

March 4, 1947.

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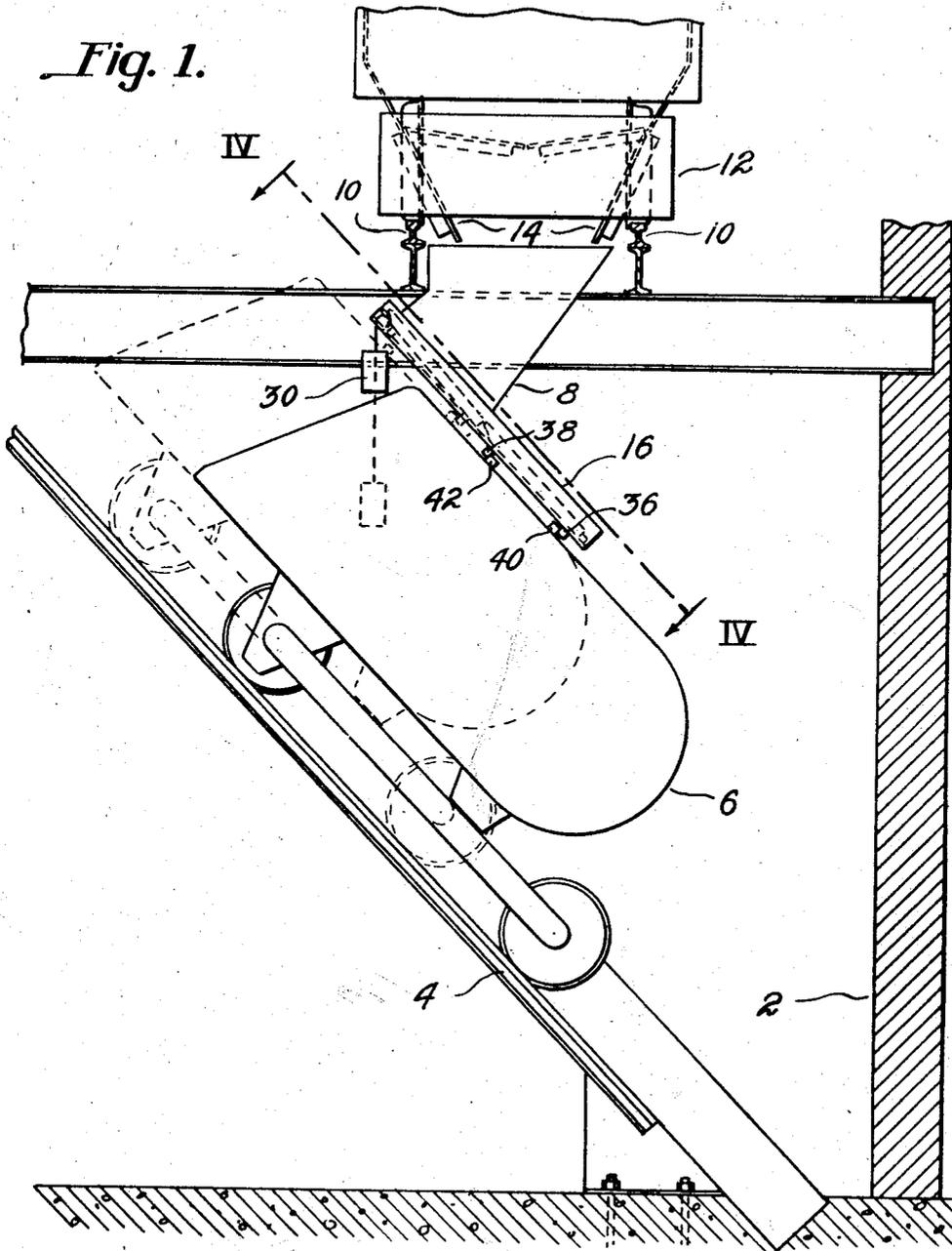
2,416,740

GATE FOR SKIP CAR CHARGING CHUTES

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3 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

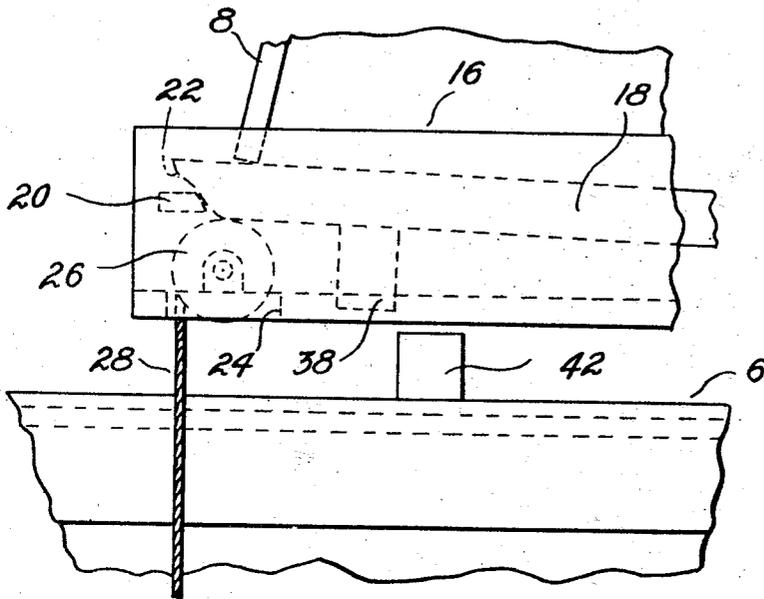
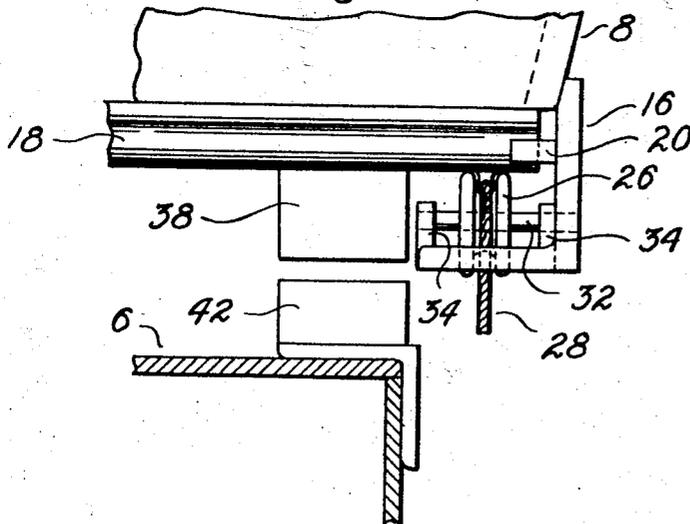


Fig. 3.



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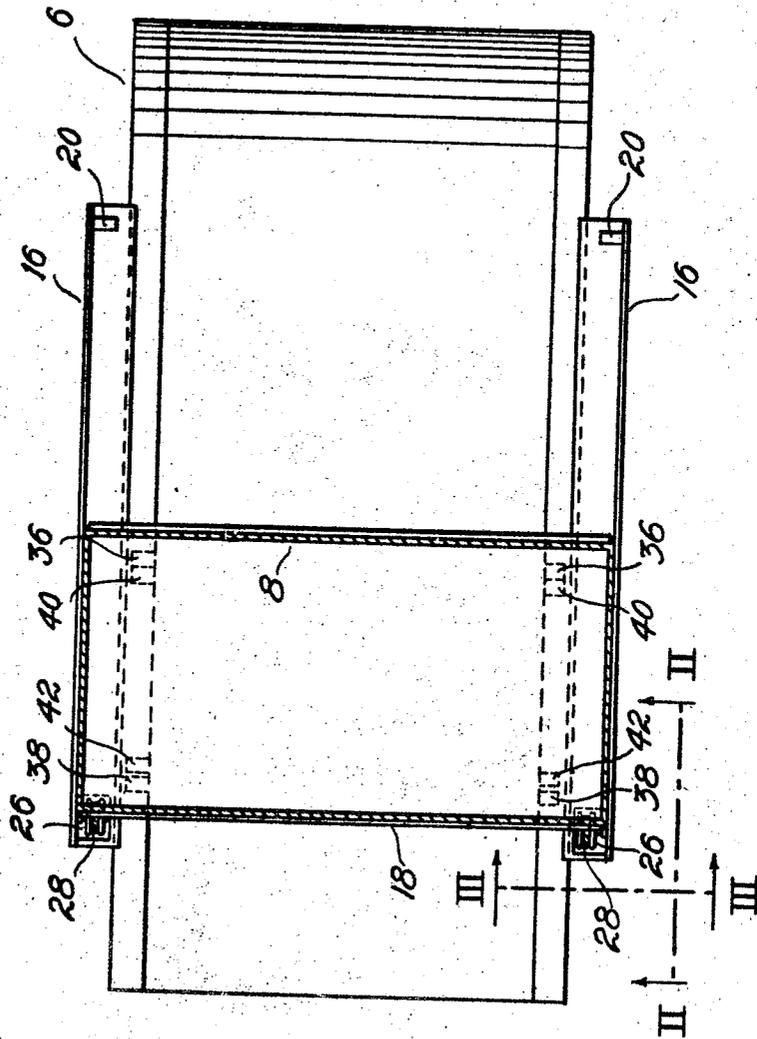
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Fig. 4.



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GATE FOR SKIP CAR CHARGING CHUTES

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4 Claims. (Cl. 214—125)

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This invention relates to an automatically operated gate for skip car charging chutes. In filling a blast furnace two skip cars operating on parallel inclined tracks are used to lift material from the stock house to the furnace top. Material is collected from overhead bins in a larry car equipped with bottom discharge doors, transported to a point over the skip pit and discharged through a chute into the skip car. The first skip is then pulled up the incline and the second skip, which serves as a counterbalance for the first, is lowered into the pit and the cycle is repeated.

Through failure of the operator to exercise due precaution, or through mechanical failure, the load from the larry car may be discharged when the skips are in motion or when the larry is centered over the wrong skip pit. In such cases the material is discharged through the chute into the skip pit where it must be cleaned up by hand, this being an arduous task which causes a loss of production. Since the chute opening is large, there is the danger that a workman will fall therethrough into the skip pit when the larry car is not located over the chute.

It is an object of my invention to provide a gate on the charging chute which will automatically open when the skip car enters the pit and automatically close when the skip car leaves the pit.

These and other objects will be more apparent after referring to the following specification and attached drawings, in which:

Figure 1 is an elevation of the gate with the skip car in the pit;

Figure 2 is an enlarged view taken on the line II—II of Figure 4;

Figure 3 is an enlarged view taken on the line III—III of Figure 4; and

Figure 4 is a view taken on the line IV—IV of Figure 1.

Referring more particularly to the drawings, the reference numeral 2 indicates a skip pit having an inclined track 4 therein. Mounted for movement on the track 4 is the usual skip car 6, which in its lowest position, is located under the charging chute 8. Mounted in the usual manner above the chute 8 are the rails 10 for supporting a larry car 12, which is equipped with bottom discharge doors 14. My invention consists in fastening a pair of steel angles 16 to the bottom of the chute 8 in any suitable manner, these angles being arranged with their bottom legs parallel to the rails 4 and facing each other. Mounted for sliding movement on the angles is a gate 18 which may be fabricated from steel

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plates. Stops 20 are welded or otherwise fastened to the ends of the angles 16 to prevent the gate 18 from riding off the ends of the angles. The gate 18 is provided with a beveled upper edge or cam surface 22 for a purpose which will appear later. The upper end of each of the angles 16 is cut out at 24 to provide clearance for a sheave wheel 26 over which passes a cable 28, one end of which is fastened to the gate 18 and the other end being attached to a counterweight 30. The sheave wheel 26 is supported on a shaft 32 carried in bearings 34 attached to the angle 16. To the bottom of gate 18 on each side thereof is fastened a pair of spaced apart lugs 36 and 38. Similar lugs 40 and 42 spaced apart a distance less than the distance between the lugs 36 and 38 are attached to the top of the skip car 6.

In operation the gate 18 and door 14 of the car 12 are open when the skip car 6 is in its lower position under the chute 8 as shown in full lines in Figure 1. After the car 6 is loaded, the doors 14 are closed and the skip car 6 starts its journey up the tracks 4 toward the top of the blast furnace. The lugs 42 at the upper end of the car engage the lugs 38 on the bottom of the gate 18 and carry it upwardly until the leading end of the gate 18 strikes the sheave wheels 26. The beveled edge 22 enables the gate to ride up over the sheave wheels, thus raising the lugs 38 out of engagement with the lugs 42 with the car 6 continuing its upward travel. The counterweights 30, which are in the lower broken line position shown in Figure 1, hold the gate 18 in this position. In case material or a workman falls into the chute 8, the gate 18 prevents the material or the workman from falling into the pit 2. After the load is dumped into the blast furnace, the skip car 6 returns to a position under the chute 8. As it nears this position, the lugs 40 on the car 6 engage the lugs 36 on the gate 18 and move the gate to its original open position. The cycle is then repeated.

While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. A safety device for a skip car charging chute comprising a gate attached to the bottom of the chute, said gate being slidable in a plane parallel to the direction of movement of the skip car, a pair of spaced apart lugs attached to the bottom of the gate, a pair of lugs on the top of said car

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spaced apart a distance less than the first pair of lugs, the lug on one end of the gate being engaged by the adjacent lug on the car to close the gate as the skip car departs from under the chute, and means for raising the gate to disengage the lugs when the gate is closed, the other lug on the car engaging the other lug on the gate to open the gate as the skip car arrives under the gate.

2. A safety device for a skip car charging chute in which the loaded skip car travels upwardly at an angle away from the chute, said safety device comprising a gate attached to the bottom of the chute, said gate being slidable in a plane parallel to the direction of movement of the skip car, means for holding the gate in position at each end of its travel, a pair of spaced apart lugs attached to the bottom of the gate, a pair of lugs on the top of said car spaced apart a distance less than the first pair of lugs, the lug at the upper end of the gate being engaged by the lug at the upper end of the car to close the gate as the car travels upwardly, and means for raising the gate to disengage the lugs when the gate is closed, the lower lug on the car engaging the lower lug on the gate to open the gate as the car travels downwardly under the chute.

3. A safety device for a skip car charging chute in which the loaded skip car travels upwardly at an angle away from the chute, said safety device comprising a gate attached to the bottom of the chute, said gate being slidable in a plane parallel to the direction of movement of the skip car, a rope attached to the front end of the gate, a counterweight at the end of the rope, a sheave wheel over which the rope passes, a pair of spaced apart lugs attached to the bottom of the gate, a pair of lugs on the top of said car spaced apart a distance less than the first pair of lugs, the lug at the upper end of the gate being engaged by the lug at the upper end of the car to close the gate as the car travels upwardly, said gate rid-

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ing up the sheave wheel to raise the gate and disengage the lugs when the gate is closed, the lower lug on the car engaging the lower lug on the gate to open the gate as the skip car arrives under the gate.

4. A safety device for a skip car charging chute in which the loaded skip car travels upwardly at an angle away from the chute, said safety device comprising a gate attached to the bottom of the chute, said gate being slidable in a plane parallel to the direction of movement of the skip car from a closed position to a lower open position, a cam surface on the upper end of the gate, a pair of ropes, one attached to each side of the gate, a sheave wheel for each of the ropes at the upper limit of travel of the gate, a counterweight at the end of each of the ropes, a pair of spaced apart lugs attached to the bottom of the gate, a pair of lugs on the top of said car spaced apart a distance less than the first pair of lugs, the lug at the upper end of the gate being engaged by the lug at the upper end of the car to close the gate as the car travels upwardly, the cam surface engaging the sheave wheels to raise the gate and disengage the lugs when the gate is closed, the lower lug on the car engaging the lower lug on the gate to open the gate as the skip car arrives under the gate.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|-----------|---------|---------------|
| 1,755,840 | Ross | Apr. 22, 1930 |
| 1,562,987 | Nagel | Nov. 24, 1925 |
| 1,335,531 | Shimizu | Mar. 30, 1920 |
| 1,746,359 | Morford | Feb. 11, 1930 |