

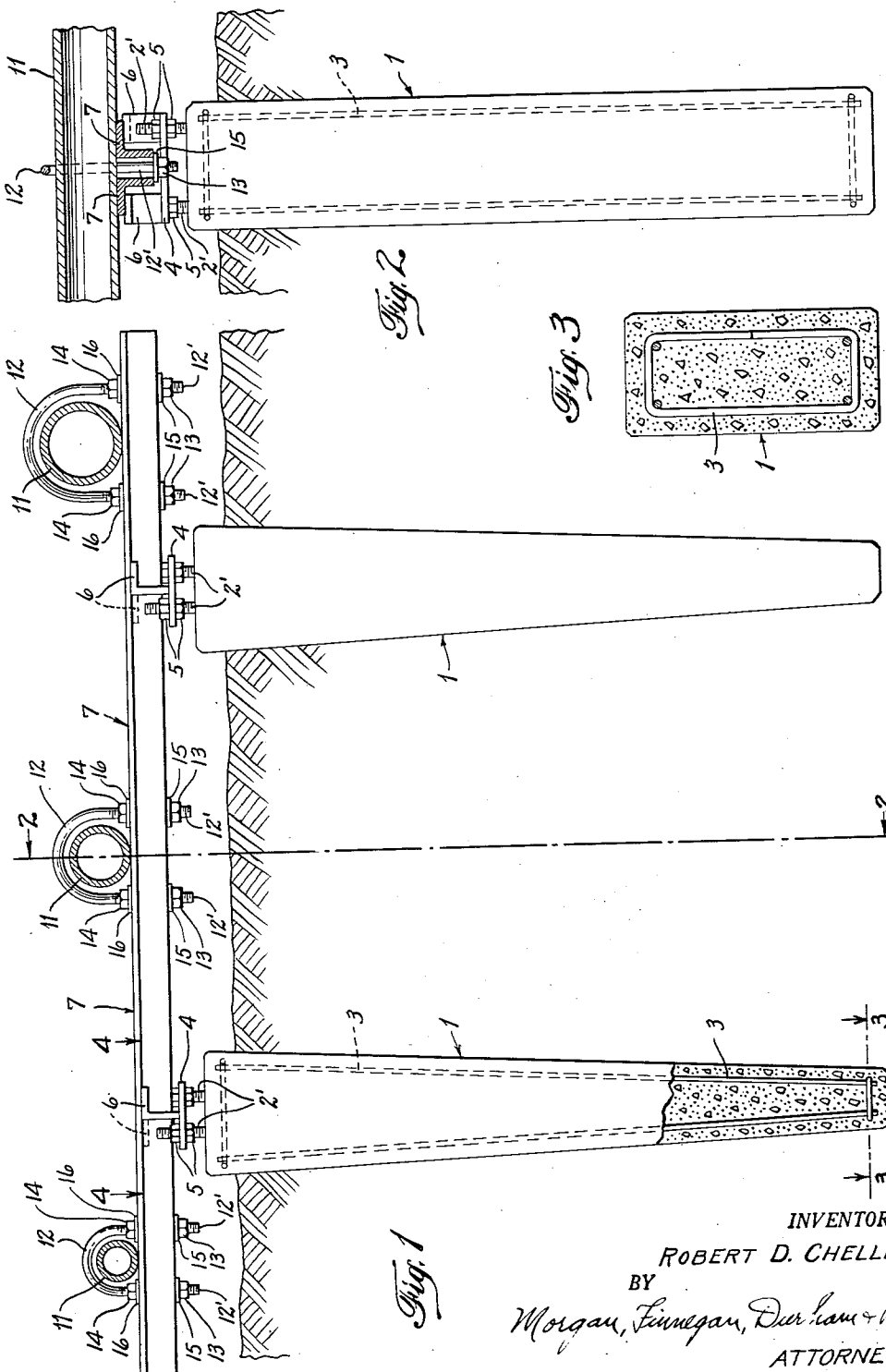
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R. D. CHELLIS
PIPE SUPPORT STRUCTURE

2,765,135

Filed April 16, 1953

2 Sheets-Sheet 1



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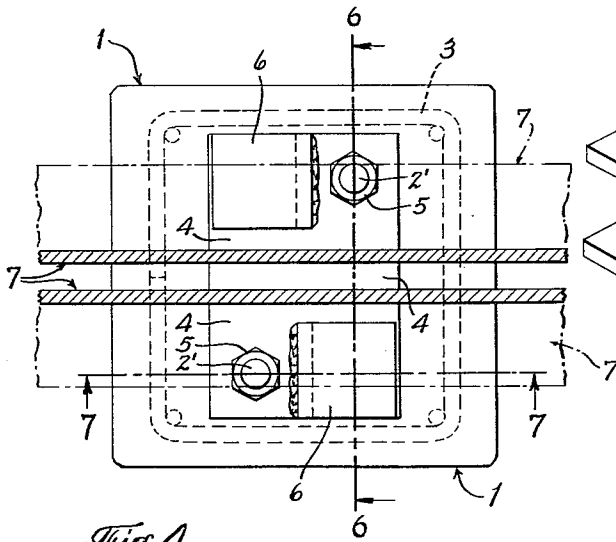


Fig. 4

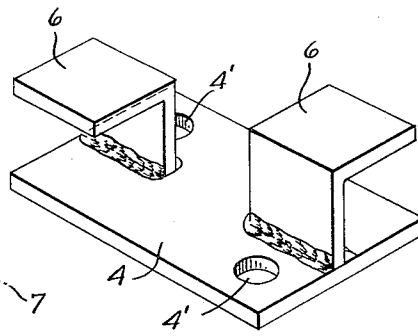


Fig. 5

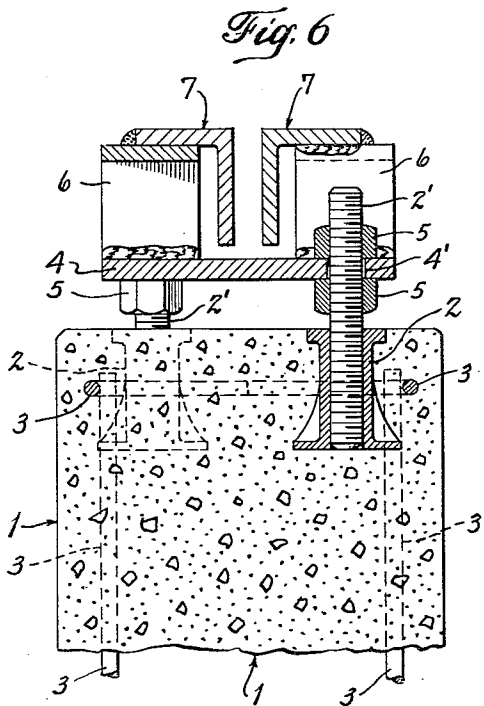


Fig. 6

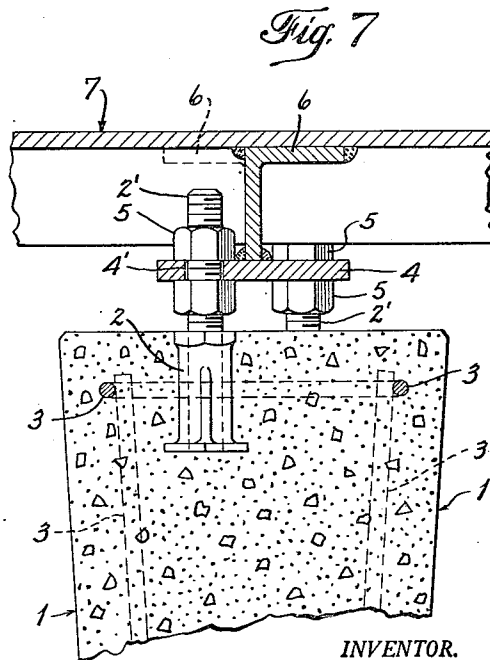


Fig. 7

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PIPE SUPPORT STRUCTURE

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8 Claims. (Cl. 248—49)

This invention relates to the supporting of pipes and bands of pipe lines such as are used to convey petroleum, chemicals and the like and relates more particularly to certain new and useful improvements in supporting structures for such pipes and bands of pipe lines.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

Present common practice is to employ elevated structural steel framework resting on foundations or to employ poured-in-place concrete footings or sleepers, for supporting bands of pipes. Exact location of the piping must be known prior to construction of the support structure, which necessitates manufacture and fabrication of a substantial portion of the structure in situ. In addition, respacing and relocation of the pipes, or their replacement with new pipe, etc., can only be accomplished by substantial changes of the framework or footings, or both, of the supports.

Speaking generally, the present invention provides support structure for bands of pipes enabling a portion of the labor of constructing the structure to be done in advance of knowledge of exact location of piping, and enabling a reduction in quantities of construction materials and cost.

Conventionally, the supports for a band of pipes are located successively at regular intervals along the line of pipe and, in accordance with this invention, each such support for a band of pipes comprises a set of short posts or piles, advantageously in the form of pre-cast concrete posts, and a cross-head horizontally spanning the posts carried by brackets mounted at the post tops in vertically adjustable relation thereto.

The piles or posts can be pre-cast, brackets fabricated, and cross-head members delivered to the site of the work before exact locations of pipes are known. By cutting cross-head members to any desired lengths at the site of the work, any required length of support can be obtained. By spacing the posts so that the cross-head spans the posts and cantilevers at its ends over the posts, the bending moment of the cross-head can be reduced, thus reducing the size required.

Advantageously, the posts or piles are arranged in pairs and are adapted to be driven vertically into the ground spaced apart one from the other at the site where pipes of the band are to be supported. Advantageously, they can be constructed elsewhere and need not be fabricated in situ. Each post of a support is provided at its top with adjustable means for supporting its cross-head supporting bracket in vertically adjustable relation to the post top. The cross-head is fixedly secured to these brackets. By reason of the adjustable bracket supporting means, all the brackets of a support may be brought to a common level with each other and with those of other supports of the system. Each cross-head spans the space

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between adjacent posts of the support and, as noted above, preferably extends cantilever-fashion beyond the posts at its ends.

Preferably, the cross-head comprises two separate parallel elongated structural members each separately secured to and supported by the respective brackets of the support in suitably spaced relation to each other so as to provide space therebetween down through which suitable pipe guiding and securing means passing over the tops of the pipes extend and are secured to the cross-head members. Each bracket is preferably fashioned to provide separate bracket arms forming horizontal coplanar shelf portions for separately supporting the respective cross-head members in the desired spaced horizontal relation. Preferably also, each cross-head member is a structural steel angle bar having two legs at right angles to each other, one leg being horizontally disposed and fixedly supported on one of the bracket shelf portions, and the other leg extending vertically downwardly between said shelf portions in opposing suitably spaced relation to the corresponding vertical leg of the other cross-head member.

The pipe guiding and securing devices are each preferably semi-circular bent rods passing over the tops of the pipes and extending downwardly through the space between the component parallel cross-head members, to which the bent rods are secured as by means of washers and nuts located above and below the cross-head.

In the accompanying drawings which form part of the instant specification and are to be read in conjunction therewith,

Fig. 1 is a view in front elevation of an illustrative embodiment of a pipe band support in accordance with this invention;

Fig. 2 is a view in section taken along the line 2—2 of Fig. 1;

Fig. 3 is a view in section taken along the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary view in section taken along the line 4—4 of Fig. 1;

Fig. 5 is a view in perspective of a cross-head supporting bracket of the embodiment of Fig. 1;

Fig. 6 is a somewhat enlarged fragmentary view in section taken along the line 6—6 of Fig. 4 showing the manner in which the component cross-head members are supported on the bracket; and,

Fig. 7 is a somewhat enlarged fragmentary view in section taken along the line 7—7 of Fig. 4.

Referring now to the illustrative embodiment of the invention shown by way of example in the drawings, the pipe band support there depicted comprises two pre-formed concrete posts or piles driven into the ground and designated generally by the numeral 1. The posts 1 are wedge-shaped (Fig. 1) to facilitate their installation and have internally threaded inserts 2 embedded in their heads. Each post has an internal reinforcing cage 3 composed of reinforcing bars.

I prefer to cast these posts on their sides on a large form bed (not shown), with narrow and wide ends of the posts alternating, and with the posts separated by forms. The form bed may be readily constructed out of planking cut to the required dimensions, the form bed being set up lengthwise horizontally with its upper side open for the entrance of concrete. The reinforcing cage 3 is placed in each section of the form bed before the concrete is poured, as is a pair of threaded inserts 2 for each post for later attachment of a cross-head supporting bracket by means of stud bolts 2' and nuts 5, and for use for insertion of a temporary lifting eye bolt (not shown) or for use in lifting by one or two of the stud bolts 2'. After one layer of posts has been poured, tar paper or other medium to prevent adhesion of concrete

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is placed thereon, and another layer of posts is cast, and so on as desired. Advantageously, this forming operation may be carried on at some place other than where the pre-formed posts are to be used.

The posts 1 are set in position on the site where the pipe is to be supported and are driven, by a mechanical hammer operated by steam, compressed air or Diesel fuel, into the ground. The hammer may be suspended from a movable crane which can also be used for handling the posts.

A supporting bracket comprising a base 4, having holes 4' to receive stud bolts 2', is set over the studs 2' carried by each post 1. The nuts 5 are threaded to the bolts 2' at the upper and lower sides of the bracket base 4. The lower pair of nuts 5 are used for leveling the supporting bracket to the desired elevations. The upper pair of nuts 5 are used for holding the brackets securely in position after tightening them.

A pair of bracket arms 6 are fixedly mounted by welding on each bracket base 4. The arms 6 of each set are mounted spaced apart one from the other and, preferably, aligned perpendicularly to the line running between posts 1 (see Fig. 4). Preferably, they are identical angle irons disposed each with a vertical leg welded to the bracket base 4 and the other leg extending horizontally to provide co-planar shelf portions.

A cross-head comprised of two cross-head members 7 is fixedly mounted on the sets of bracket arms 6, the members 7 extending in spaced parallel relation one to the other from post to post and spanning the space therebetween. Each cross-head member 7 is a structural steel angle and is mounted with one leg extending vertically downwardly into the space or slot formed by the gap between the bracket arms 6. The other or horizontal leg of each cross-head member rests on the horizontal leg of the adjacent bracket arm 6 of each set of brackets and is welded thereto. The cross-head members 7 are disposed back-to-back with their vertical legs spaced apart one from the other a sufficient distance to permit pipe-guiding and securing means to pass therebetween.

The cross-head members 7 span the space between the posts 1 and preferably extend outwardly therefrom beyond the points of support on the bracket arms 6 in cantilever fashion. This preferred form of the invention reduces the bending moment created in the cross-head member by load stresses in carrying the pipe or pipes, permitting a reduction in the size of angles and weight of materials used, and thus facilitating efficient and economical construction.

Pipes 11 are held in proper position on the cross-head by clamp or other suitable pipe-guiding and securing means which, as here preferably embodied, comprise semi-circular fasteners in the form of bent rods 12, each overlying the pipe and having two straight legs 12' of sufficient length to extend downwardly into the slot or space between the vertical legs of the parallel cross-head members 7. Each of the legs 12' is threaded and, as shown, extends below the cross-head. The rods 12 are tightly fastened to the cross-head members 7 by two pairs of nuts 13 and 14, respectively, set against two pairs of washers 15 and 16, respectively, located one nut and washer above, and one nut and washer below, the cross-head members 7 on each leg 12' of the bent rod 12, as shown in Fig. 1, the washers 14 and 15 spanning the space between the vertical legs of the cross-head members 7. By turning the nuts 13 tight against the washers 14, the legs 12' are held against movement within the space between cross-head members 7 and are fastened thereto.

Thus, each pipe 11 to be carried rests on the cross-head members 7 and is adjustably held against movement thereon by the bent rods 12.

With this arrangement, all of the various parts making up the structure can be manufactured and fabricated

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prior to determination of the exact location of the pipe or pipes to be carried. The structure may be assembled rapidly on the scene, the pre-formed concrete posts 1 being spaced and the length of cross-head members 7 being cut to any desired length for the requirements of the particular location and number of pipes to be carried.

The cross-head members 7 and the pipes supported thereon may be leveled expeditiously at the desired elevation by manipulation of nuts 5 upwardly or downwardly to raise or lower the bracket base member 4 and its integral arms 6.

If, thereafter, it is desired to replace the pipe, the pipe in place is released from loop rod fasteners 12 by backing the nuts 13 off the legs 12', whereupon the fasteners may be withdrawn and the new pipe installed after removal of the old. Also, if it is desired to relocate the pipe on the cross-head members 7, the nuts 13 are similarly backed off and rods 12 can be shifted in position longitudinally on the cross-head. It is preferred that some of the pipes carried be located on the cantilever extending portions of the cross-head members (see Fig. 1) as I find that this results in minimum stresses and bending moments in the structure.

It should be understood that the invention is not limited to the details described and shown in the drawing, except as appears hereafter in the claims and that references in the claims to elements making up the invention are intended to include their equivalents as well.

What I claim is:

1. A supporting structure for bands of pipes comprising pre-formed concrete posts spaced apart one from the other and each disposed vertically; a bracket mounted on each said post for adjustable vertical movement relative thereto, each said bracket comprising a base member and a set of two bracket arms fixedly mounted thereon in spaced apart relationship; and a cross-head comprising two longitudinally parallel structural members spanning the space between said posts to carry the pipe, said structural members respectively being fixedly mounted on corresponding bracket arms of said brackets and each having a vertical leg extending downwardly into the space between the bracket arms of each said set; and, pipe-guiding and securing means releasably clamped to said structural members.

2. The subject matter of claim 1 characterized by the fact that each bracket arm is an angle having a vertical leg and a horizontal leg, the bracket arms being mounted at the bottom of their respective vertical legs to their respective base members and the structural members resting on the horizontal legs of said bracket arms, said horizontal legs providing co-planar horizontal shelf portions.

3. The subject matter of claim 2 characterized by the fact that said structural members are disposed with their vertical legs spaced apart one from the other to provide a clamping slot therebetween, and said pipe-guiding means including at least one semi-circular rod fastener adapted to over-lie the pipe having legs to fix the fastener against movement on the structural members, said fastener legs extending downwardly into the space between the vertical legs of the structural members, and adjustable holding means for releasably securing the legs to said structural members.

4. The subject matter of claim 3 characterized by the fact that the two structural members overhang at least one of the posts in cantilever fashion to reduce bending moments in the structural members.

5. A supporting structure for bands of pipes comprising support piles or posts spaced apart one from the other and each disposed vertically; a bracket mounted on each post, said brackets each having a base member and having supporting arms fixedly mounted thereon spaced from each other; a cross-head comprising separate elongated pipe-supporting members each having a pipe supporting arm portion and having a mounting leg extending into

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the space between the supporting arms of each bracket, said pipe-supporting members being fixedly mounted on said supporting arms in spaced relation to each other and spanning the space separating said posts to support the pipe; and, pipe-guiding and securing means traversing the space between said pipe-supporting members and releasably clamped to said pipe-supporting members.

6. A supporting structure in accordance with claim 5 wherein the bracket is mounted on each post for adjustable vertical movement relative thereto.

7. A supporting structure in accordance with claim 5, wherein each bracket is mounted to each post by a hollow insert member positioned in the top of each post, a column member for each said insert member releasably secured therein, and mounting means adjustably securing each bracket to each column member.

8. A supporting structure as in claim 7, wherein said

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hollow inserts are internally threaded and said column members are stud bolts threadedly received within said inserts, and said mounting means comprises nuts threadedly engaging said stud bolts above and below the brackets.

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