

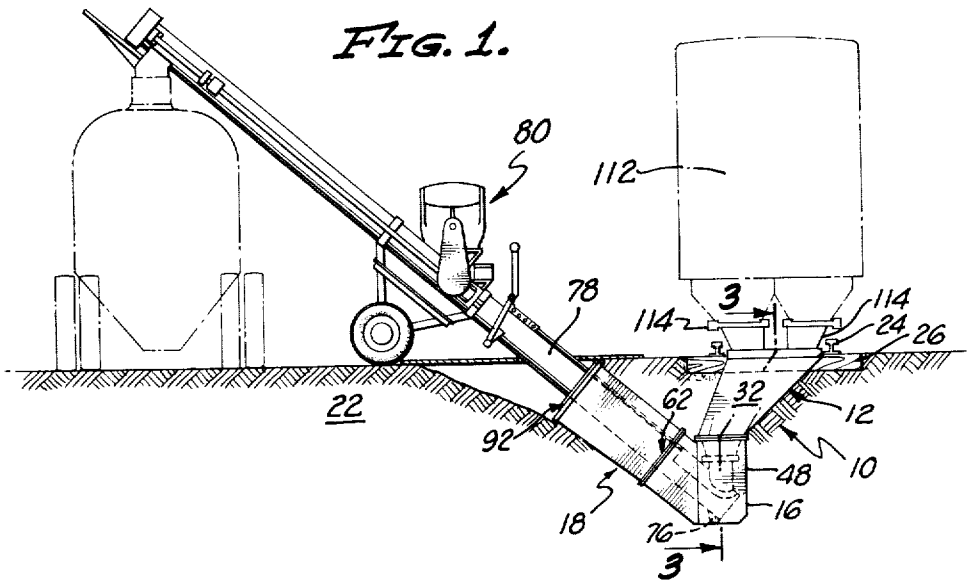
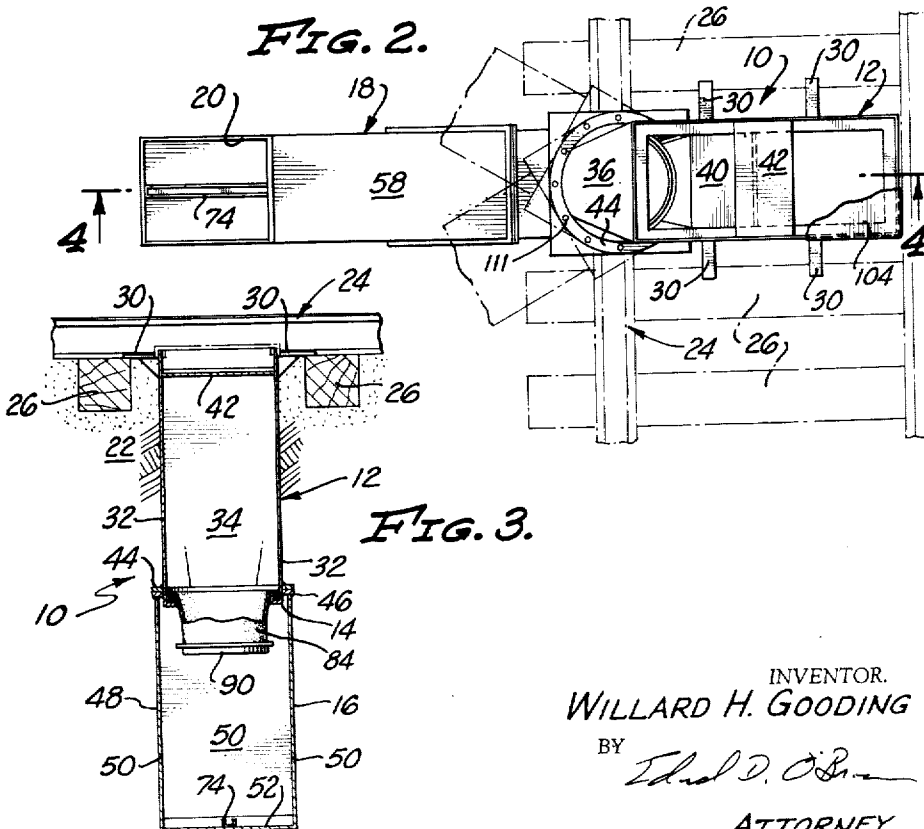
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W. H. GOODING  
PIT STRUCTURES

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2 Sheets-Sheet 1



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1

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## PIT STRUCTURES

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This invention pertains to pit structures for use in conjunction with other equipment in transferring bulk quantities of granular materials from railroad cars.

Because of cost considerations whenever possible granular materials are shipped in bulk quantities such as, for example, in railroad carload quantities. By this procedure the cost of a plurality of individual containers such as sacks is eliminated from the cost the consumer must pay for such materials. Unfortunately past equipment utilized for transferring bulk quantities of materials from railroad cars has, as a general rule, either been relatively expensive to own or to operate.

It has been discovered that material cost saving can be achieved in transferring bulk quantities of granular materials from railroad cars to trucks or the like through the use of portable unloading structures as defined in the copending application, Serial No. 816,921, filed May 27, 1959. These structures are considered very efficient for the purpose intended. Commercially, however it is believed that these structures are limited to what may be termed "job site" utilization because of certain financial considerations.

Each of the unloaders described in this co-pending application includes a conveyor mechanism upon one extremity of which there is mounted an especially designed hopper. These unloaders are constructed in such a manner so that a pit may be dug beneath a railroad track and so that such a hopper and a part of the attached conveying mechanism may be inserted within such a pit generally beneath a space normally occupied by a railroad tie. When unloaders as defined in this prior, co-pending application are positioned in this general manner they may be operated so as to transfer granular material from a railroad car to a truck at a very nominal cost. Because of the manner in which the unloaders described in this co-pending application are constructed they can be used to transfer such materials substantially irrespective of the nature of the terrain adjacent to a railroad track.

The steps in installing an unloader as described in the aforementioned application are sufficiently time consuming and expensive in character so that it is not particularly economically advantageous to install an unloader in order to transfer only one or a comparatively few carloads of granular material. If only such a comparatively small quantity of bulk material is to be handled at a time with this type of unloader it is either necessary to leave the complete unloader in a desired operative position or to dig part of the unloader out of the pit in which it is located and then to fill up this pit and replace the railroad tie which was removed during its installation. Both of these alternatives are disadvantageous.

The latter is disadvantageous because of the costs involved, not only in the removal of a specific unloader but in the subsequent relocation of the same or another unloader in the identical location at a future date when it may again be desired to transfer material from a railroad car. The former of these options involving leaving an unloader in a given position is undesired because of danger of damage to the unloader when it is left unattended, and because of the fact that various individuals, such as children, may play upon such equipment and become injured. Economically this former option

2

is also objectionable because it renders the specific unloader involved immobile and, thus, prevents its being used at another location.

An object of this invention is to provide a new and improved pit structure which is adapted to be permanently located generally beneath a railroad track in the space normally occupied by a railroad tie. A further object of this invention is to provide a pit structure of this character which may be permanently left in place in the ground between periods when it is used, and during which is adapted to be covered so that it cannot constitute a so-called "attractive nuisance" type of hazard when it is not being used. A more important objective of this invention is, however, to provide pit structures which are adapted to be permanently installed in locations as are indicated in the preceding and which are designed so as to be used in connection with portable unloading structures of the type set forth in the aforementioned co-pending application or of other types whenever it is desired or is necessary to handle bulk quantities of granular material from a railroad car.

This latter objective of this invention is very important to the economics of providing equipment for handling bulk quantities of granular material. A pit structure of the present invention is a comparatively inexpensive piece of equipment. Because of this it may be left beneath a railroad track for a comparatively long period without any serious cost disadvantage being encountered. It is considered that from the long-range viewpoint it is normally much less expensive to leave a pit structure of the present invention in place beneath a railroad track where it is ready to be used at any time, than to periodically locate such a pit structure in this type of operative location and to periodically remove it from this type of location, as for example, when it is not to be used for a prolonged period.

Different economic considerations, however, apply to the use of complete unloader structures such as are set forth in the aforementioned co-pending application. Such unloaders are relatively expensive pieces of equipment. Because of this it is not economically satisfactory to leave them in a given location during periods of non-use. Further, if such unloaders were left in such positions various legal problems growing out of the so-called "attractive nuisance" doctrine of tort law would arise.

Pit structures of the present invention overcome problems resulting from unloaders structures being left in a specific location for a prolonged period for the simple reason that they are designed and adapted so that a complete unloader structure may either be operatively associated with or operatively disassociated with such a pit structure whenever desired at a very nominal or minimum expense. As a consequence of this an unloader as set forth in the aforementioned co-pending application or of other types designed for use with a pit structure of this invention may be moved from one location to another so as to be kept in relatively constant use, while a pit structure of this invention may merely be "locked up" whenever it is not in use.

These and various other features and advantages of this invention will be more fully apparent from a detailed consideration of the remainder of this description, the appended claims and the accompanying drawing in which:

FIG. 1 is a side elevational view illustrating the installation and use of a pit structure of this invention;

FIG. 2 is a top plan view of the pit structure shown in FIG. 1;

FIG. 3 is a cross-sectional view taken at line 3—3 of FIG. 1;

FIG. 4 is a cross-sectional view, taken at line 4—4 of FIG. 2;

3

FIG. 5 is an end elevational view taken in the direction of line 5—5 of FIG. 4; and

FIGS. 6, 7 and 8 are detailed views showing the construction of various parts employed in the pit structure shown in the preceding figures of the drawing.

These drawings are not to be taken as limiting the present invention in any respect. Those skilled in the art to which this invention pertains will realize that the basic features or principles of this invention can be employed in several different ways. They will also realize that various modifications and/or adaptations can be made in the specific pit structure illustrated through the use of routine design of engineering skill.

The actual nature of a pit structure of this invention is considered to be fully explained and summarized by the appended claims forming a part of this disclosure. However, as an aid to understanding this invention it can be stated in essentially summary form that it concerns a pit structure which includes a hopper means converging towards a bottom, tunnel means having an open end and a closed end, the closed end of the tunnel means being in communication with the bottom of the hopper means and connector means extending from the bottom of the hopper into the closed end of the tunnel means employed. Preferably this tunnel means includes a guide structure which is adapted to receive an extremity of a conveyer mechanism and to guide such an extremity of a conveyer mechanism from the open end of the tunnel down into the closed end of the tunnel into a position in which the conveyer mechanism is operatively attached to the connector means so as to receive material from the hopper means during the intended use of this pit structure.

The actual details of the present invention will be more fully apparent from a detailed consideration and examination of the accompanying drawings. Here there is shown a pit structure 10 of the present invention which includes a hopper 12 having a circular bottom 14 leading into a closed extremity 16 of a tunnel 18. This tunnel 18 also has a normally open end 20. This entire pit structure 10 is adapted to be installed in the ground 22 generally beneath a conventional railroad track 24 in the space normally occupied by any tie 26 used in connection with this track.

The hopper 12 is formed so as to include a rectangularly shaped, vertically extending top wall 28, the sides of which may carry attached brackets 30 which are adapted to engage adjacent railroad ties 26 in order to temporarily support the hopper 12 in an operative position as the pit structure 10 is installed and used. The hopper 12 includes opposed, parallel side walls 32 which extend downwardly from the top wall 28 and other walls 34 and 36 which are attached to the side walls 32 so as to connect them and which also are attached to the top wall 28 so as to extend downwardly therefrom. It will be noted that both of the walls 34 and 36 slant generally in the same direction and that the walls 32, 34 and 36 are curved slightly at their lower extremities so as to define a circular bottom opening 38 leading from the hopper 12 which is located in an "off-center" location generally at one side of the railroad track 24.

With this construction the principal portion of the wall 34 is located in the space generally beneath the center part of the railroad track 24. In order to complete the hopper 12 it is preferred to locate within it a baffle-like wall 40 positioned midway between the walls 34 and 36 so as to extend between the side walls 32. Thus, the baffle wall 40 is located so as to point generally toward the center of the bottom opening 38. If desired, a small horizontally extending divider wall 42 may be positioned across the top of the baffle wall 40.

In the pit structure 10 an outwardly extending ring-like flange 44 is attached to the walls 32, 34 and 36 so as to extend around the bottom opening 38. This flange 44 is adapted to be located against a corresponding top flange 46 on a closed, box-like end 48 of the tunnel 18. This

4

end 48 includes three side walls 50 which are attached to the top flange 46 so as to extend vertically from it and a bottom wall 52 which extends at a right angle to the side walls 50. The walls 50 are located at right angles to one another as shown.

In the tunnel 18 itself other vertical side walls 54 extend from the two parallel side walls 50 between another bottom wall 56 and a top wall 58. This other bottom wall 56 constitutes an extension of the bottom wall 52 and extends upwardly from it at an angle to the horizontal while the top wall 58 extends from the top flange 46 parallel to the bottom wall 56. This structure consisting of the walls 54, 56 and 58 preferably is formed so as to constitute a "tunnel" proper of uniform cross-sectional configuration.

It is normally preferred to form the entire tunnel 18 so that the "tunnel" constituted by the walls 54, 56 and 58 is composed of a plurality of sections such as the one section 60 and the end 48 indicated in FIGS. 1, 2 and 4 of the drawings, and so that the individual sections 60 or parts and the end 48 are connected together by means of a water-impervious joint 62 as are indicated in detail in FIG. 6 of the drawings. In this figure a joint 62 is indicated between a single section 60 and the parts of the walls 54, 56 and 58 extending from the end 48.

Each of the joints 62 preferably includes channels 64 located so as to completely surround the walls 54, 56 and 58. These channels 64 face one another and are adapted to be filled with a heavy grease or other similar type of "waterproofing" or mastic or related composition. Further, the channels 64 are adapted to receive extensions 66 formed upon a stabilizing "ring" 68 consisting of several common angle irons welded together. The ring 68 is, of course, formed so as to extend completely around the tunnel 18 and so that the extensions 66 on it fit within all portions of the channels 64. When the extensions 66 are located in these positions they serve an important alignment function in aligning the sections 60 and in sealing by contact with the composition within these channels 64. Small internal flanges 70 within the sections 60 are preferably used in connection with bolts 72 in order to hold these sections with respect to each other so that the ring such as the ring 68 is always operative for the intended alignment and waterproofing purposes.

The sections of the tunnel 18, including the closed end 48, are provided with aligned upstanding channel iron rails 74 which extend along the bottom walls 56 and 52 so as to terminate directly beneath the bottom opening 38. These rails 74 are adapted to receive a skid 76 on the end of the barrel 78 of an unloader mechanism 80 of the general type described in the aforementioned co-pending application is incorporated herein by reference. Similar skid type structures or other types of conveyor mechanisms can, of course, also be employed in this manner. During the use of the pit structure 10 this skid 76 is inserted through the open end 20 of the tunnel 18 with the skid in engagement with the rail 74, and is guided into an operative position as shown in FIGS. 1 and 4 of the drawings by means of the rail 74. When this unloader 80 is in this operative position and opening 82 into the barrel 78 is located directly beneath the bottom opening 38.

In order to establish an operative connection between this opening 82 and the bottom opening 38 it is preferred to secure to the interior of this bottom opening 38 a flexible connector 84 formed out of rubber impregnated canvas or various other similar or equivalent materials. This connector 84 is of the essential character of a tubular chute. One end of it (the connector 84) is passed around a retaining ring 86 wedged into a groove 88 formed as an extension of the walls 32, 34 and 36 within the interior of the bottom opening 38 so as to be securely and firmly held in position at all times. The exterior of the other or lower extremity of the connector 84 carries a ring-like flange 90 formed of angle iron or the equivalent

5

which is adapted to fit within and rest against the opening 83 in order to establish an adequate connection with the interior of the barrel 78 of the unloader 80. This flange 90 can be secured to the exterior of the connector 84 by rivets, retaining rings or other equivalent mechanical means.

It is possible to form an adequate seal around the barrel 78 at the open end 20 of the tunnel 18 through the use of a closure 92 as indicated in FIG. 5 of the drawings. This closure 92 is preferably formed of two parts 94 which are connected together by means of hinges 96. Around the periphery of this closure 92 there may be conveniently formed a flange 98 adapted to engage and fit against the exterior of the tunnel 18 surrounding the open end 20. A moisture resistant resilient rubber or equivalent gasket 100 adapted to engage the exterior of the barrel 78 is preferably carried by the parts 94 so as to surround a centrally located opening 102 defined by them. The barrel 78 passes through this opening 102 as shown.

During periods of non-use the top wall 28 may conveniently be surrounded by another closure 104, constructed as indicated in FIG. 7 of the drawing so as to include a peripheral flange 106 defining a continuous groove 108 adapted to fit over this top wall 28. A sealing washer or the equivalent 110 may be located within the groove 108 for the obvious purpose. During periods of non use a closure (not shown) of a similar character to the closure 104 may be located over the open end 20 of the tunnel 18. Such closures may conveniently be locked in place by conventional padlocks or the like (not shown).

It is believed that the utility of the pit structure 10 will be obvious to those skilled in the art from a detailed consideration of the foregoing description of this structure. This pit structure 10 may be easily and conveniently assembled on a job site as it is being installed beneath a railroad track. Further, with this type of structure the connection between the bottom opening 38 of the hopper 12 and the closed end 48 of the tunnel 18 can serve easily as a swivel joint as indicated in FIG. 2 of the drawing by various lines in phantom so that the relative position or angle of the tunnel 18 with respect to the railroad track 24 may be changed or varied so that the pit structure can be conveniently used when it is desired to have an unloader, such as the unloader mechanism 80, extend at other than a right angle to a railroad track. This is exceedingly important as when several unloaders are to be used simultaneously in loading several trailers behind a tractor.

Mechanical means such as bolts 111 can be secured between the flanges 44 and 46 in order to hold the hopper 12 and the closed end 48 of the tunnel 18 with respect to one another after the tunnel 18 and the hopper 12 have been adjusted to a desired position with respect to one another. A plurality of holes 113 are provided in the flanges 44 and 46 in order to permit them to be secured together in this manner after they have been adjusted to a desired position. Various other equivalent mechanical structures or means (not shown) may also be employed so that these two parts may be rotated with respect to one another at any time without being secured together at a fixed angle. Preferably, of course, grease or other sealing material (not shown) is located between the flanges 44 and 46 so as to establish a water resistant connection between these flanges.

During the use of the pit structure 10 a conventional railroad car 112 is located above this pit structure, and appropriate known connectors or adaptors 114 are attached to this car so as to extend into the interior of the top wall 28 as indicated in FIGS. 1 and 4 of the drawings. These connectors preferably are located as indicated at each side of the dividing wall 42 so that during the use of the pit structure 10 material conveyed from the railroad car 112 is passed into the hopper 12.

The "off-center" configuration of the hopper 12 is con-

6

sidered desirable inasmuch as the sloping of the walls 34, 36 and 40 tends to prevent any material from falling directly from the railroad car 112 into the inlet opening 82 of the unloader mechanism 80. This prevents a direct load from being placed upon the operative structure within this unloader mechanism 80 during the use of the pit structure 10. In effect, the walls 36 and 40 operate to "absorb" kinetic energy of the material falling from a railroad car 112 and allow such material to slide gradually into the unloader mechanism 80. This effectively avoids any unnecessary stresses and strains such as would tend to cause difficulties in operating this mechanism.

This result is achieved along with another beneficial result pertaining to the placement of an unloader mechanism when a pit structure, such as the structure 10, is utilized. Because of clearance problems adjacent to a railroad track it is necessary that any unloader mechanism used adjacent to such a track be spaced a substantial distance away from the track proper. With the "off-center" location of the bottom opening 38 of the hopper 12 made possible by the sloping configuration of the walls 34 and 36 the tunnel 18 is located generally beneath a single railroad rail at one side of a railroad track. As a consequence of this any unloader, such as the mechanism 80, extends generally from one side of a railroad track and not from the center of such a track. This permits greater clearance than would be obtained if such unloader mechanism had an operative end located directly beneath the center of a railroad track.

Another advantage of the present invention lies in the fact that the rails 74 serve as a guide means so as to enable an unloader mechanism such as the mechanism 80 to be easily and accurately inserted to an operative position within a pit structure of this invention or to be removed from such a position. It will be noted that the rails 74 are arranged in the tunnel 18 so as to gradually guide and extremity of the mechanism 80 at an angle to the horizontal manner so that connection is made in an automatic manner to the connector 84 leading from the hopper 12. If desired, the portion of the rail 74 located beneath this connector 84 may be sloped upwardly slightly so as to guide an extremity of the mechanism 80 upwardly into an operative position during the connection of an unloader mechanism, such as the mechanism 80 to a pit structure 10.

Those skilled in the art to which this invention pertains will realize that pit structures as herein described may be easily and conveniently manufactured at a comparatively nominal cost. Further, they will realize that these pit structures are substantially water-resistant in character and that they may be used in a number of different locations where prior unloaders could not be used because of space, clearance, dust and/or other problems. Because of the nature of this invention it is to be considered as being limited solely by the appended claims forming a part of this disclosure.

I claim:

1. A pit structure for use with a conveyor in transferring bulk quantities of granular materials, which pit structure includes: hopper means having a top with an opening located therein, a bottom having an opening located therein, said bottom being spaced from said top, and walls attached to the peripheries of said top and said bottom, at least some of said walls converging together toward said bottom; tunnel means having a material discharge end and material receiving end, said receiving end being in communication with said bottom opening in said hopper means; connector means secured around said bottom opening of said hopper means so as to extend therefrom into said receiving end of said tunnel means; and guide means for guiding a conveyor through said tunnel means from said discharge end of said tunnel means into said receiving end of said tunnel means and into engagement with the extremity of said connector means located within said receiving end of said tunnel means, said guide

7

means leading from said discharge end of said tunnel along the interior thereof.

2. A pit structure as defined in claim 1 wherein said bottom of said hopper means is attached to the top of said receiving end of said tunnel means.

3. A pit structure as defined in claim 1 wherein said bottom of said hopper means is attached to said top of said tunnel means whereby the position of said tunnel means with respect to said hopper means may be adjusted to various fixed positions.

4. A pit structure as defined in claim 1 wherein said connector means are flexible.

5. A pit structure as defined in claim 1 including rigid reinforcing means located around the periphery of the extremity of said connector means spaced from said bottom of said hopper means, said reinforcing means being adapted to engage the periphery of an opening into a conveyor located so as to extend into said tunnel means.

6. A pit structure as defined in claim 1 wherein said guide means comprises track means located within said tunnel means so as to extend from said discharge end into said receiving end of said tunnel means.

7. A pit structure for use with a conveyor in transferring bulk quantities of granular materials which pit structure includes: hopper means having a top, said top being formed to fit within the space normally occupied by a railroad tie between two railroad rails and having an opening formed therein, and a bottom having an opening located therein, said bottom being located beneath said top and being spaced from said top, and peripheral walls attached to the periphery of said bottom, at least some of said walls

8

converging together toward said bottom; elongated tunnel means having a material discharge end and a material receiving end, said receiving end being located generally beneath said bottom and being in communication with said bottom opening; adjustable joint means connecting said bottom of said hopper means in various fixed positions, and said receiving end of said tunnel means; flexible, tubular connector means, one end of said connector means being secured to said bottom around the periphery of said receiving end of said tunnel means, said connector means extending into said closed end of said tunnel means; track means located within the bottom of said tunnel means so as to lead from said discharge end of said tunnel means into said receiving end of said tunnel means, said track means being for engaging a skid on a conveyor and guiding said conveyor through said tunnel means into a position in which said conveyor is engaged by and in communication with the interior of said connector means; and means for forming a seal with said receiving end of said tunnel means around a conveyor extending into said tunnel means.

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