an open channel of laterally arcuate shape formed from sheet metal, integral flanges extending continuously along the side edges of said channel to be imbedded in the earth, inwardly projecting beads formed in said channel and extending across the same, rigid bars engaging the top of said channel, severally above said beads, tension rods embracing the channel in the several beads, said flanges and bars being perforated to receive the ends of said rods, means engaging said bars for tensioning said rods and anchoring stakes secured to said bars.

8. In a flume, an open sheet metal channel formed with flanges extending continuously along the side edges thereof to be embodied in the earth, a baffle wall formed from sheet metal and projecting down into the earth beneath said channel and across the same, said wall having an upper edge fitting the bottom of the channel, means securing said edge to the channel and wing portions of said wall projecting from the side edges thereof and obliquely from the sides of said channel to guard against the undermining of the channel by surface water, said wing portions projecting above said flanges on the channel and being slotted to receive said flanges.

ROBERT ADLER.