Dec. 20, 1949 P. A. RIDDELL 2,491,583

SHAFT SINKING APPARATUS

Filed Feb. 17, 1948 2 Sheets-Sheet 1

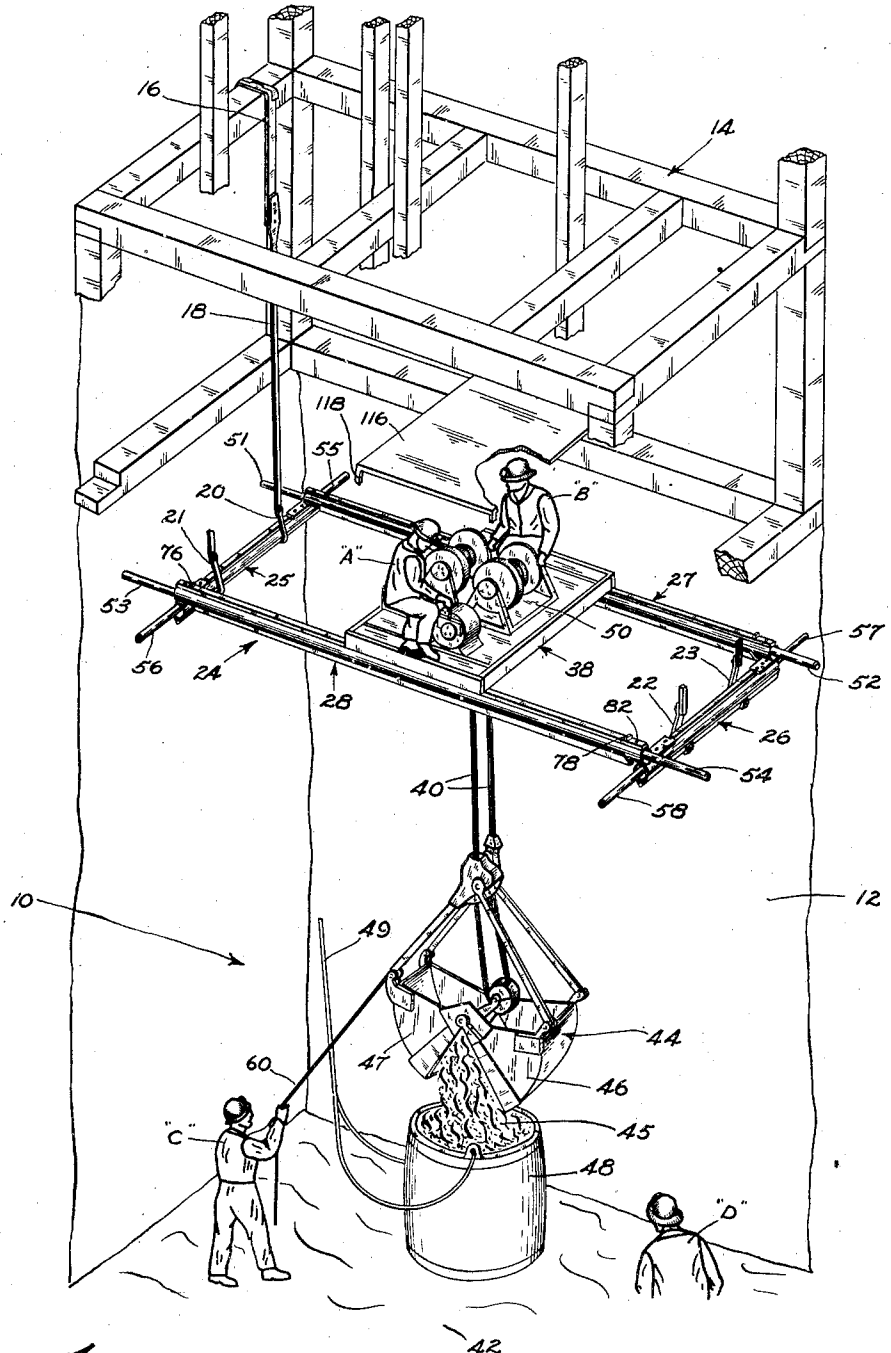


Fig. 1.

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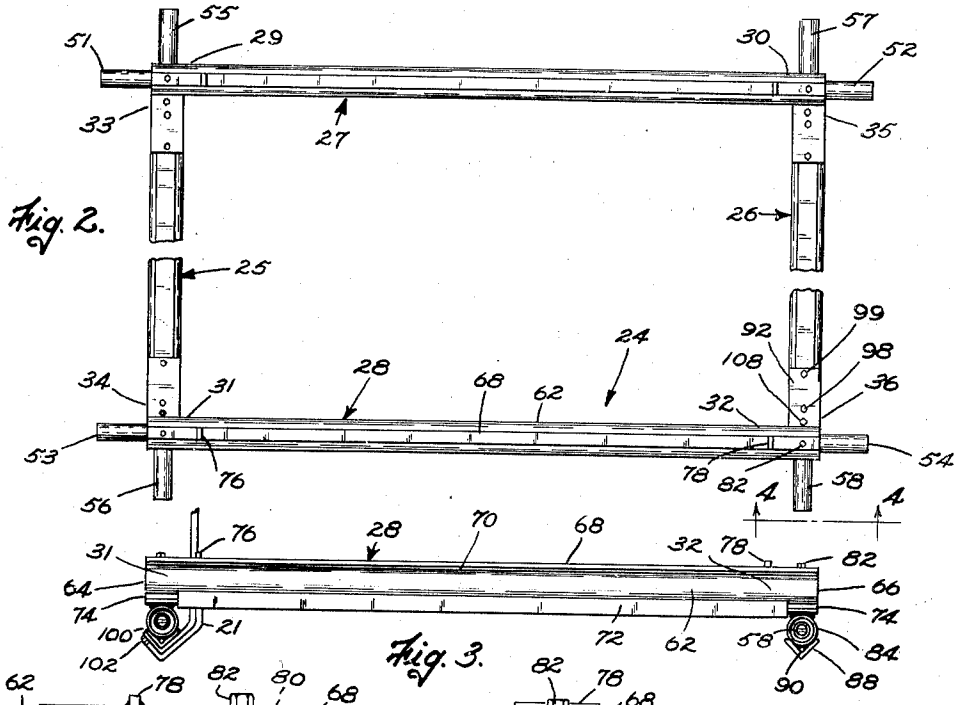


Fig. 2.

Fig. 3.

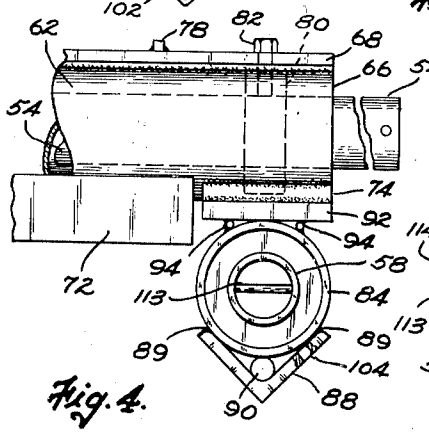


Fig. 4.

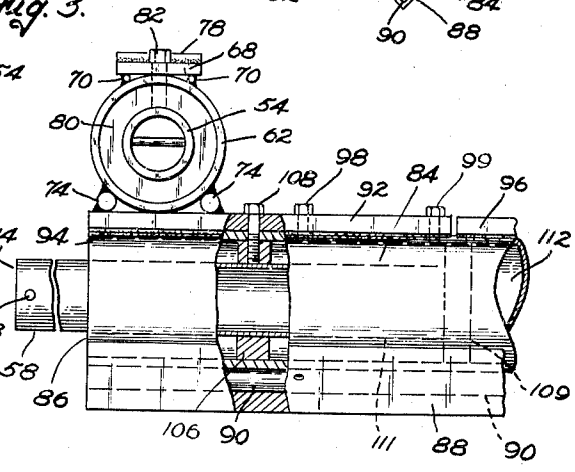


Fig. 5.

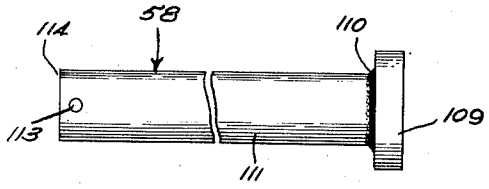


Fig. 6.

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SHAFT SINKING APPARATUS

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3 Claims. (Cl. 214—115)

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This invention relates to an apparatus for sinking mine shafts, and more particularly to stabilizing means for such apparatus when in operation.

Sinking of mine shafts has always been a costly, laborious and time consuming task. Earlier methods of sinking mine shafts required a large number of men to be sent in small groups, depending on the size shaft, to the bottom or floor of the shaft and manually shovel the loosened earth therein into hoistable buckets which removed the loosened earth to the entrance of the shaft to be carried away. The fatigue of shoveling by hand in the loosened, uneven and restricted bottom of the shaft necessitated the frequent relieving of crews engaged in such work. Later the manual shoveling operation was replaced by power-driven excavating apparatus which enabled this operation to be done with a considerable saving in time and manpower, all as disclosed in prior Patent No. 2,326,172, dated August 10, 1943, issued to Joseph Murray Riddell. Because of the limited cross-sectional area of the shaft, it was essential that the excavating apparatus be of a smaller cross-sectional area, compact, and portable. It has been found preferable to have such apparatus suspended within the shaft from the shaft-supporting girders. However, it has been found that during operation the suspended apparatus may have a tendency to sway and/or vibrate, thereby reducing its efficiency. Thus it is one of the objects of this invention to provide a stabilizing means which will eliminate swaying of the apparatus while in operation, and thereby materially reduce the time required for sinking a mine shaft.

It is a further object of this invention to provide a stabilizing means which is simple in construction, inexpensive to produce, effective in operation, and easily adjustable by the operator.

Further and additional objects will appear from the following description, the accompanying drawings, and the appended claims.

In accordance with one embodiment of this invention a frame is provided of such size as to allow it to be suspended from shaft-supporting girders within a mine shaft. Mounted on and movable about the frame is a platform from which is suspended an excavating shovel controlled and operated from the platform. Resting on the floor of the shaft is a hoistable bucket which receives the excavated materials from the shovel and then is hoisted to the entrance of the shaft for disposition. Adjacent the corners of the frame are mounted adjustably extensible stabilizing elements which, after the frame has been suspended in the shaft at a desired position, are brought into contact with the adjacent shaft walls and locked in place. Thus, when the excavating apparatus is in operation, the supporting frame is held in a stationary position, thereby enabling the excavating operation to be accomplished without attendant swaying of the frame.

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For a more complete understanding of this invention reference should now be had to the drawings, wherein

Fig. 1 is a fragmentary perspective view of the bottom portion of a shaft with two of the shaft walls removed so as to expose a suspended excavating apparatus, with the stabilizing elements being shown extended outwardly from the frame to the shaft walls;

Fig. 2 is a fragmentary top plan view of the frame of the apparatus shown in Fig. 1, with the platform removed, showing the stabilizing elements extended;

Fig. 3 is a front elevational view of the frame of Fig. 2 showing one of the supporting hooks engaging the frame and the stabilizing elements in the retracted position;

Fig. 4 is a fragmentary front elevational view of one of the corners of the frame taken along line 4—4 of Fig. 2;

Fig. 5 is a fragmentary side elevational view of the corner shown in Fig. 4 with portions being cut away showing the guide and locking nut for the stabilizing element; and

Fig. 6 is a fragmentary side elevational view of one stabilizing element.

Referring now to the drawings and more particularly to Fig. 1, an excavating apparatus 10 is provided which is adapted to be suspended within shaft 12 from shaft-supporting girders 14. Four L-shaped supporting hooks 16 (only one being shown in Fig. 1) engage the girders 14 at their upper end and are connected by means of metallic supporting straps 18 to a correspondingly same number of V-shaped hooks 20, 21, 22 and 23, which engage frame 24 of apparatus 10. In this particular instance the frame 24 is of a rectangular shape presenting substantially the same peripheral contour as a horizontal section of the shaft 12, but somewhat smaller to permit of ready vertical adjustment. The frame 24 as shown in Fig. 2 comprises two pairs of parallel load-bearing members 25—26 and 27—28. Load-bearing members 27 and 28 are of greater length than load-bearing members 25 and 26, and are mounted at their end portions 29—30 and 31—32 on and

above bearing members 25 and 26, also at their respective end portions 33—34 and 35—36.

Resting on bearing members 27 and 28 is a rectangularly shaped platform 38. The platform is provided with motor-driven wheels (not shown) so that it can be moved as desired over said frame. Suspended from platform 38 by cables 40 to the floor 42 of the shaft 12 is an excavating shovel 44 which is operated so as to grip loosened earth between its jaws 46 and 47 and deposit said earth 45 into a hoistable bucket 48 which rests on the floor 42 of the shaft. After the bucket 48 is loaded with the loosened earth and the platform 38 moved to one end of the frame 24, the bucket is hoisted by cable 49 between load bearing members 27 and 28 to the top of the shaft, not shown, and removed therefrom. Control and power means 50 for operating shovel 44 and moving the platform 38 are mounted on the platform. As thus far described, the device is similar to that disclosed and claimed in the prior Patent No. 2 326,172.

Extending outwardly from each end portion of each load bearing member are extensible stabilizing elements 51, 52, 53, 54, 55, 56, 57 and 58, which, when extended and locked, contact the adjacent walls of shaft 12 and hold the frame 24 in a rigid position. The description to follow will be directed specifically to the construction of the load bearing members which make up the frame of the apparatus and the manner of mounting the extensible elements with the load bearing members.

Load bearing member 28 shown in Fig. 3 comprises a pipe member 62, having open ends 64 and 66, a rail member 68 being of substantially the same length as pipe member 62 and mounted by welded round rods 70 or any other suitable means on the upper side of said member 62, a V-shaped channel member 72 mounted by welding or any other suitable means on the underside of said member 62, and a stiffening rod (not shown in Fig. 3) between the pipe member 62 and the channel member 72. The V-shaped channel member 72 and the stiffening rod are shorter in length than pipe member 62 and are positioned between the end portions 31 and 32 adjacent which the load bearing member 28 is attached to load bearing members 25 and 26 by welded round rods 74. Recessed from the ends 64 and 66 of load bearing member 28 on rail member 68 are welded stops 76 and 78 which limit the movement of platform 38 along said rail member.

A guide ring 80 is secured within the pipe 62 adjacent the end 66 thereof which serves as a guide for the stabilizing element 54, which latter extends outwardly in a telescopic manner from said open end 66. The stabilizing element 54 is slidable within the central aperture of the guide ring 80. A locking bolt 82 extends through rail member 68 and pipe member 62 and is threaded through guide ring 80 placed within pipe member 62. Thus the locking bolt may be tightened to firmly clamp the stabilizing element in any desired extended position. A like arrangement is employed for guiding and locking stabilizing elements 51, 52, 53, 55, 56, 57 and 58 in the opposite ends of bearing members 27, 28, 25, and 26 respectively.

Channel member 72 (and the corresponding channel members on the other load bearing members) has a two-fold purpose, namely to give added strength to pipe member 62 and to protect the pipe member by serving as a deflecting plate for rocks which may be thrown upwardly and strike the frame during blasting at the bottom of the shaft.

Load bearing members 25 and 26 are similar in construction to load bearing members 27 and 28 but are shorter, in the embodiment here being described. As shown in Fig. 5, load bearing member 26 comprises a pipe member 84 having an open end 86, a V-shaped channel member 88 welded at 89 to the underside of pipe 84, a stiffening rod 90 placed at the underside of pipe member 84 between channel member 88 and said pipe member, a corner tie plate 92 attached to the upper side of said pipe member at the end portion 36 by welded round rods 94, and a rail member 96 welded to the upper side of said pipe member between said end portions 35 and 36. The corner tie plate 92 serves as a flat base for mounting the end portion 32 of load bearing member 28 thereon. Welded round rods 74, above mentioned, connect pipe member 62 to corner plate 92. Bolts 98 and 99 act as further means for securing corner plate 92 to pipe member 84. The same arrangement is followed for connecting the bearing members 25, 26, 27 and 28 at the other three corners of the frame 24.

At four points as shown in Fig. 1, V-shaped hooks 20, 21, 22 and 23 engage V-shaped channel member 88 of bearing member 26 and a similar V-shaped channel member 100 for bearing member 25. Each hook, as shown in Fig. 3, may be secured to channel members 88 and 100 by means of securing bolts 102, which extend through said hooks and are threaded into said channels. As shown in Fig. 4, threaded holes 104 are provided in the channels for receiving the securing bolts (not there shown) for anchoring the hooks to said channels.

A guide ring 106, similar to guide ring 80 above described, is placed within pipe member 84 as shown in Fig. 5, and is held in place by locking bolt 108, which latter also locks stabilizing element 58 in any desired extended or retracted position. Guide ring 106 in conjunction with a collar plate 109 welded or otherwise secured to the inner end 110 of the shank portion 111 of stabilizing element 58, prevents wobbling of the element 58 when it is extended and contacting the shaft wall. Collar plate 109 slidably engages the inner wall surface 112 of pipe member 84. In order to enable the operator A or B to pull the stabilizing element 58 outwardly when it is in a fully retracted position, as shown in Fig. 3, a crossbar 113 extending diametrically across the outer end 114 of shank 111 is provided which serves as a handle. After the stabilizing element has been pulled far enough from the pipe member so as to expose a portion of the shank 111 of said element by pulling the crossbar 113, the stabilizing element may be further extended by the operator grasping the shank 111 by hand and pulling the element outwardly until the end 114 contacts the wall of the shaft. Once the frame 24 has been centered in the shaft, the stabilizing elements are held in place by locking bolts 108 as shown in Fig. 5.

As a protection from falling objects for operators A and B who operate and control the excavating shovel 44 from platform 38, a cover 116 is provided which is attached to the platform 38 by posts 118 at the four corners.

It will be obvious that certain modifications of the specific embodiments shown may be made without departing from the true spirit and scope of this invention. For example, in certain instances where the shaft is other than of rectan-

gular shape it may be more desirable for the frame to be square, hexagonal, or octagonal in shape, in order to more closely adhere to the contour of the shaft to be sunk.

Thus it will be seen that stabilizing means associated with the support frame have been provided which will eliminate swaying of the excavating apparatus while in operation thereby greatly increasing the effectiveness of such operation. The stabilizing means provided is simple in construction, inexpensive to produce, and adapted to be easily and quickly adjusted by the operators. Likewise means have been provided for limited adjustment of the frame in the shaft along a horizontal plane.

While one embodiment of this invention is shown above, it will be understood of course that the invention is not to be limited thereto, since many other modifications may be made, and it is contemplated, therefore, by the appended claims to cover any such modifications as fall within the true spirit and scope of this invention.

I claim:

1. An apparatus for sinking mine shafts, comprising a rectangular-shaped frame member suspended within said shaft from shaft wall supporting girders, said frame comprising two pairs of hollow load bearing members with open ends, one pair mounted on and above the other pair; a platform mounted on said pair of load bearing members disposed above the other and adapted to move in an endwise direction along said members, an excavating shovel suspended from said platform, power means mounted on said platform for operating said shovel, and adjustable stabilizing elements protruding outwardly from the open ends of said hollow load bearing members and contacting the adjacent walls of said shaft.

2. An apparatus for sinking mine shafts, comprising a rectangular-shaped frame member suspended within said shaft from shaft wall supporting girders, said frame comprising two pairs of hollow, load bearing members with open ends,

the longer pair mounted on and above the shorter pair; a platform mounted on said longer pair of load bearing members and adapted to move lengthwise on said members, an excavating shovel suspended from said platform, power means mounted on said platform for operating said shovel, and adjustable, telescopic, stabilizing elements adapted to be extended outwardly from the open ends of said load bearing members and contact the adjacent walls of said shaft.

3. An apparatus for sinking mine shafts, comprising a rectangular-shaped frame member suspended within said shaft from shaft wall supporting girders, a platform mounted on said frame and adapted to move transversely across said frame, an excavating shovel suspended from said platform, control means mounted on said platform for operating said shovel, and adjustable stabilizing elements protruding outwardly from said frame and contacting the adjacent walls of said shaft, said stabilizing elements comprising a pipe section of such size as to loosely fit within the open end of said hollow load bearing member, an enlarged head section rigidly affixed to the inner end of said pipe and slidably engaging the inner surface of said bearing member, and a guide member rigidly mounted within said load bearing member for said pipe section to extend therethrough and a locking bolt to hold said stabilizing element in its extended position.

PAUL ALEXANDER RIDDELL.

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