

W. E. GREENOUGH, S. B. DAVIS AND A. KRAGTORP.

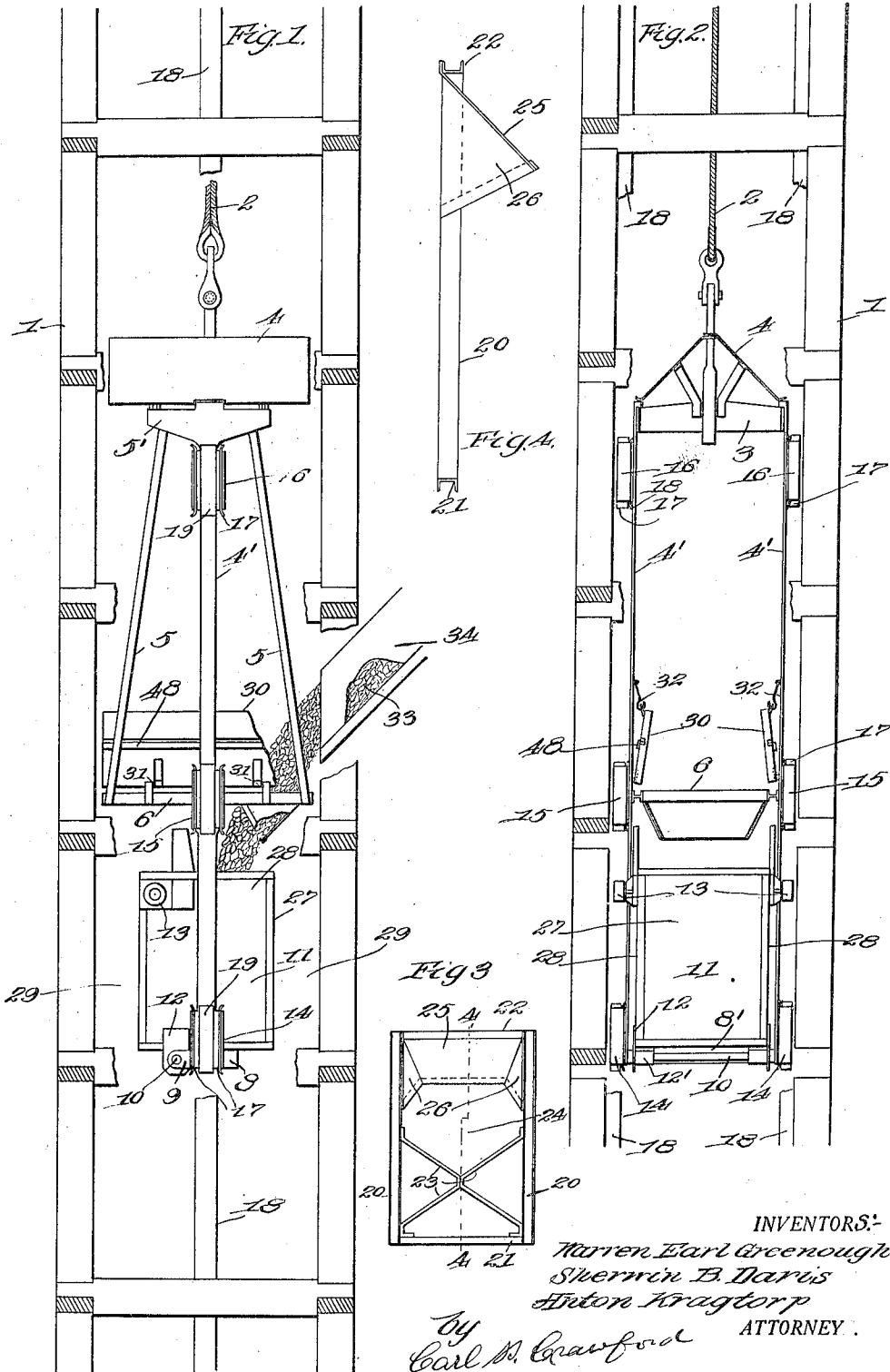
MINE HOISTING APPARATUS.

APPLICATION FILED APR. 13, 1918.

1,317,366.

Patented Sept. 30, 1919.

2 SHEETS—SHEET 1.



INVENTORS:

Warren Earl Greenough
Sherwin B. Davis
Anton Kragtorp

ATTORNEY.

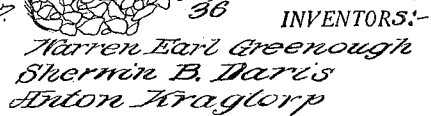
by
Carl M. Crawford

MINE HOISTING APPARATUS.

Patented Sept. 30, 1919.

2 SHEETS--SHEET 2.

1,317,366.



ATTORNEY

By
Carl M. Crawford

UNITED STATES PATENT OFFICE.

WARREN EARL GREENOUGH AND SHERWIN B. DAVIS, OF SPOKANE, WASHINGTON, AND
ANTON KRAGTORP, OF MULLAN, IDAHO; SAID DAVIS AND SAID KRAGTORP AS-
SIGNORS TO SAID GREENOUGH.

MINE HOISTING APPARATUS.

1,317,366.

Specification of Letters Patent.

Patented Sept. 30, 1919.

Application filed April 13, 1918. Serial No. 229,427.

To all whom it may concern:

Be it known that we, WARREN EARL GREENOUGH, SHERWIN B. DAVIS, and ANTON KRAGTORP, the first two being citizens of the United States, residing at Spokane, in the county of Spokane and State of Washington, and the last named being a citizen of the United States, and residing at Mullan, in the county of Shoshone and State of Idaho, have invented new and useful Improvements in Mine Hoisting Apparatus, of which the following is a specification.

This invention relates to improvements in hoisting apparatus and has to do more particularly with an improved cage and skip structure for mines.

One of the features of this invention is to provide a cage and skip structure having a rigid frame, this frame including a rigid deck frame. In this combination, it is a feature of our invention to provide a dump-way through the rigid deck frame whereby material in storage bins, or ore pockets, at different elevations in the shaft can be dumped through the rigid deck frame into the subjacent skip. Our improved deck frame is provided with one or more floor sections which may be adjusted into an open position to permit of passage of the material through the rigid deck frame, or which may be closed down onto the deck frame to form a suitable floor. In this connection, it is a feature of our invention to provide the deck frame with an apron which is suitably arranged to guide the material into the skip. Thus with a rigid deck frame, which may be designed to fit the shaft, and allow suitable working clearance, and by reason of this apron, we are able to convey material from the storage bins, or ore pockets into the subjacent skip without danger of pieces of material falling into the shaft. Furthermore, we are able to provide a rigid deck frame of substantially the size of the shaft, with allowance for clearance, and the size of the shaft and deck frame are not in any way dependent upon the size and capacity of the skip.

Because of the foregoing construction, we are able to dispose the skip in very close subjacent relation to the deck frame, with the result that the height or length of our combined cage and skip structure can be

very greatly reduced, the advantage being that the head room between the sheave wheel and the point of discharge of the skip can be much less than is necessary with the cage and skip combinations heretofore used.

Furthermore, by reason of the improved means set forth for conveying the material into the skip, we can employ a skip of any desired capacity in any of the usual size mine shafts, the height of the skip being sufficient to dump the material outside the shaft timbers when the skip is in a dumping position, and the desired skip capacity being obtained by properly selecting the cross sectional dimensions of the skip.

A further feature of our invention consists in the provision of novel means whereby our improved cage and skip structure may also be used in shaft sinking. This feature of our invention includes extensible guide shoe means whereby the cage structure may be retained in guiding registry with the guides when the skip is lowered to the bottom of the sump. This improved means, specifically speaking, includes in addition to the usual shoes, auxiliary shoes, which are connected by wearing plates or strips of such length that adjacent superposed shoes may be connected to form a continuous and elongated shoe. This feature of our invention includes auxiliary shoes extending above the cross-head of the cage so that when the latter has descended below the lower extremities of the last finished guides, the wearing plates will still be in engagement with said guides throughout a considerable length.

Other features and objects of our invention will be more fully described in connection with the accompanying drawings and will be more particularly pointed out in and by the appended claims.

In the drawings:

Figure 1, is a view in side elevation of our improved combination cage and skip structure showing the skip in receiving relation with respect to a storage bin chute.

Fig. 2, is a view looking from the left of Fig. 1.

Fig. 3, is a detached plan view of our improved rigid deck frame.

Fig. 4, is a longitudinal sectional view of said deck frame on line 4—4 of Fig. 3.

Fig. 5, is a view showing our improved structure used for sinking a shaft, the skip being lowered to the bottom of the sump.

Fig. 6, is a view looking from the left of Fig. 5.

Fig. 7, is a face view of one of the shoes showing the same equipped with relatively short wearing plates such as are used when operating in a working shaft.

Fig. 8, is a view showing a shoe provided with elongated wearing plates of sufficient length to connect adjacent super-posed shoes, such as will be used in sinking operations.

Fig. 9, is a sectional view on line 9—9 of Fig. 8.

Like characters of reference designate similar parts throughout the different figures of the drawings.

First referring to Figs. 1 to 4, in which our invention is illustrated in its utility for a working shaft, we have shown the shaft timbers 1 conventionally, and sufficiently fully, not to require detailed description thereof, therefore we will immediately refer to the subject matter constituting our invention.

A hoisting cable 2, is connected with a cross-head 3, in the usual manner, a hood 4, being super-imposed thereon. To the cross-head 3, is suspended a rigid framework consisting of main vertical frame members 4', which preferably extend coextensive of the length of the entire structure. Deck supporting frame members 5, extend from the deck 6, to which they are fastened, to upper extensions 5', of the vertical frame members 4'. The lower ends of the vertical frame members 4' are suitably connected at 8, by a cross-piece 8', and at 9, by skip hinge shaft 10. A skip 11, is mounted upon the frame in subjacent relation to the deck 6, and brackets 12, and journals 12', connect the skip with the hinge shaft 10. Suitable dump rollers 13, are provided on the skip for engagement with dump guides, not shown. Along the vertical frame members 4', in suitable spaced relation, are sets of lower, intermediate and upper shoes 14, 15 and 16, which are provided with wearing plates 17, for engagement with the sides of the guides 18, and face plates 19, for engagement with the faces of the guides 18. It will be noted that the terminal ends of the plates are suitably flared, as usual.

The deck frame 6 is proportioned to fit the shaft with the slight necessary working clearance, it being understood that these cage skips are specially designed and worked out for the particular type of shaft which is to be equipped therewith. It is of special advantage, in many ways, as hereinafter more fully set forth, to have a deck closely fitting the shaft, and it is also a great advantage to have the deck frame en-

tirely rigid. Thus our improved deck frame may consist of lateral frame members 20, and end frame members 21 and 22. Near one end, the frame is suitably braced, as indicated at 23, thereby leaving a dump-way 24. These braces serve as a foot support to the operator when the car is at rest, and the doors are opened. An apron is mounted upon the deck frame and the same is shown as having a bottom material guiding wall 25, extending downwardly and inclined inwardly from end frame member 22, the apron also including side walls 26 which incline inwardly and downwardly from the lateral frame members 20. Thus this hopped construction of apron will serve to guide the material into the skip without risk of the material falling into the shaft with possible resultant injury. From Fig. 1, it is clear how the material will be guided and delivered into the skip 11, inside of one side wall 27 thereof, and from Fig. 2, it will be clear how the material will be directed inside of the remaining walls 28, of said skip.

Furthermore, with a rigid deck structure or frame, it will be seen that by dumping through the deck, we are able to dispose the skip in very close subjacent relation to the deck, thereby greatly shortening the entire length of the cage skip.

The deck 6, is provided with one or more floor sections 30, which will preferably be hinged to the deck frame as indicated at 31, and which may be retained in an open position by any suitable expedient such as hooks 32. In Figs. 1 and 2, the floor sections are shown in an open position to permit the material 33 to pass from the storage bin chute 34, through the rigid deck frame, into the skip 11. Obviously, the floor sections will be closed, at other times, thereby affording a floor area surface substantially equal to the cross section of the shaft, on which to support structural parts, material and men, in elevation or descent in the shaft.

In Figs. 5 and 6 we have shown how, with only a slight modifying attachment, our cage skip can be used in sinking a shaft. The shaft timbers 35 are shown completed down to a certain elevation above the bottom of the sump 36. The guides 37 terminate at 38. The device of our invention is shown lowered so that the bottom of the cage skip frame rests upon the muck or other material 39, forming the bottom of the sump. Thus it will be seen that the cross-head 3 is disposed a considerable distance below the lower ends 38, of the guides 37. Therefore, the skip-cages now in use, and now known to us, would be out of shoe registry with the guides, entirely, if they were used for shaft sinking, and disposed in the position illustrated in Figs. 5 and 6. As a matter of fact, however, the usual cage skip used for working a shaft, is not used at all for sinking a

shaft, (a separate device being used for this purpose) and therefore it is a feature of our invention to provide a cage-skip which will serve equally well in either utility.

5 As in Fig. 1, the lower shoes 14 are provided with the short wearing plates 17 and 19. However, the intermediate shoes 15, and the upper shoes 16, are connected by elongated wearing plates, the plates 39 engaging
10 the sides of the guides, when elevated, and the plates 40 the faces of the guides. At each end, these plates are flared, as indicated at one end at 41 and 42. Secured to the vertical frame members 4' are auxiliary
15 lower shoes 43, which are of the same construction as the usual shoes 14 to 16. Above the cage-skip are upper auxiliary shoes 44. These shoes 44 are connected by a shoe bar 45, which will serve to hold these shoes firmly
20 in position with respect to the guides 37. The shoe bar 45, may be hubbed, as indicated at 46, for passage therethrough of the hoisting cable 2. Shoes 43 and 44, are connected by side wearing plates 47, identical with
25 plates 39. However, the face wearing plates 40, are of sufficient length to reach from shoes 15 to shoes 44, thereby affording a continuous guide face engagement of exceptional length.

30 Now, therefore, it will be clear that while our cage-skip can be lowered a considerable distance below the guides 37, it will be in guiding engagement therewith so that when the cage-skip is elevated, the face plates 40
35 and the side plates 47, will maintain the upper ends of the plates 39 in engageable registry with guides 37.

The floor sections 30, are provided with rails 48, which extend throughout the length
40 of said section. Thus the mine transfer car can be run onto and off from the deck, as a direct result of the deck being rigid. Further, by arranging the floor sections 30 with their greatest length coincident with the passage-way through the cage, the rails 48 need
45 not be in sections but each can be made of one piece, without a break therein.

A rigid deck frame has very great advantages over a collapsible deck frame in
50 that the rigid frame may be proportioned to fit the shaft, with slight working clearance, and therefore it substantially fills the shaft, transversely, and is thus very effective against dropping of materials off from the
55 deck down into the shaft, and further, it prevents the operatives from getting their arms or legs caught between the deck and shaft.

Our invention provides for the utmost
60 flexibility of proportions in designing this structure for a shaft. For instance, it will be clear that the skip must be of sufficient height from the axis of the shaft 10, to the top of the skip, so that when the skip is inverted to a dumping incline of say 50 de-

grees, it will have sufficient reach to dump its contents outside of the shaft. Given this height; if the skip were proportioned to have clearance fit with the full cross section of the shaft, it would have a capacity
70 for content in excess of the engine power of the usual mine. Therefore, with our construction of rigid deck frame and apron, we can reduce either transverse dimension of the skip, to provide for the desired capacity, and we can always correspondingly proportion the apron so that material will always be discharged into the skip irrespective of reduction of the latter with respect
80 to the shaft.

It is believed that the advantages and utility of our invention will be fully understood from the foregoing description, and while we have herein shown and described specific forms of our invention, we do not
85 wish to be limited thereto except for such limitation as the claims may import.

We claim:

1. In a mine shaft hoist, a combined skip and cage structure comprising a main rigid
90 frame, a rigid cage deck frame on said main frame, a skip mounted on said main frame in sub-jacent relation to said deck and of reduced cross section with respect thereto, said deck having a dump-way therethrough
95 for passage of material into said skip, whereby said skip may be located in close relation beneath said deck to thereby relatively shorten the height of said frame.

2. In a mine shaft hoist, a combined skip
100 and cage structure comprising a rigid frame, a cage deck on said frame proportioned to run in said shaft with a slight edge working clearance, a skip on said frame beneath said deck and of greatly reduced cross sectional dimensions with respect to said deck,
105 said deck having a dump-way therethrough for passage of material into said skip, whereby said skip may be located in close relation beneath said deck to thereby relatively shorten the height of said frame.
110

3. In a mine shaft hoist, a combined skip and cage structure comprising a rigid frame, a cage deck on said frame, a skip mounted
115 on said frame beneath said deck, said deck having a dump-way therethrough for passage of material into said skip, and an apron carried by said deck for guiding the material into said skip.

4. In a mine shaft hoist, a combined skip
120 and cage structure comprising a rigid frame, a cage deck on said frame, a skip on said frame beneath said deck, said deck having a dump-way therethrough for passage of material into said skip and an apron carried
125 by said deck and projecting downwardly therefrom and inclined toward said skip to guide the material into said skip.

5. In a mine shaft hoist, a combined cage and skip structure comprising a rigid hoist
130

frame, a cage deck frame mounted on said hoist frame and having a dump-way therethrough, and said deck frame being proportioned to fit the shaft with a slight working clearance, a skip mounted on said hoist frame beneath said deck and of reduced cross sectional dimensions with respect to said deck, said deck frame having a dump-way therethrough and being provided with an apron inclined downwardly to guide the material into said skip, and floor sections on said deck frame openable for passage of the material through said deck frame and closable down onto said deck frame to form a deck floor.

6. In a deck frame structure for a combined mine shaft cage and skip, a deck frame having a dump-way therethrough, an apron mounted on said frame, and a floor section or sections closable onto said frame to form a floor or openable for passage of the material through said frame.

7. In a mine shaft hoist for sinking, a combined cage and skip structure, and guiding means carried by said structure and extending sufficiently thereabove to retain engagement with the shaft guides when the skip is lowered to the sump.

8. In a mine shaft hoist for sinking, a combined cage and skip structure, usual shoes on said structure for engagement with the guides of the shaft, and said structure having means extending sufficiently above said structure to retain engagement with the shaft guides when the skip is lowered to the sump and thereby register the usual shoes with such guides when the structure is hoisted.

9. In a mine shaft hoist, a combined cage and skip structure having vertically arranged shoes, relatively short guide wearing strips for said shoes when said structure is used for mining in completed shafts, and relatively long guide wearing strips of sufficient length to extend from one shoe to the next shoe when said structure is used for sinking.

10. In a mine shaft for sinking, a com-

bined cage and skip structure having lower, intermediate and upper shoes, short wearing strips for said lower shoes, long wearing plates having their upper ends secured to said upper shoes and their lower ends secured to said intermediate shoes to form elongated wearing shoe plates when sinking, auxiliary shoes secured to said structure above said upper shoes, top auxiliary shoes above said structure, a shoe bar holding said top auxiliary shoes in position with the shaft guides, elongated side wearing plates having their lower ends secured to said lower auxiliary shoes and their upper ends secured to said top auxiliary shoes, and edge wearing plates secured to said intermediate shoes and extending past said top and lower auxiliary shoes and being secured to said top auxiliary shoes.

11. In a deck frame structure for a combined cage and skip, a deck frame having a dump way therethrough, an apron mounted on said frame and projecting therebelow, floor sections hinged to said deck frame and adapted to be opened to permit of passage of material through said deck frame and closed onto said deck frame to form a floor, and rails secured to said floor sections to permit a transfer car to be run onto or off from said deck.

12. In a main shaft hoisting apparatus, a combined cage and skip, an open deck frame above said skip for passage of material through said frame down into said skip, an apron projecting downwardly through one portion of said open frame to guide the material into said skip, floor sections for said deck frame hinged to open away from the central portion of said frame, and a skeleton operator's support mounted in another portion of said open frame for support of the operator when said floor sections are open.

In testimony, that we claim the foregoing as our own, we hereby affix our signatures.

WARREN EARL GREENOUGH.

SHERWIN B. DAVIS.

ANTON KRAGTORP.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."