D. F. LEPLEY.

MINE SKIP.

APPLICATION FILED JAN. 17, 1919.

1,304,784.

Patented May 27, 1919.

5 SHEETS—SHEET 1.

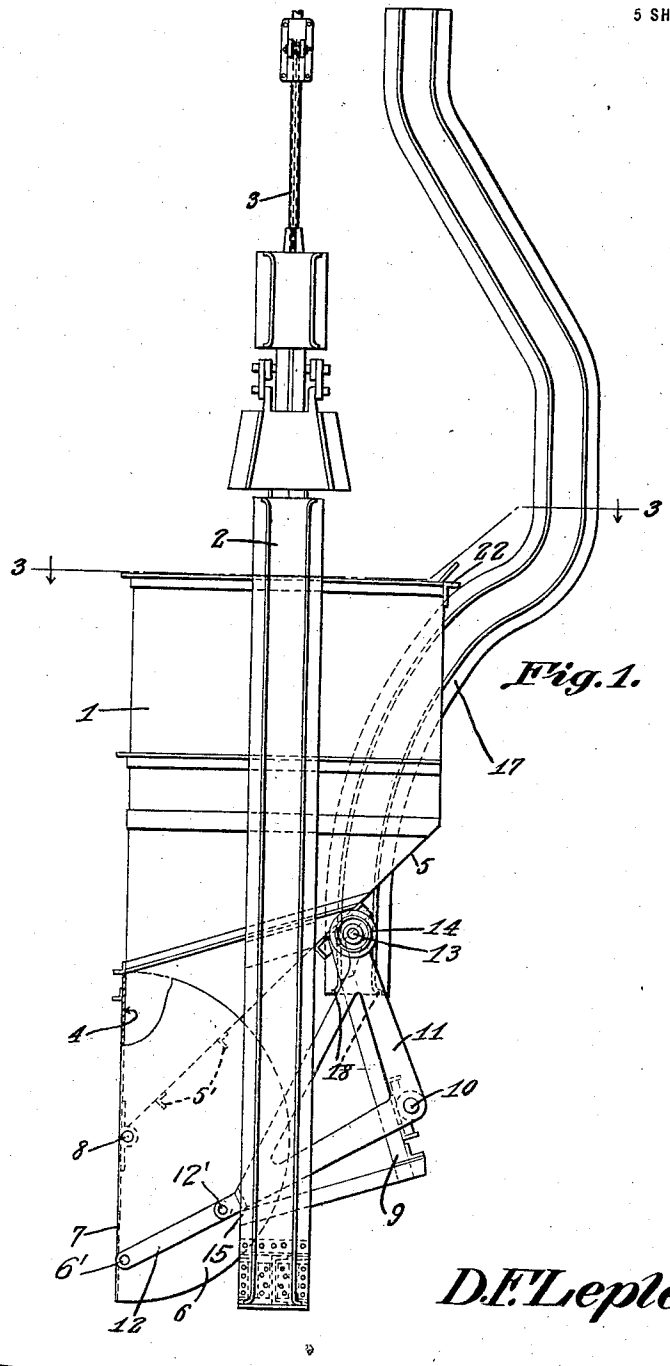


Fig. 1.

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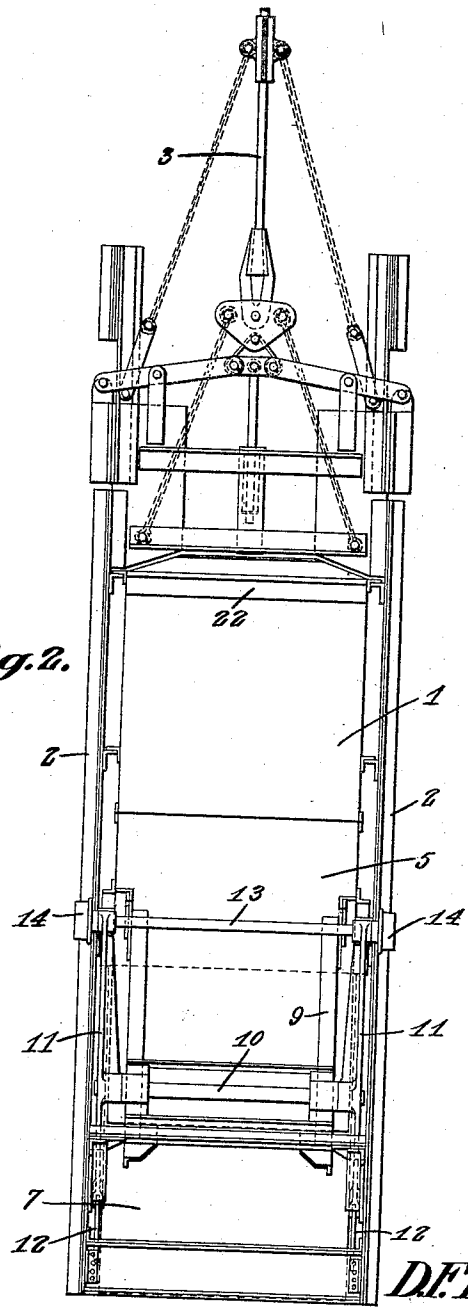
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5 SHEETS—SHEET 2.

Fig. 2.



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5 SHEETS—SHEET 3.

Fig. 3.

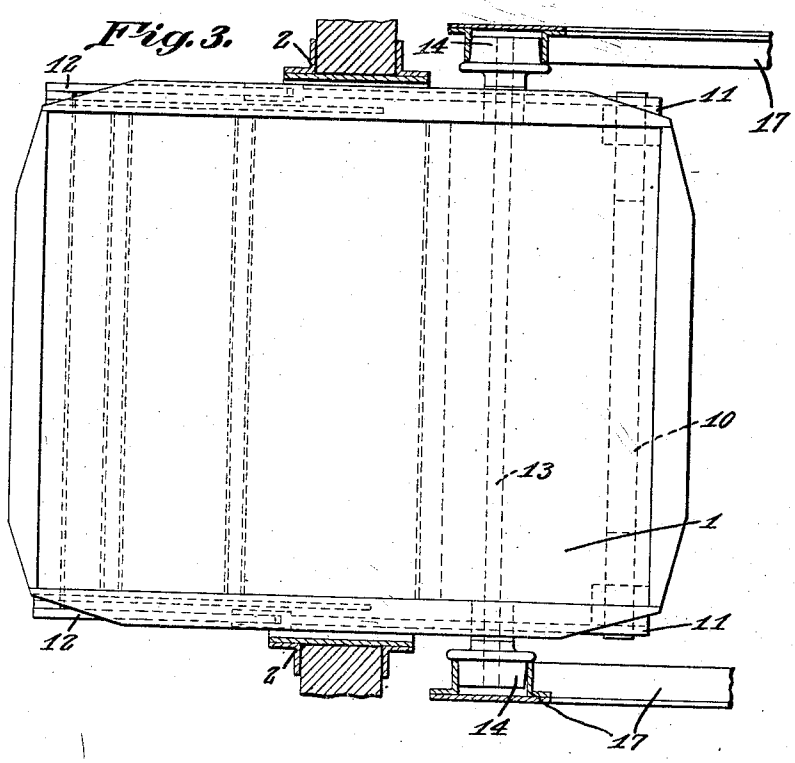
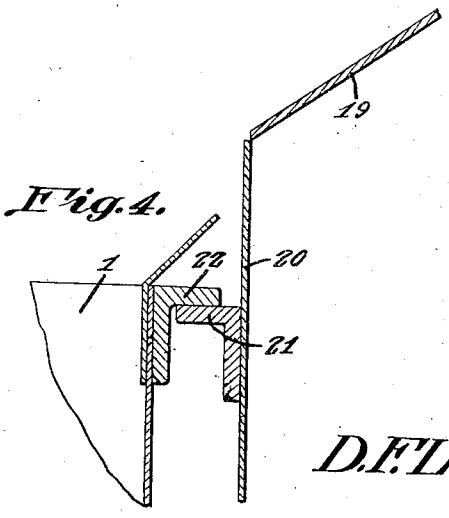


Fig. 4.



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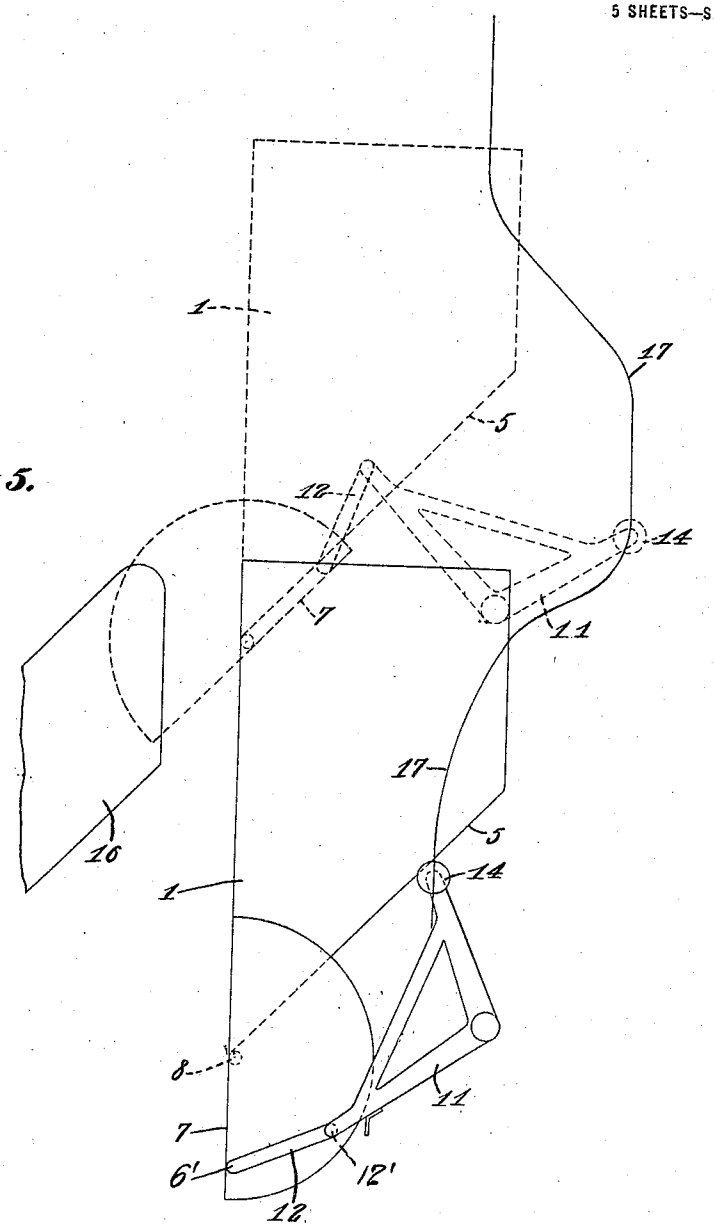
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5 SHEETS—SHEET 4.

Fig. 5.



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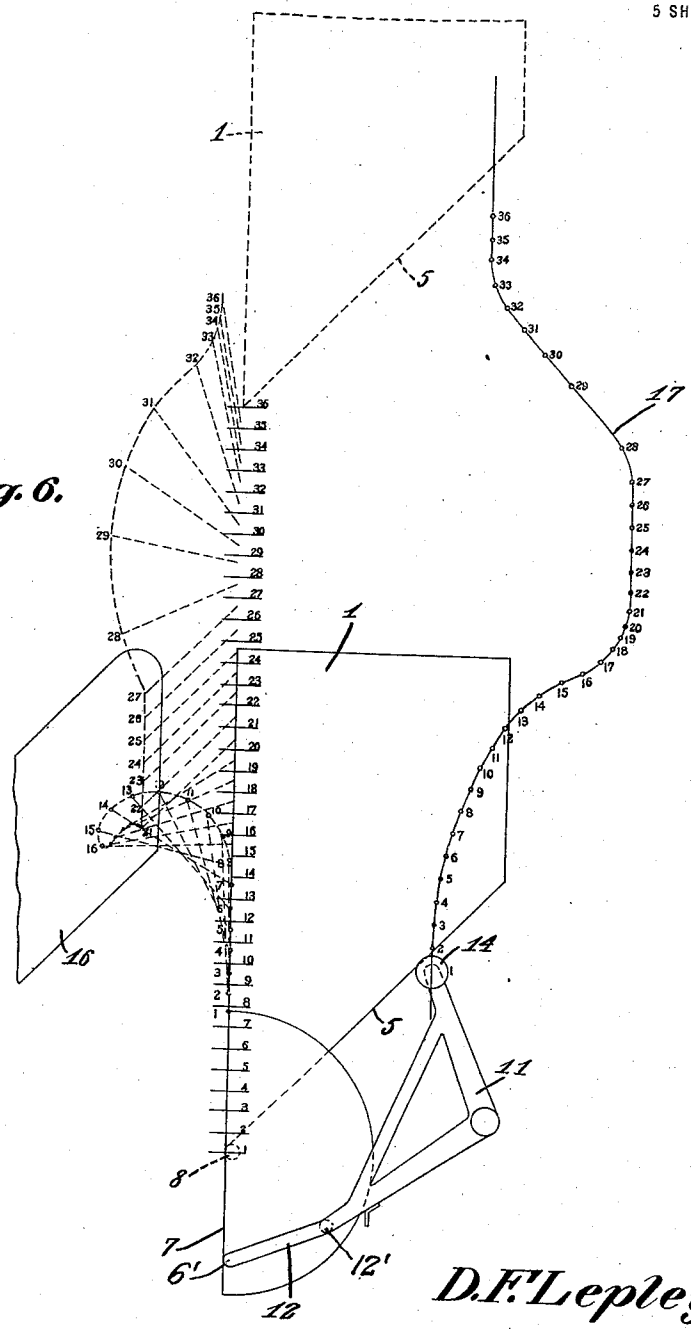
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5 SHEETS—SHEET 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

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MINE-SKIP.

1,304,784. Specification of Letters Patent. Patented May 27, 1919.

Application filed January 17, 1919. Serial No. 271,661.

To all whom it may concern:

Be it known that I, DANIEL F. LEPLEY, a citizen of the United States, residing at Connellsville, in the county of Fayette and State of Pennsylvania, have invented a new and useful Mine-Skip, of which the following is a specification.

This invention relates to mine skips.

One of the objects of the invention is to provide a skip that will discharge its load out of the bottom thereof, and is non-tiltably connected to its upright hoist bail, thereby to avoid the many objectionable features of the ordinary overturning skip, without introducing other new undesirable features.

Another object is to provide a skip hoist that is always balanced, whether loaded or empty, and in which the empty skip at the delivery position will lose no portion of its weight as a counterbalance to the loaded skip at the bottom, thus avoiding the excessive unbalanced starting load present where overturning skips are used.

A further object is to provide a skip having a combined gate and chute which will safely retain the contents of the skip while in transit, and which will discharge the same from the bottom of the skip into a receiving chute without danger of spilling any portion of the contents of the skip into the shaft.

Another object is to provide a complete and positive mechanical control of the chute or gate throughout the entire unloading cycle, both in opening and closing, so that no slamming nor injurious shocks to the operating parts is possible.

A further object is to provide mechanism of this character so constructed and arranged that the opening of the combined gate and chute is effected gradually and easily during the retarding or last stage of the hoist cycle, and the closing, of the same is effected during the acceleration or first stage of the lowering cycle, thus to avoid all manual operations and delays in discharging the load.

A still further object is to provide a skip that will adapt itself to the handling of the maximum output with the minimum initial money outlay for shaft and tipple structure, this being due to the small size of the shaft and tipple portions necessary as compared with other forms of skips of equal tonnage, it being unnecessary to provide special and expensive means in the top of the tower to prevent overwinding of the empty skip, such provision being avoided because of the means employed to return the gate to normal or closed position when the hoisted skip is moved above its discharge position.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts which will be hereinafter more fully described and pointed out in the claims, it being understood that various changes may be made in the construction and arrangement of the parts without departing from the spirit or sacrificing any of the advantages of the invention as set forth in the appended claims.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:

Figure 1 is a side elevation of the skip and showing the relative positions of the parts when the skip is approaching its delivering position.

Fig. 2 is a rear elevation of the structure shown in Fig. 1.

Fig. 3 is a section on line 3—3, Fig. 1.

Fig. 4 is an enlarged section through a portion of the top of the skip and through a portion of the chute at the bottom of the shaft, and showing their relative positions during the loading of the skip.

Fig. 5 is a diagram showing the relative positions of the skip and delivery chute at two points in the operation of the skip, the positions of the parts while the skip is ascending or descending being shown by full lines and, while delivering, by dotted lines.

Fig. 6 is a diagram illustrating the relative movement of the parts to bring delivery spout to delivering position.

Referring to the figures by characters of reference, 1 designates the container or body portion of the skip mounted in a frame 2 the sides of which are adapted to engage the guide rails in the mine shaft and which frame can be of any desired construction. A portion of the hoisting rigging connected to the upper portion of the frame 2 has been shown at 3, and neither the frame nor the hoisting structure constitutes, in itself, any part of the present invention.

The bottom of the body 1 is inclined and its lower end forms the bottom wall of the outlet opening 4 in one wall of the body. This bottom 5 is reinforced by transverse angle strips 5′ and extends between segmental

wings 6 provided at the sides of a combined gate and discharge chute 7 which is hingedly connected at its center to the lower end of the bottom 5, as shown at 8. An angular extension 9 is provided on the frame 2 and under the bottom 5 and journaled on this extension is a transverse shaft 10 to the ends of which are secured bell cranks 11. The lower arms of the bell cranks are connected by links 12 to the points 6′ on the respective wings 6, thus forming toggles, while the upper arms of the bell cranks are connected by a shaft 13 to the ends of which are secured wheels 14. A stop 15 is provided in the frame 2 against which the toggle arms of the bell cranks 11 normally rest and when the parts are thus positioned the points 12′ where the bell cranks are connected to the links 12, are slightly below the plane occupied by the axis of shaft 10 and the points 6′. Thus the gate and chute 7 is locked in position so as to close the opening 4 while the skip is traveling within the mine shaft.

A delivery chute 16 is mounted with its upper end close to the shaft in which the skip is arranged to travel and supported at the sides of the path of the skip and near the chute 16 are tripping rails 17 adapted to be engaged by and to shift the rollers or wheels 14. The rails are constructed in any manner desired so as to provide channels in which the wheels can travel and each rail begins at a point below the level of the top of the chute, where a wheel 14 can enter the channel readily during the upward movement of the skip, the sides of the channel, at the lower end, being preferably flared slightly, as shown at 18, to prevent the wheels from pounding against the rails should they be slightly out of line from any cause. From its lower end each rail follows a curve such as disclosed in diagram at 17 in Fig. 6 and extending to a point above the chute 16. As the wheels 14 move successively to the different positions numbered from 1 to 36 along the curved rail 17 in Fig. 6 the hinge 8 moves to the different positions indicated by the right hand column of figures at the left of Fig. 6, and the upper end of the gate or chute 7 moves successively to the positions indicated by the series of numerals at the left of Fig. 6. This tilting of the gate or chute 7 is obviously controlled by the speed of movement of the skip and when the chute 7 reaches the chute 16, the bell cranks 11 are tilted at the proper time and speed to lift the connections 12′ to unlock the gate or chute 7 and to swing it so that it comes to delivering position and then swings upwardly to closed position should the skip move too far above the delivery chute 16, due to overwinding.

It will be noted that the operation of the combined gate and chute 7 is gradual and free of all pounding such as would be caused should one part be compelled to strike directly against another part and which pounding would soon produce breakage of some of the parts. It will also be noted that should the delivery chute 7 be raised too high, it will not become released and hang down within the mine shaft, but will be moved to closed or partly closed position so that the contents of the skip will not be wasted by spilling down the shaft. The bell cranks 11 and the links 12 form toggles and coöperate to lock the discharge spout or gate 7 in closed position when at points below the chute 16, thus preventing said chute 7 from swinging to a position upside down while in transit within the shaft.

In Fig. 4 has been shown a portion of a loading chute 19 having a vertically sliding gate 20 provided with a flange 21. Thus when the skip is brought to position at the bottom of the shaft the flange 22 at the top of the skip will strike and depress the flange 21 on the gate 20 and open the gate by moving it downwardly relative to the chute 19. Thus material will gravitate from the chute to the skip as will be obvious.

What is claimed is:—

1. In a mine skip the combination with a container having an opening in one wall and a bottom inclined downwardly to the bottom of the opening, of a combined gate and chute hinged between its ends at the bottom of the opening and having side wings, a toggle movable with the container and connected to the gate for fastening the gate in closed position, and stationary means for shifting the toggle to open the gate during the upward movement of the container.

2. In a mine skip the combination with a container having an outlet opening, and a combined gate and chute normally closing the opening, of a toggle movable with the container and connected to the gate, means for supporting the middle joint of the toggle past the dead center to fasten the gate in closed position, an arm extending from the toggle, and stationary means in the path of the arm for shifting the toggle during the movement of the container, to open the gate.

3. In a mine skip the combination with a container having an outlet opening, and a combined gate and chute normally closing the opening, of a toggle movable with the container and connected to the gate, a stop, said toggle normally resting against the stop with its intermediate joint below the dead center, thereby to fasten the gate in closed position while in transit, and fixed means for shifting the toggle during the movement of the container to unfasten and open the gate.

4. In a mine skip the combination with a container having an outlet opening and a combined gate and chute normally closing

the opening, of a toggle movable with the container and connected to the gate, means for supporting the intermediate joint of the toggle past the dead center to fasten the gate in closed position, a stationary delivery chute near the path of the container, and stationary means coöperating with the toggle and controlled by the speed of movement of the container for unlocking the gate, and for swinging the gate to delivering position within and above the delivery chute and to closed position, during the upward and downward movement, respectively, of the container.

5. In a mine skip the combination with a container having an outlet opening and a combined gate and chute normally closing the opening, of a delivery chute fixedly mounted near the path of the container, and coöperating movable and fixed means on the container and adjacent the path of the container, respectively, for opening and closing the gate at a speed and to a degree dependent upon the speed and distance of movement of the skip.

6. In a mine skip the combination with a container having an outlet in one wall and an inclined bottom extending downwardly to the bottom of the outlet, of levers movable with the container, a combined gate and chute hinged to the bottom of the outlet, links connecting the levers and gate and forming toggles, the intermediate joints of the toggles being normally supported below their dead centers to fasten the gate in closed position while the container is in transit, a delivery chute, wheels upon the levers, and tripping rails in the paths of the wheels for shifting the levers to swing the gate to delivering position within the delivery chute during the upward movement of the container.

7. In a mine skip the combination with a container having an outlet in one wall and an inclined bottom extending downwardly to the bottom of the outlet, of a combined gate and chute into the bottom of the outlet, a toggle connected to the combined gate and chute and having its intermediate joint normally below the dead center to fasten the gate in closed position while the container is in transit, a delivery chute, a wheel connected to one of the members of the toggle, and means in the path of the wheel for shifting the toggle to unlock and swing the gate to delivering position within the delivery chute during the upward movement of the container and for returning the gate to normal or closed position when the container is moved upwardly above its discharge position.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

DANIEL F. LEPLEY.

Witnesses:
W. H. SOISSON,
B. C. BURKHARDT.

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