May 29, 1962

P. C. O'LEARY

TIMBER SKIP

3,036,661

Filed June 8, 1959

4 Sheets-Sheet 1

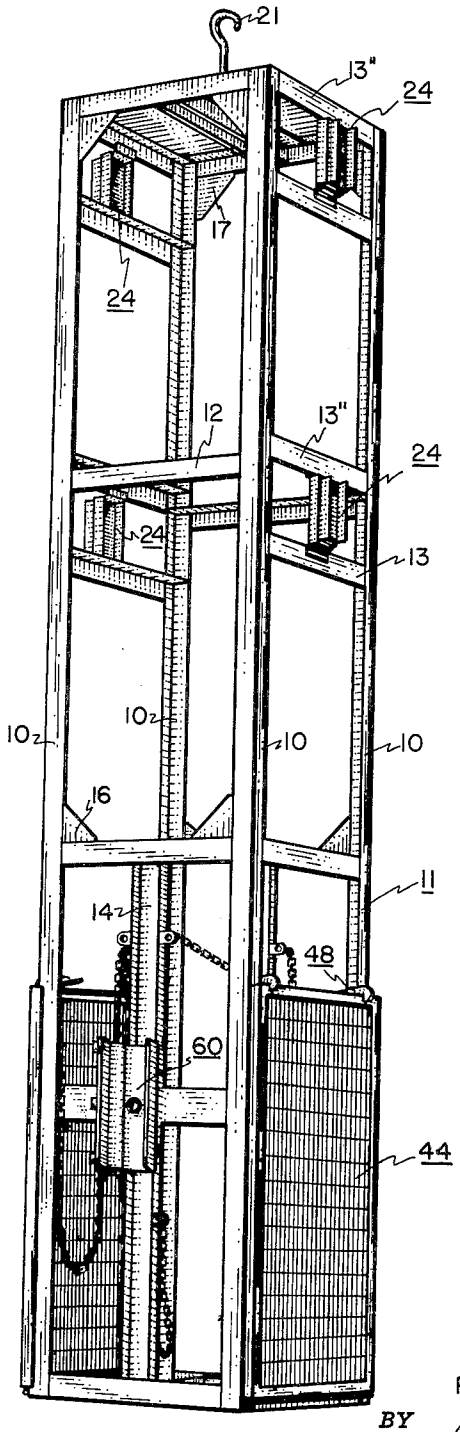


FIG. 1

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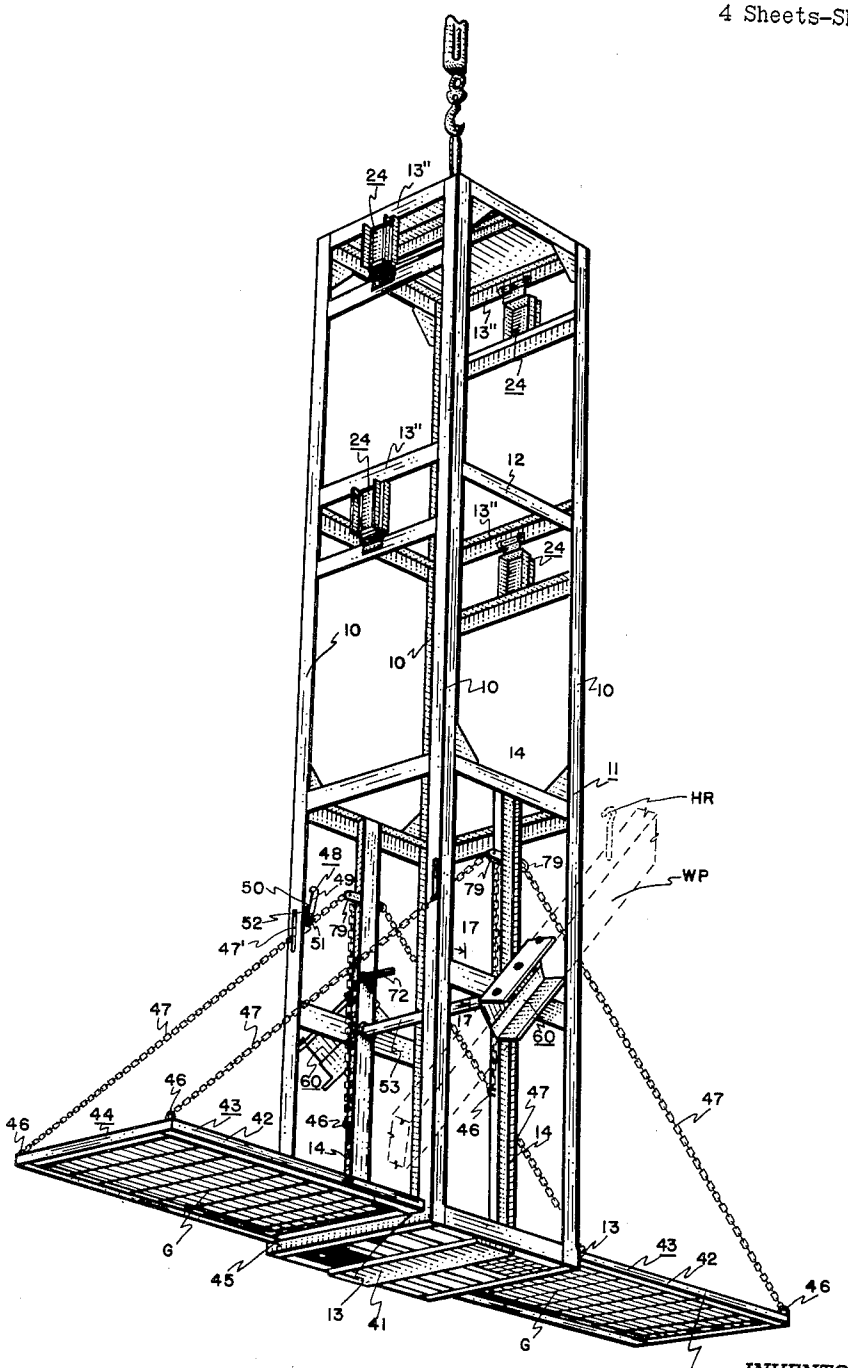


FIG. 2

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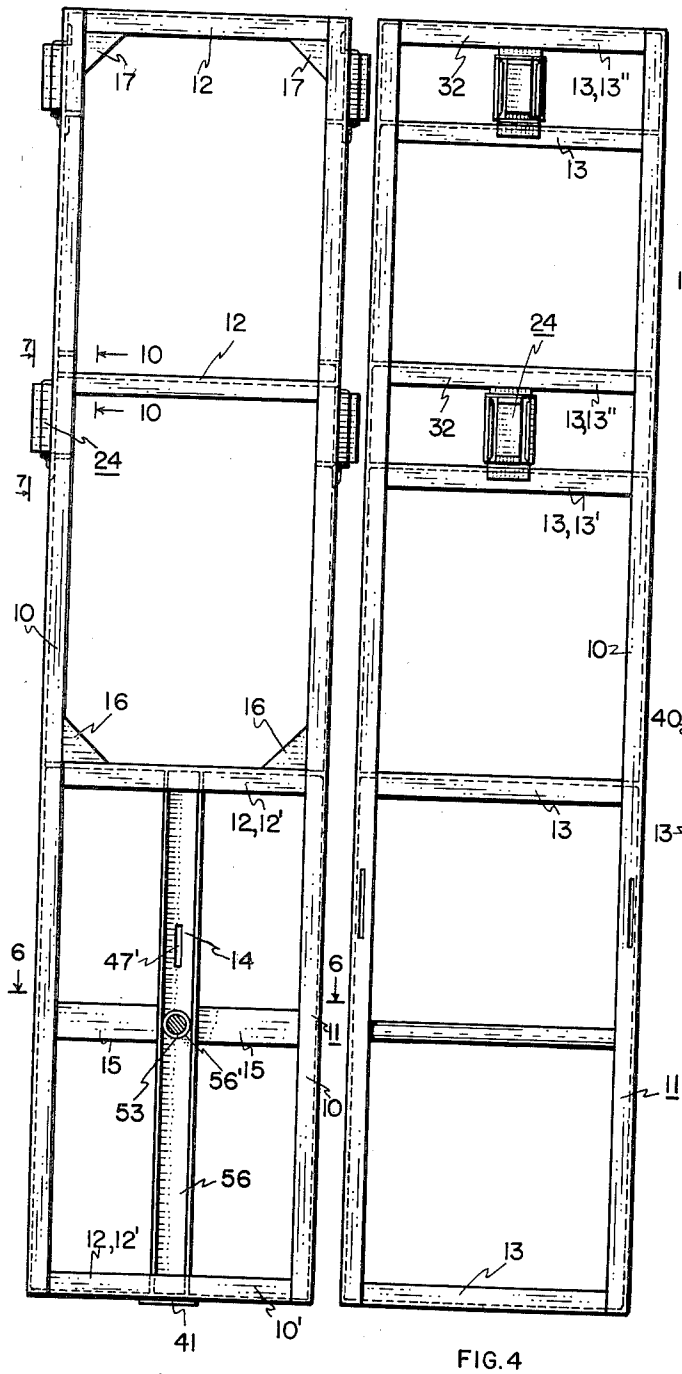


FIG. 3

FIG. 4

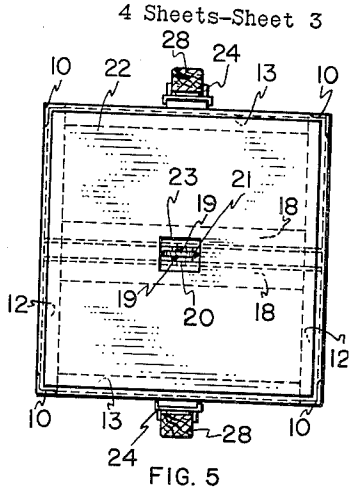


FIG. 5

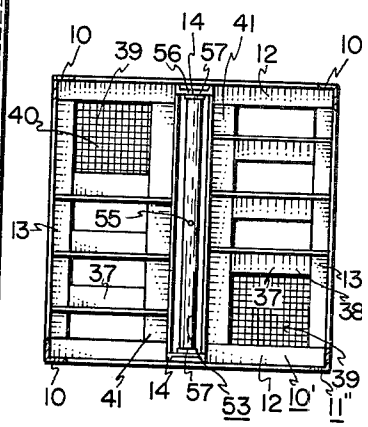


FIG. 6

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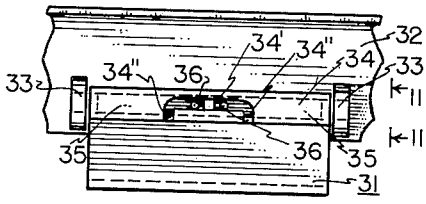


FIG. 10



FIG. 11

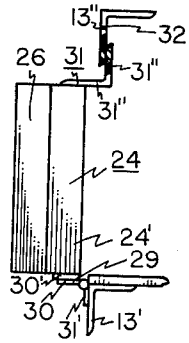


FIG. 9

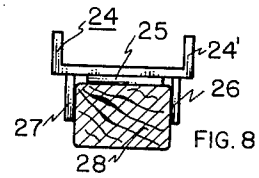


FIG. 8

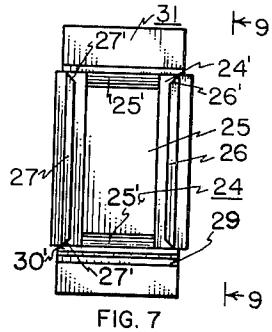


FIG. 7

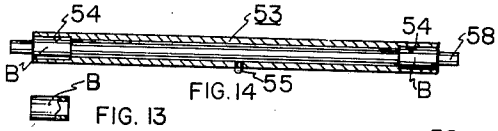


FIG. 13

FIG. 14



FIG. 12

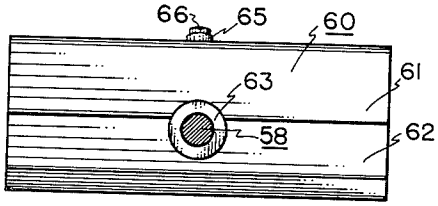


FIG. 16

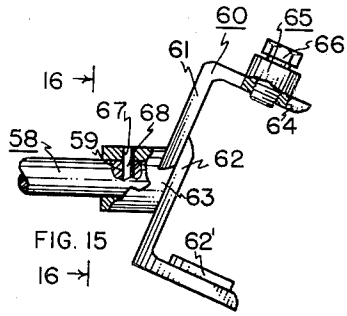


FIG. 15

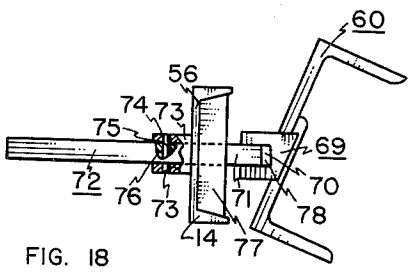


FIG. 18

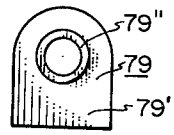


FIG. 19

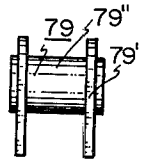


FIG. 20

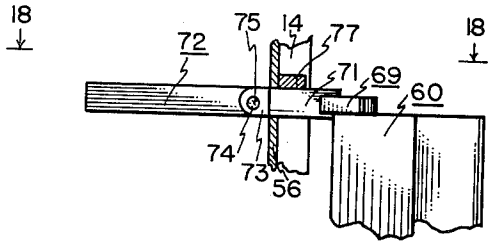


FIG. 17

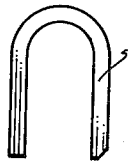


FIG. 21

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3,036,661

TIMBER SKIP

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Filed June 8, 1959, Ser. No. 818,656
12 Claims. (Cl. 187—1)

This invention relates to the operation of sinking a mine shaft and, more particularly, to means for lowering "timber" (i.e. wood framing, structural steel, or preformed concrete) into the shaft preparatory to installation of the timber therewithin so as to provide ground support for the shaft walls. In particular, the present invention provides a unique "timber" skip or cage which by reason of its design may be preloaded in a particular manner with a set of timber, tools and accessories, lowered with workmen to a point below the last installed timber set, and there manipulated by the workmen to facilitate the installation of a new shaft set (immediately below and connecting to the last set installed) in a manner much preferred to that heretofore possible.

When timbering is used for supporting mine shaft walls, each timber "set" will usually consist of a pair of wall plates, a pair of end plates joined to the wall plates and defining therewith a lateral rectangle or frame, a pair of dividers separating the frame into three compartments (i.e. two skip compartments and one service compartment), two pairs of shaft guides each being medially disposed within and connected to the framework of a respective one of the skip compartments, a plurality of posts respectively connecting the several wall plate, end plate, divider junctures to similar junctures of the timber set previously installed within the shaft, and a series of lagging strips for aligning and otherwise firming up the set within the shaft. See volume 1 of the Mining Engineers' Handbook, by Robert Peele, Third Edition, John Wiley and Sons, Inc., New York City, New York, at Section 7–14 thereof. An important problem encountered in connection with the sinking of a vertical or inclined mine shaft is to discover a solution for conveying each respective timber set down into the shaft, together with working men, tools and accessories, in a manner so that the heavy wall plates of the set may be easily positioned and secured to the wall plates of the previous set by means of the conventional hanging rods, with the working men being provided with suitable platform facilities so as to enable the positioning not only of the wall plates but also the remainder of the timber set and lagging.

In present day mining operations the loading, transporting, unloading and positioning of timber sets is performed in a very clumsy and awkward manner in that the timbering generally is secured principally beneath a descending skip or cage. The workmen whose assignment is to install the successive timber sets find it extremely difficult to remove the timber from a conventional cage or skip and install the same in proper position beneath the last installed timber set.

Accordingly, an object of the present invention is to provide new and improved means for conveying "timber" (e.g. pre-cut, tongued, and rabbeted wood framing) down a mine shaft so that the same may be easily installed therein.

A further object of the present invention is to provide a timber skip or cage in which, during the descent thereof, the heavy wall plates are disposed vertically, the same adapted to be pivoted to assume a horizontal disposition when the desired positioning of the cage within the shaft is reached.

An additional object of the present invention is to provide platform means for the workmen descending with the cage so that the same, with a minimum of expended

effort, may orient properly the wall plates for installation, secure the hanging rods thereof to the hanging rods depending from the wall plates situated immediately thereabove, and where the workmen may be supplied with extensible platform means for facilitating the complete installation of the timber set.

A still further object of the present invention is to provide guide shoes for the timber skip which may be selectively retracted from engagement with the guide rails of the shaft, thus enabling disengagement of the skip therefrom.

According to the present invention the timber skip consists of a vertically elongated cage or framework provided with a base and a top. If desired the base may be formed with a series of angle irons delineating a series of divider compartments, the latter being designed to aid in the preloading of the skip so that timber withdrawal therefrom may be facilitated. The top of the skip will generally consist of a protector plate completely covering the top of the skip framework so as to alleviate danger to workmen in the skip of falling rocks and debris. A medial access aperture disposed in this top protector plate enables a hook, clevis or other suitable device to be secured to the skip framework and to be available for connection to the conventional hoist cable.

The skip is provided with guide shoes and is dimensioned for admittance into and travel throughout the length of the shaft's central compartment as is formed by the stacked timber sets within the shaft, the guide shoes engaging the shaft guides of this compartment. The guide shoes are hinged and each is supplied with an actuatable lock in order that the shoes may be disengaged from the guides at the skip's upper extremity of travel.

Of particular importance is the fact that the skip is provided with a pair of hinged platforms which are extensible sideways when the lower portion of the skip is disposed beneath the last timber set installed within the shaft, but which platforms may be retracted and latched for accommodating the vertical travel of the skip. These platforms enable the workmen to step out of the skip framework proper and into the working areas immediately beneath the last installed timber set in the shaft, and to install the end plates, dividers and posts, together with lagging, in he desired manner.

Also of major importance is the fact that the timber skip is supplied with a trunnion mechanism, hereinafter to be explained in detail, whereby the long, heavy wall plates of the preloaded timber set may be secured thereto in vertical orientation, carried by the skip down into the shaft for their installation and, at a suitable working level immediately below the last installed timber set, be pivoted outwardly and horizontally in an askew manner so that the hanging rods thereof will meet the hook end portions of the hanging rod depending from the previously installed wall plates of the upper timber set. Once the hanging rods of the four wall plates are engaged, the workmen simply loosen the bolts in the trunnion mechanism so that the newly-installed wall plates may slip out of their trunnion clamps and assume a vertical suspension from the wall plates immediately above.

A lock mechanism is supplied the trunnion apparatus so that the same may lock the wall plates in vertical disposition during the descent of the skip into the shaft, with the workmen being supplied means for unlocking these wall plates and pivoting the same to horizontal positions at the proper point within the shaft.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be under-

stood by reference to the following description, taken in connection with the accompanying drawings in which:

FIGURE 1 is a perspective view of the timber skip of the present invention with the working platforms thereof withdrawn vertically and latched in place so as to accommodate the vertical travel of the skip within the shaft.

FIGURE 2 is a perspective view of the timber skip of the invention with the platforms extended for use by the workmen in order to install the disassembled timber set preloaded within and to the sides of the skip.

FIGURE 3 is a front elevation of the timber skip framework.

FIGURE 4 is a side elevation of the framework shown in FIGURE 3.

FIGURE 5 is a top plan of the timber skip framework shown in FIGURE 4.

FIGURE 6 is a section taken along the line **6—6** in FIGURE 3.

FIGURE 7 is a view taken along the line **7—7** in FIGURE 3 and constitutes a front elevation of the hinged guide shoe of the timber skip which cooperates with the shaft guide rails.

FIGURE 8 is a plan view of the guide shoes shown in FIGURE 7 and illustrates the inclusion of a shaft guide rail when the shoe is engaged with the same.

FIGURE 9 is a side elevation of the guide shoe taken along the line **9—9** in FIGURE 7.

FIGURE 10 is a view taken along the line **10—10** in FIGURE 3 and illustrates the locking mechanism for the several guide shoes.

FIGURE 11 is a side elevation of a portion of this locking mechanism and is taken along the line **11—11** in FIGURE 10.

FIGURE 12 is an elevation of the horizontal trunnion shaft incorporated in the present invention.

FIGURE 13 is an elevation shown partially in cross-section of a cylindrical, brass bearing, two of the same being employed to journal the trunnion shaft in FIGURE 12 within its sleeve.

FIGURE 14 is a vertical section of the trunnion shaft and trunnion sleeve when the former is journalled within the latter by the bearings heretofore mentioned.

FIGURE 15 is an edge-on view of the trunnion clamp of the present invention, the clamp being shown as mounted upon the trunnion shaft of FIGURE 12.

FIGURE 16 is a view taken along the line **16—16** in FIGURE 15 and illustrates another view of the trunnion clamp.

FIGURE 17 is a fragmentary elevation taken along the line **17—17** in FIGURE 2 and illustrates the manner and means by which the trunnion clamp is locked in its vertical orientation.

FIGURE 18 is a plan view taken along the line **18—18** in FIGURE 17.

FIGURES 19 and 20 are front and side elevations, respectively, of the idler bracket which is mounted upon the skip framework channels for accommodating the chains connecting to the skip platforms.

FIGURE 21 is a front elevation of the U-shaped bar bracket which mounts the chains to the skip platforms and skip channels.

In FIGURES 1–6 elongated angle irons **10** (four in number) of the skip framework **11** constitute the four corners thereof and are spaced apart by four front and four rear angles **12** and by six right side and six left side angles **13**. The ends of the angles are contoured in a similar fashion as shown in FIGURE 5 so that the several angles may be fitted together and welded in place. Two channels **14** are welded (concave outwardly) to the front and rear angles **12'** with plates **15** (a total of four in number) medially bracing the two channels **14** by being welded thereto and to the angle irons **10**. Four gusset plates **16** are welded to the corner angles **10** and to the upper front and rear angles **12'** as shown. Gusset plates **17** reinforce the upper structure of the skip framework by being welded to upper front and rear angles **12** and corner angles **10**.

At the top of the structure a pair of angles **18** (see FIGURE 5) are spaced a short distance apart and are welded to medial portions of the angles **12**. Discs **19** are welded to the inner surfaces of the adjacent flanges of the two angles **18** and these flanges and discs **19** are line drilled to accommodate pin **20** associated with hoist hook **21**. The top plate **22** is supplied with a central aperture **23** to accommodate the hoist hook **21**, and the plate **22** is welded to the four top angles **12** and **13**.

The several guide shoes **24**, shown with particularity in FIGURES 7–11, are identical both in construction and also in attachment to the skip framework. These guide shoes consist of a channel **24'** to which base plate **25** and side plates **26** and **27** are welded. The plates **25**, **26** and **27** are chamfered at their edges as shown at **25'**, **26'** and **27'** and in fact serve as the guide surfaces for the shaft guide rails **28** of the stacked timber sets of the shaft. Piano hinge **29** has one flange **30** attached to plate **30'** which is welded to channel **24'** and the other flange **31'** welded or otherwise affixed to side angle **13'**. The guide shoe also includes an upwardly oriented angle **31** whose horizontally extending flange **31''** is welded to the upper edge of channel **24'** and whose upwardly extending flange **31''** selectively engages the vertical flange **32** of angle **13''**. Accordingly, it will be seen that each of the guide shoes may be swung in and out of the skip frame (but not past the vertical) so as to permit the shoes to disengage and engage, selectively, the shaft guide rails. These guide shoes may be locked in position by the incorporation in each guide shoe mounting of locking ears **33**, welded on the depending flange **32** of angle **13''**, and by the inclusion of sleeve **34** which is welded or otherwise affixed to the angle **31** of the guide shoes. Sleeve **34** is longitudinally and laterally slotted in the manner shown so as to provide for a longitudinal slide slot **34'** and a 90° lockout **34''** at both ends thereof. A pair of slide bolts **35** are provided with a respective, outwardly protruding actuating pin **36**. Thus, when it is desired to lock the shoes in place so that the skip may slide up and down the shaft guide rail, the pins **36** are merely urged outwardly until the pins **36** are at the lockout portions of the slot in sleeve **34**; here they are urged laterally in the direction of the slot ends. When it is desired to release the lock of the several shoes, then the pins **36** are merely urged upwardly and together so that the slide bolts **35** are disengaged from the locking ears **33** of the lock.

In addition to angles **12** and **13** (see FIGURE 6) the base or floor **10'** of the frame structure includes a series of angles **37** the lower flanges **38** of which are relieved as shown for enabling the proper fitting of the base components. These angles serve to provide dividers to accommodate the preloading of the skip and the larger divided sections or compartments **39** are supplied with grating rectangles **40**. The underneath side of the base is supplied with a reinforcing plate **41**.

A series of angles **42** (see FIGURE 2) form a pair of rectangular frames **43** and enclose respective gratings G, the latter with the angle frames forming staging, i.e., a pair of platforms **44** which are attached by a pair of piano hinges **45** to the respective angles **13** of the framework. Accordingly, hinge connections are found at the junctures of the two platforms **44** and the lowermost angles **13** of the skip framework. Lugs **46** are provided the platforms **44** and also the vertical channels **14** so as to accommodate the mounting of the four chain braces **47**. These four chain braces pass through relief apertures **47'** in the four corner angles **10**. Rather than use pulley wheels, the inventor has found that conventional idler brackets **79** having ears **79'** and a barrel **79''** (see FIGURES 2, 19 and 20) may be mounted near the upper extremities of the two channels **14**, on the side flanges thereof, and suffice for mounting the several chain lengths **47**. Accord-

ingly, when the two platforms are lowered as shown in FIGURE 2 the chains will be taut. In this position of the two platforms the workmen may perform the timbering of the newly-installed timber shaft set with comparative ease. When the job is finished and the skip is to be withdrawn from within the shaft, the two platforms are merely withdrawn by the workmen pulling on the chain lengths so that the upper angles of the platforms are engaged by hinged latches **48**. Each of these four latches **48** includes a principal latch portion **49** and a base latch portion **50** secured to a respective angle **10**, the two being joined by hinge pin **51**, and the latch **48** being secured at **52** to the angle irons **10**.

A major feature of the present timber skip is the inclusion of certain trunnion apparatus. Reference is now made to FIGURES 6, 12–14. A pipe or sleeve **53** is fitted into the bore **56'** of web **56** of channels **14** and includes counterbored areas **54** at the ends thereof and a grease fitting **55**. For added support, washer-shaped discs **57** are welded to both the sleeves **53** and the two channel webs **56**. Cylindrical bearings B mounted within the two counterbored areas **54** so that sleeve **53** may journal the trunnion shaft **58**, the same being disposed therethrough and protruding from ends thereof. Trunnion shaft **58** provided with radial end bores **59** at either end thereof, which bores serve for pinning the trunnion clamps thereto.

The trunnion clamp **60** (see FIGURES 15 and 16) is formed by a pair of angles **61** and **62** and plate **62'** (neglecting omitted lock plate **69**) which are welded together in the manner shown. Mounting sleeve **63** attaches to the two angles **61** and **62**; preferably, the sleeve **63** attaches to the two angles **61** and **62** in an askew manner so that when the wall plate timbers are held in the trunnion clamps, the upper surfaces thereof will be tilted outwardly relative to the vertical. The upper angle **61** of each trunnion clamp is provided with bores **64** at three places, and threaded, boss-type inserts are therewithin set and welded. These inserts are designated as **65**. Bolts **66** are threaded through each of the inserts **65** and clamp the wall plates within the trunnion clamps when they are disposed therewithin. The sleeve **63** includes radial aperture **67** designed to accommodate the pin **68** which pins the respective trunnion shaft end to the sleeve.

Each trunnion clamp includes a lock plate **69** welded to the top edge thereof (see FIGURES 17 and 18). This plate is notched as at **70** and selectively engages end **71** of lock bar **72**. Pivot ears **73** are welded to the inside surface of the web **56** of channel **14**, these pivot ears being provided line-drilled apertures **74** to accommodate pin **75**. It is the pin **75** which passes through bore **76** of lock bar **72** and rotatably pins this lock bar to the ears **73**. A stop plate **77** is welded interiorly of each of the channels **14** and is slightly above ears **73**. Thus, when it is desired to lock the trunnion clamps **60** in vertical disposition so that the wall plates which they carry will also be in vertical position, the workman merely pushes down on the interior end of bar **72** so that the exterior end **71** thereof engages slot **78** of trunnion plate **69**. When it is desired to disengage the trunnion clamp from lock bar **72** so that the wall plate clamped into the trunnion clamp may be rotationally displaced to achieve a horizontal disposition, then a workman merely lifts the inner end of the lock bar **72** so as to disengage the end **71** thereof of the trunnion clamp. Preferably, of course, the wall plate should be mounted within the trunnion clamps close to their center of gravity so that little if any torque is required (save to overcome friction) to change the disposition of the wall plates from the vertical to the horizontal.

Thus, what is achieved by the present invention is a timber skip wherein the wall plates are carried exteriorly of the skip framework but where the smaller timbers are carried in the interior thereof, together with the workmen, their tools and accessories.

Again, it is important to note that the askew orientation of the trunnion clamps relative to the common trunnion shaft enable hanging rods HR, when secured to the wall plates WP, to be angulated outwardly so as to be adapted for easy engagement with the depending hanging rods (not shown) of the wall plates last installed. This facilitates easy engagement of the ends of the hanging rods, and after such engagement the trunnion clamps may release the new wall plates (by the rearward threading of bolts **66**) so that the wall plates may slide from their clamps and fall into their respective positions directly underneath the previously installed wall plates. After this is accomplished the remainder of the timbers is installed and the necessary lagging introduced to firm up the same within the shaft.

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects, and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

I claim:

1. A timber skip for lowering a timber set, including a pair of wall plates, into a mine shaft for installation therewithin, said timber skip including, in combination: a framework; guide means affixed to said framework for guiding said framework within said shaft; trunnion means affixed to said framework for releasably clamping said wall plates in vertical, pivotally displaceable disposition; and platform means for supporting the weight of workmen descending with the skip.

2. A timber skip for lowering a timber set, including a pair of wall plates, into a mine shaft for installation therewithin, said timber skip including, in combination: a framework; guide means affixed to said framework for guiding said frameworkwithin said shaft; trunnion means affixed to said framework for releasably clamping said wall plates exterior of but closely adjacent to said framework in vertical, pivotally displaceable disposition; and platform means for supporting the weight of workmen descending with the skip.

3. A timber skip for lowering a timber set, including a pair of wall plates, into a mine shaft for installation therewithin, said timber skip including, in combination: a framework; guide means affixed to said framework for guiding said framework within said shaft; trunnion means affixed to said framework for releasably clamping said wall plates exterior of but closely adjacent to said framework in vertical, pivotally displaceable disposition; and platform means for supporting the weight of workmen descending with the skip, said platform means comprising a pair of platforms hingedly connected to opposite sides of said framework in proximity with the base thereof and being extensible outwardly and downwardly to the horizontal and withdrawable upwardly and inwardly to vertical disposition adjacent the sides of the framework, said framework including means for releasably retaining said platforms in their vertical disposition.

4. A timber skip for lowering a timber set, including a pair of wall plates, into a mine shaft for installation therewithin, said timber skip including, in combination: a framework; guide means affixed to said framework for guiding said framework within said shaft; trunnion means affixed to said framework for releasably clamping said wall plates exterior of but closely adjacent to said framework in vertical, pivotally displaceable disposition; and platform means for supporting the weight of workmen descending with the skip, said platform means comprising a pair of platforms hingedly connected to opposite sides of said framework in proximity with the base thereof and being extensible outwardly and downwardly to the horizontal and withdrawable upwardly and inwardly to vertical disposition adjacent the sides of the framework, elongate connector means affixed to said framework and said platforms for limiting the downward travel of the latter to the horizontal, said framework including latch

means for releasably retaining said platforms in their vertical disposition.

5. A timber skip for lowering a timber set, including a pair of wall plates, into a mine shaft for installation therewithin, said timber skip including, in combination: a framework; guide means affixed to said framework for guiding said framework within said shaft; trunnion means affixed to said framework for releasably clamping said wall plates exterior of but closely adjacent to said framework in vertical, pivotally displaceable disposition; and platform means for supporting the weight of workmen descending with the skip, said platform means comprising a pair of platforms hingedly connected to opposite sides of said framework in proximity with the base thereof and being extensible outwardly and downwardly to the horizontal and withdrawable upwardly and inwardly to vertical disposition adjacent the sides of the framework, elongate connector means affixed to said framework and said platforms for limiting the downward travel of the latter to the horizontal, idler means mounted to said framework for slideably retaining said elongate connector means, said framework including latch means for releasably retaining said platforms in their vertical disposition.

6. Apparatus according to claim 3 wherein said trunnion means comprises a trunning shaft journalled within said framework and a pair of trunning clamps affixed to the ends of said shaft.

7. Apparatus according to claim 3 wherein said trunnion means comprises a horizontal sleeve affixed to said framework, a trunnion shaft, means journalling said trunnion shaft within said sleeve, and a pair of trunnion clamps affixed to the ends of said trunnion shaft.

8. Apparatus according to claim 3 wherein said trunnion means comprises a horizontal sleeve affixed to said framework, a trunnion shaft, means journalling said trunnion shaft within said sleeve, a pair of trunnion clamps affixed to the ends of said trunnion shaft, and means for releasably locking said trunnion clamps into vertical dispositions.

9. Apparatus according to claim 3 wherein said trunnion means comprises a horizontal sleeve affixed to said framework, a trunnion shaft, means journalling said trunnion shaft within said sleeve, and a pair of trunnion clamps affixed to the ends of said trunnion shaft in a mutually askew manner.

10. Apparatus according to claim 3 wherein said trunnion means comprises a horizontal sleeve affixed to said framework, a trunnion shaft, means journalling said trunnion shaft within said sleeve, a pair of trunnion clamps affixed to the ends of said trunnion shaft in a mutually askew manner, and means for releasably locking said trunnion clamps into vertical dispositions.

11. Apparatus according to claim 3 wherein said trunnion means comprises a trunnion shaft journalled within said framework and a pair of trunnion clamps affixed to the ends of said shaft in a mutually askew manner.

12. A mine shaft skip including, in combination, a timber skip for lowering a timber set, including a pair of wall plates, into a mine shaft for installation therewithin, said timber skip including, in combination: a framework; guide means affixed to said framework for guiding said framework within said shaft; and platform means for supporting the weight of workmen descending with the skip, said platform means comprising a pair of platforms hingedly connected to opposite sides of said framework in proximity with the base thereof and being extensible outwardly and downwardly to the horizontal and withdrawable upwardly and inwardly to vertical disposition adjacent the sides of the framework, and wherein said framework includes means for releasably retaining said platforms in their vertical disposition; and means affixed to and extending between said framework and respective ones of said platforms for limiting the downward disposition of said platforms to the horizontal, to support the same thereat.

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