June 9, 1931. D. T. FINKBEINER 1,809,513

METHOD OF CONSTRUCTING CULVERTS

Filed April 2, 1927

Fig. 1.

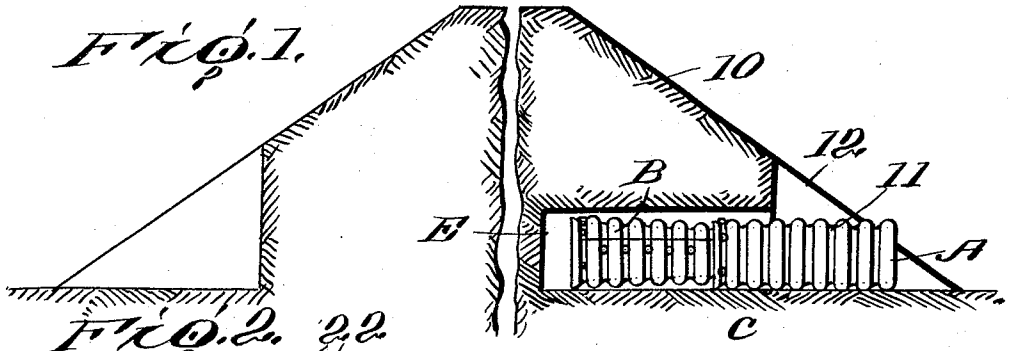


Fig. 2.

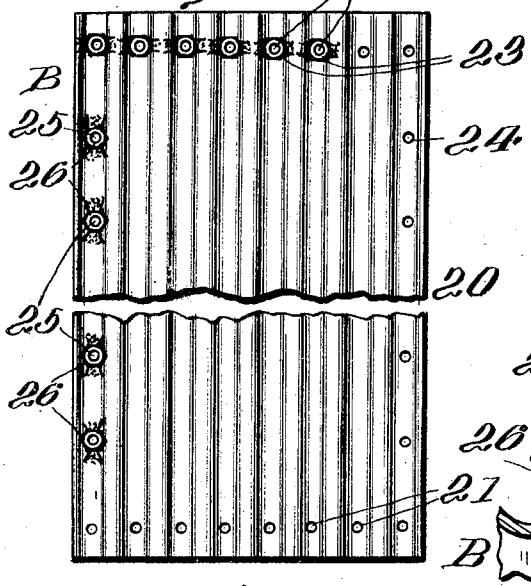


Fig. 3.

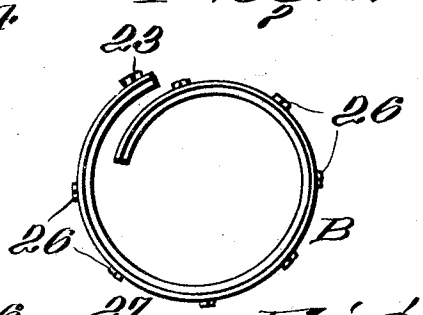


Fig. 5.

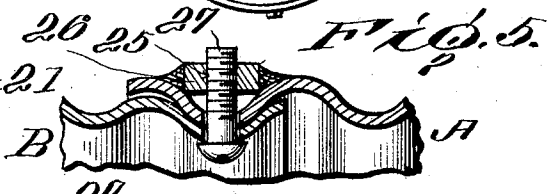
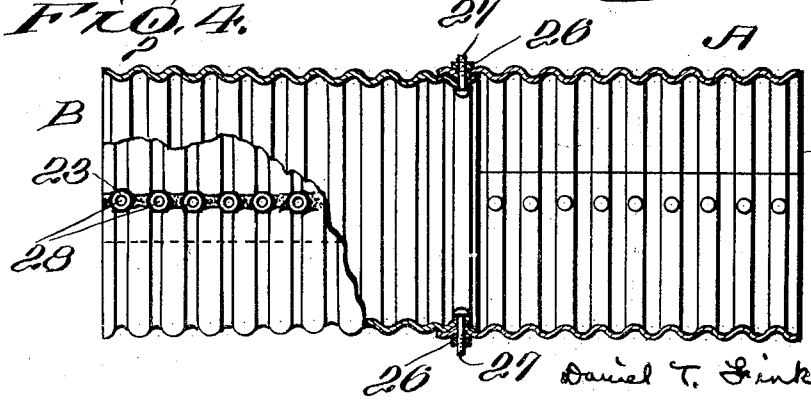


Fig. 4.



Inventor

Daniel T. Finkbeiner

By Wm. E. Hodges

Attorney

Patented June 9, 1931 1,809,513

UNITED STATES PATENT OFFICE

DANIEL T. FINKBEINER, OF BEAVER, PENNSYLVANIA

METHOD OF CONSTRUCTING CULVERTS

Application filed April 2, 1927. Serial No. 180,492.

This invention is a method of constructing culverts or the like, from corrugated or similar piping.

In the method of "jacking" culverts through an embankment, pipe units varying in length from eight to twenty feet are generally employed. In practice, the earth of the embankment is first excavated a sufficient distance to permit a pipe unit of the desired length to be "jacked" into the opening. When the first unit has been positioned, a second unit is joined thereto, and after the excavation has been extended, the lengthened culvert is again "jacked", and so on until the culvert extends entirely through the embankment. To successfully carry out this operation it is necessary to have the various pipe units specially prepared, and carefully matched and punched at the point of fabrication, so that when said units are to be coupled, they may be readily riveted together in the field. That is, a pipe unit is made up of a series of pipe sections, riveted together end for end, but the ends of two pipe units which are to be telescoped for "jacking" purposes must be very carefully matched, so that the field man may match and field rivet the units together as they are needed.

One of the objects of the invention is to provide a method which avoids the use of jacks, jack supports, joint riveting trenches, dirt accumulation trenches, and practically all of the trench timber work commonly employed in the "jacking" method. A further object is to provide pipe sections so constructed that each one may be collapsed and passed through a pipe section which has already been positioned within an excavation, and then united to said last mentioned pipe section in an efficient manner.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings:—

Figure 1 is a diagrammatic view illustrating the method of constructing a culvert in accordance with the invention. Figure 2 is a view illustrating a pipe section for culvert purposes, prior to being shaped into the desired cylindrical form. Figure 3 is a view of the same blank after shaping. Figure 4 is a longitudinal sectional view illustrating the method of joining two adjacent sections end for end. Figure 5 is a detail sectional view illustrating the method of securing the ends of the culvert sections together.

Referring to the drawings, 10 designates an embankment through which it is desired to "jack" a culvert, 11 the approach trench, 12 the excavation for the culvert. The culvert is indicated as a whole at C, being made up of a plurality of corrugated pipe sections joined end for end in a manner to be later described.

Each pipe section is made up of a rectangular blank 20 adapted to be rolled into approximately cylindrical form, as illustrated in Figure 3. The longitudinal edges of the blank are designed to overlap, and are provided with openings 21 and 22 respectively, adapted to register with each other, said openings 22 coinciding with bosses 23, which are internally threaded. The bosses may be constructed in any desired manner, but a simple way is to spot weld internally threaded nuts of the proper bore, to the top surface of the blank and in register with the openings, said nuts being positioned in the valleys of the corrugations. The ends of the blank are also provided with annularly arranged openings 24 and 25, respectively, said openings 24 on one blank being positioned to register with correspondingly positioned openings 25 of an adjoining blank. The openings 25 are provided with external bosses 26, similar to the bosses 23.

In practice, the first section A of the culvert is preferably constructed with its longitudinal edges permanently riveted together in the usual way, one end being provided with the annularly arranged openings 25 having bosses 26. The section thus provided is laid in the approach trench 11, with the end having the openings 25, shoved up to the face E of the embankment. After the section A has been positioned an excavation 12 is started, the same being circular in shape and just a little larger than the outside diameter of the pipe. This excavation,

subject to modification due to any instability of the embankment, is continued to a distance corresponding to the approximate length of the pipe section A. A section B, similar to that illustrated in Figure 3, is then contracted in diameter by suitable means, and while retained in said contracted relation is passed or carried through the section A and projected into the extended excavation 12, until the openings 24 are opposite the openings 25 of said section A. The said section B is then allowed to expand, the expansion, however, being limited by reason of the rear end of section B being enclosed within the contiguous end of section A. The openings 24 and 25 are brought into register and a workman then enters the culvert and connects the telescoping ends of the two sections together by means of screws 27, passed through the registering openings 24 and 25 and engaging the threaded bosses 26. After this is done, the longitudinal edges of section B are also permanently united by means of screw 28 passed through the registering openings 21 and 22, respectively, and engaging the bosses 23. The excavation E is then lengthened a distance corresponding to the length of another pipe section, and a new pipe section is then collapsed and passed through the sections A and B and secured to the forward end of section B in the same manner that section B was attached to section A. These foregoing steps are continued until the excavation E extends entirely through the embankment and a culvert of the proper length has been built up within said excavation.

The advantages of the invention will be readily understood by those skilled in the art to which it belongs. For instance, the method of excavating ahead and attaching each new section of the culvert to the forward end of the pipe which has already been positioned, avoids the limitations in the working length of a culvert to be installed by the "jacking" method, because in the last mentioned method the entire culvert must be moved as it is built up. Obviously the method can be used to advantage in laying new sewers and the like, or replacing broken or worn out ones, particularly where they are located under streets, which may not be excavated without producing serious traffic problems. It is particularly economical for working through railroad embankments or in deep cuts, and subject to the necessary modifications of tunnel methods, air, etc., is equally applicable for underwater operations.

Having thus explained the nature of the invention and described an operative manner of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the forms of its use, what is claimed is:—

1. The method of constructing culverts and the like comprising forming a pipe of a plurality of sections, each pipe section after the first one laid being first contracted to less than normal diameter so as to maintain an expansible tension thereon, and while so contracted being passed through the previously laid sections and then allowed to expand under its natural expansible tension to its normal diameter, and finally securing one end of each expanded sections to a contiguous end of the last previously laid section.

2. The method of constructing culverts and the like comprising forming a pipe of a plurality of sections, each pipe section after the first one placed in position being first contracted to less than normal diameter so as to maintain an expansible tension thereon, and while so contracted being passed through the previously laid sections and then allowed to expand under its natural expansible tension to its normal diameter, with its rear end located within the forward extremity of the last previously laid section so as to place them in telescoping engagement, and finally rigidly connecting said ends.

3. The method of constructing culverts and the like comprising placing a pipe section in the desired position, making a tunnel-like excavation in the earth in advance of said section and in alignment therewith, contracting an additional pipe section to less than its normal diameter so as to maintain an expansible tension thereon, and while so contracted passing it through the first section and then allowing it to expand under its natural expansible tension to its normal diameter, and finally securing the adjacent ends of said sections.

4. The method of constructing culverts and the like comprising placing a pipe section in the desired position, making a tunnel-like excavation in the earth in advance of said section and in alignment therewith, contracting an additional pipe section to less than its normal diameter so as to maintain an expansible tension thereon, and while so contracted passing it through the first section and then allowing it to expand under its natural expansible tension to its normal diameter, and with its rear end positioned within the forward end of said first section, and finally securing the telescoped ends of said sections together, said securing operations being performed from positions within the sections.

In testimony whereof I have hereunto set my hand.

DANIEL T. FINKBEINER.