Sept. 12, 1933. G. J. WALKER 1,926,693

CUPOLA CHARGER

Filed July 10, 1930

Fig. 1.

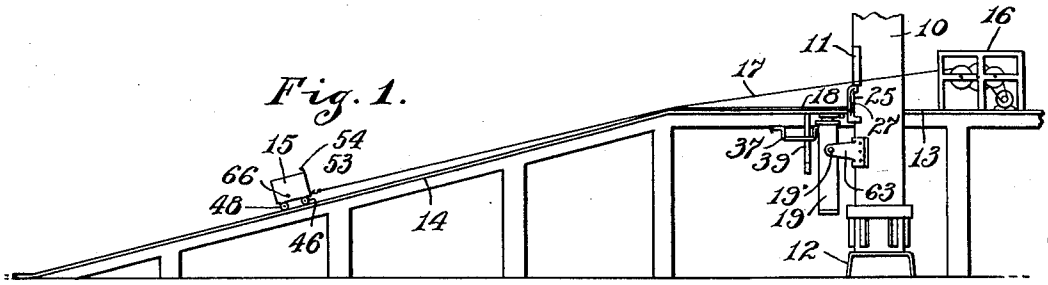


Fig. 2.

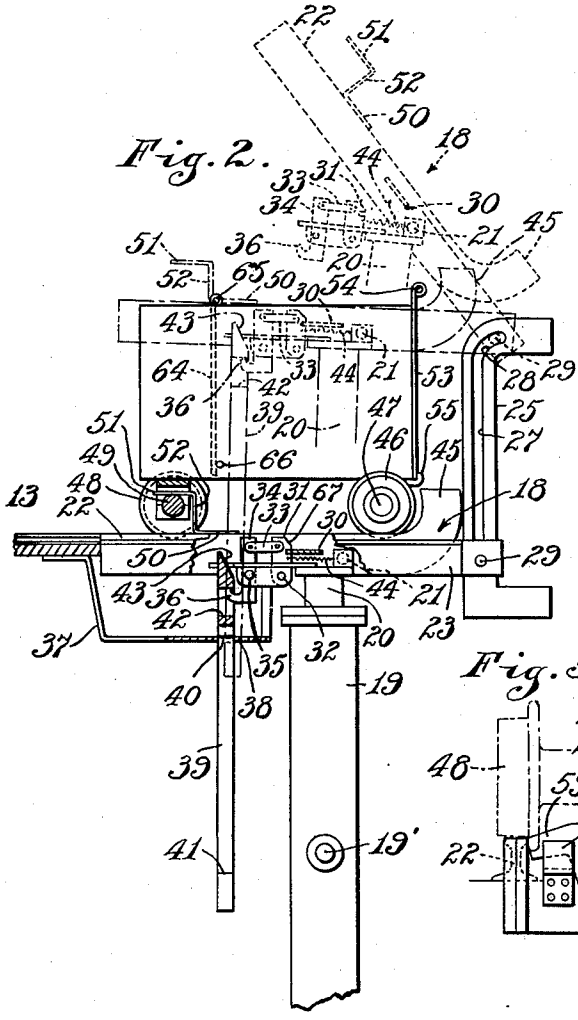


Fig. 3.

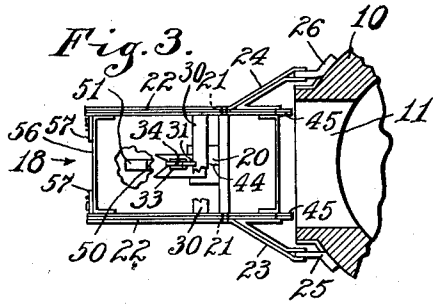


Fig. 4.

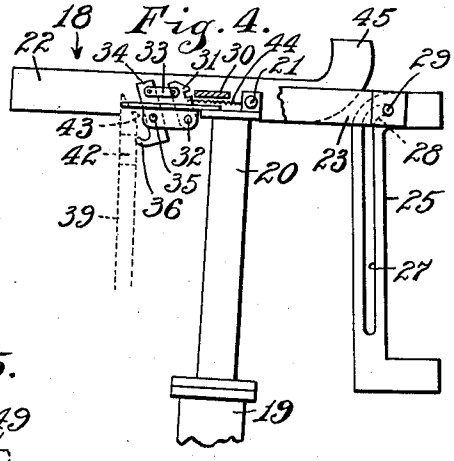
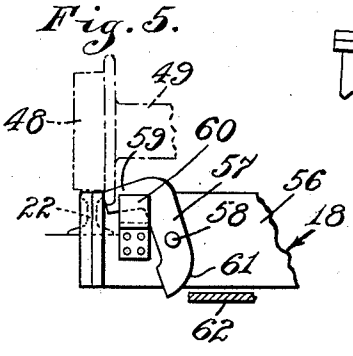


Fig. 5.



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1,926,693

CUPOLA CHARGER

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Application July 10, 1930. Serial No. 466,923

10 Claims. (Cl. 214—18)

The present application relates to cupola chargers, and the primary object of the invention is to provide a charging device for cupolas and other furnaces which shall be extremely simple and inexpensive, and at the same time, highly efficient. A further object of the invention is to provide an elevating and tilting platform of improved construction. A further object of the invention is to provide, in connection with such a platform, simple and highly efficient safety devices. Further objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, my invention may be embodied in the form illustrated in the accompanying drawing, attention being called to the fact, however, that the drawing is illustrative only, and that change may be made in the specific construction illustrated and described, so long as the scope of the appended claims is not violated.

In said drawing:

Fig. 1 is a more or less diagrammatic illustration of a charging device constructed in accordance with my invention;

Fig. 2 is a side elevation of a detail thereof, certain portions being shown in section for clarity of illustration;

Fig. 3 is a plan view, on a reduced scale, of the detail illustrated in Fig. 2, and showing a fragment of the cupola in horizontal section;

Fig. 4 is a fragmentary side elevation of a portion of the device illustrated in Fig. 2, the parts being shown in different positions; and

Fig. 5 is a fragmentary end elevation of a portion of the platform.

Referring more particularly to the drawing, it will be seen that I have illustrated a cupola 10 having a charging door 11 and mounted upon a base 12, the door 11 being located somewhat above a charging floor 13 which is at a considerably higher elevation than the base 12. An inclined ramp 14 carries a trackway and extends from the ground level to level of the floor 13, such trackway being adapted to mount a charging car 15.

Hoisting mechanism indicated generally at 16 and comprising one or more winding drums is mounted upon the floor 13 behind the cupola 10. That is, the cupola 10 is interposed between the ramp 14 and the winding mechanism 16. A cable 17 has its one end secured to the drum of the winding mechanism 16, and the opposite end of said cable is adapted to be attached to the car 15.

As illustrated, the trackway extends to a point slightly spaced from the cupola 10, and a platform, illustrated generally at 18, bridges the space between the end of said trackway and the cupola. The platform 18 and its associated elements are illustrated in detail in Fig. 2.

A fluid pressure cylinder 19 is mounted to pivot upon a horizontal axis 19', said cylinder being preferably carried upon brackets 63 secured to the body of the cupola. A piston 20 is reciprocably received in said cylinder 19, and the platform 18 is pivotally mounted, as at 21, upon the upper projecting end of the piston 20. Said platform carries track rails 22 adapted to register with the rails carried upon the ramp 14 and the charging floor 13.

From the opposite sides of the forward end of the platform 18 there project arms 23 and 24 adapted to cooperate respectively with guide brackets 25 and 26 preferably secured to the body of the cupola 10. Each of said brackets is formed with a substantially vertical guide slot 27, the upper ends of said slots being curved, as indicated at 28, toward a plane including the axis of the cupola and substantially parallel with the plane of the door 11. As is clearly indicated in Figs. 2, 3, and 4, each of the arms 23 and 24 is bifurcated at its outer end to embrace its respective bracket 25 or 26, and a pin 29 is mounted in the furcations of each of said arms and extends through its respective slot 27.

At a point spaced rearwardly from the point of pivotal mounting of the platform 18 on the piston 20, a cross piece 30 extends transversely across the platform below the upper surface of the rails 22. A latch member 31 is pivoted at 32 on a bracket secured to the upper end of the piston 20 and is adapted to engage the cross piece 30, being urged toward latching engagement with said piece by a coil spring 44. A pair of links 33 are pivoted at their one ends to the upper end of the latch member 31, and at their opposite ends, said links are pivoted to the upper end of a lever 34 pivoted at 35 to said piston-carried bracket. As is clearly shown in Figs. 2 and 4, the lower end of the lever 34 is formed with a laterally projecting finger 36.

Stationarily mounted below the charging floor 13 is a bracket 37 formed with a slot 38 in which is reciprocably mounted a trip bar 39, said bar being formed adjacent its upper end with a downwardly facing shoulder 40 and adjacent its lower end with an upwardly facing shoulder 41. The portion of said bar 39 between the shoulders 40 and 41 is of such dimensions as to slide smoothly within the slot 38, but the shoulders 40 and 41 are of such dimensions that they cannot pass through said slot.

At a point between the shoulder 40 and the upper end of the bar 39, said bar is formed with a recess which may, as illustrated, take the form of a slot 42, said recess being adapted to receive the finger 36 of the lever 34, whereby the bar 39 may be suspended from said finger. The upper extremity of the bar 38 is formed, as shown, as

a cam surface 43 for a purpose which will appear hereinafter.

The forward ends of the rails 22 are turned upwardly, as shown at 45, for cooperation with the front wheels 46 of the car 15 in preventing said car from rolling off of the platform when said platform is tilted. It is to be noted that the front wheels 46 are mounted upon separate stub axles 47 which do not extend across the space between said wheels; while the rear wheels 48 are mounted upon a single axle 49 which does extend transversely completely across the car. Between the rails 22 and adjacent the rear end of the platform 18 there is mounted a Z-shaped bracket 50 having a vertical portion 52 and a horizontal portion 51. As is clearly shown in Fig. 2, when the car 15 is moved onto the platform, the portion 51 of the bracket 50 engages the upper surface of the axle 49 to prevent the car 15 from toppling over when the platform is tilted, and the vertical portion 52 of said bracket engages the forward face of the axle 49, when the car is moved to its ultimate position on the platform 18, to assist in preventing the car from rolling forward off of the platform when said platform is tilted.

One form of car which I have found eminently suitable for use with the present device is provided with a dumping door 53 at its front end, said door being pivoted as at 54 at its upper end, and held in closed position by a latch 55 cooperating with the lower edge of the door, and adapted to be released by any suitable mechanism. As shown, the car may also include a dividing door 64 pivoted at its upper edge at 65 and adapted to be held in separating position by a removable pin 66.

To guard against the possibility of the car rolling backward off of the platform while said platform is elevated, I have provided the mechanism disclosed in Fig. 5. To the rear cross brace 56 there is pivoted, adjacent each end of said cross piece, a lever 57, said lever being pivotally mounted upon a pin 58. A finger 59 projects laterally from the upper end of said lever 57, the weight and position of said finger being such as to bias the lever 57 into the position shown wherein it projects into the path of the flange of the wheel 48. Preferably, a clip or bracket 60 is secured to the cross brace 56 in such a position as to embrace and reinforce the finger 59, when said finger is in the position illustrated in Fig. 5.

The bias of the lever 57 is such as to insure its assumption of the position illustrated in Fig. 5 unless it is positively moved and held out of such position. Of course, the finger 59 must be moved out of obstructing position to permit cars to be moved onto and off of the platform 18. Such movement of cars, however, should never take place except when the platform is in its lowermost position. To provide for the automatic positioning of the finger 59, the lower end of the lever 57 is cammed, as shown at 61, for cooperation with a member 62 secured to the floor 13 and projecting into the path of said lower end of the lever 57. It will be obvious from Fig. 5 that, as the platform 18 is moved downwardly slightly beyond the positon shown in Fig. 5, the projection 62 will engage the cam surface 61 of the lever 57 to move said lever in a clockwise direction, thus withdrawing the finger 59 from the path of the flange of the wheel 48.

In operation, a car 15 is loaded with a proper charge of materials for the cupola. The cable 17 is attached to the car, and the winding mechanism 16 is operated to draw the car up the ramp and onto the platform 18. The cable is then detached from the car, and fluid pressure is admitted to the bottom of the cylinder 19. As the piston 20 moves upwardly, the platform 18 is, of course, carried with it. The engagement of the latch member 31 with the cross piece 30 maintains the platform 18 in a substantially horizontal position as it moves upwardly. The pin 29 is thus caused to move upwardly through the slot 27. As the pin 29 enters the curved portion 28 of the slot 27, the platform 18 is shifted forwardly to enter the cupola door 11 slightly. Such movement is, of course, accompanied by tilting of the cylinder 19 about its pivot 19'. Almost simultaneously with this movement, the shoulder 41 comes into engagement with the bracket 37 and, as the piston 20 continues to move upwardly, the bar 39 holds back on the finger 36, thus causing counter-clockwise rotation of the lever 34 about its pivot 35 which, through the links 33, causes the latch member 31 to be moved against the tendency of the spring 44 out of latching engagement with the cross piece 30. This releases the platform 18 for tilting movement on its pivot 21, and further movement of the piston 20 causes the platform 18 to rotate about the pins 29, said pins being retained in the extremities of the curved portions 28 of the slots 27. The platform is thus brought into the ultimate dotted line position of Fig. 2, the doors 53 and 64 swing downwardly, and the contents of the car 15 are discharged into the cupola 10.

The counter-clockwise movement of the lever 34 which releases the engagement of the latch member 31 with the cross piece 30 likewise moves the finger 36 out of engagement in the recess 42, and the bar 39 is thus permitted to drop back into the position of Fig. 2, in which said bar is supported by the engagement of the shoulder 40 with the bracket 37.

Of course, the initial upward movement of the platform 18 carries the lower end of the lever 57 out of its engagement with the projection 62, thus permitting the finger 59 to fall into the position of Fig. 5.

After the contents of the car have been discharged, the fluid contained in the cylinder 19 is released, and the piston begins to subside. The platform 18 pivots about the pins 29 until the cross piece 30 engages the cammed surface 67 of the latch member 31. Normally, this engagement will move the latch member 31 in a counter-clockwise direction to permit the cross piece 30 to move into a position such that said latch member can spring into latching engagement therewith. Further downward movement of the piston 20 draws the pins 29 downwardly and outwardly through the curved portions 28 and down through the slots 27. As the platform approaches its lowermost position, the finger 36 engages the cam surface 43 at the extremity of the bar 39, and the lever 34 and latch member 31 are moved in a counter-clockwise direction. If the cross piece 30 has not already entered the latch slot of the member 31, this movement induced by the cooperation of the finger 36 with the cam face 43 permits the member 30 to move into such position. As the piston 20 reaches the lower extremity of its stroke, the finger 36 enters the recess 42 under the influence of the spring 44, and the projection 62 engages the cam surface 61 of the lever 57 to move the finger 59 out of obstructive relation with the flange of the wheel 48. The empty car 15 may

now be moved down the ramp, and a charged car may be brought up, and dumped in a similar manner.

I claim as my invention:

1. Car dumping mechanism comprising a platform adapted to support a car, a fluid pressure cylinder pivotally mounted beneath said platform, a piston received in said cylinder and wholly supporting said platform in a normally horizontal position, a guide, means on said platform cooperably engaging said guide, and means for supplying fluid under pressure to said cylinder to elevate said piston, said guide being formed to cause tilting of said platform out of such horizontal position upon elevation of said piston beyond a predetermined point.

2. Car dumping mechanism comprising a platform adapted to support a car, a fluid pressure cylinder pivotally mounted beneath said platform, a piston received in said cylinder, means pivotally securing said platform to said piston, a latch member mounted on said piston and engageable with said platform at a point removed from said securing means, means for supplying fluid under pressure to said cylinder to elevate said piston, and means for disengaging said latch member from said platform upon elevation of said piston beyond a predetermined point to permit said platform to tilt about said securing means.

3. In a device of the class described, a fluid pressure cylinder, a reciprocable piston operatively received in said cylinder, a platform pivotally mounted on said piston, a latch mounted on one of said pivotally associated elements and engageable with the other of said elements, said latch being biased toward such engagement, means for supplying fluid to said cylinder to move said piston in one direction, and means for overcoming the bias of said latch and for disengaging the same upon movement of said piston in such direction beyond a predetermined point.

4. In a device of the class described, a reciprocable member, a platform pivotally mounted on said reciprocable member, a latch mounted on one of said elements and engageable with the other, said latch being biased toward such engagement, means for moving said member in one direction, a lever operatively engaging said latch, a trip bar cooperable with said lever and normally movable therewith, and stop means arranged in the path of said bar, whereby, upon movement of said member in such direction, said bar is arrested by said stop means, and upon further movement of said member in such direction, said bar actuates said lever to disengage said latch.

5. The combination with a reciprocable member and a platform pivoted thereto, of a latch member pivoted to said reciprocable member and biased toward engagement with said platform, a lever pivoted to said reciprocable member, a link pivoted to said latch and to said lever, a trip bar suspended from said lever, and means disposed in the path of said bar to arrest upward movement thereof prior to the completion of the upward stroke of said reciprocable manner.

6. The combination with a reciprocable member and a platform pivoted thereto, of latch mechanism for normally preventing relative movement between said platform and reciprocable member comprising a latch member pivoted to said reciprocable member and biased toward engagement with said platform, a lever pivoted to said reciprocable member, a link pivoted to said latch and to one end of said lever, a finger projecting laterally from the other end of said lever, a stationary bracket having a slot therein, and a trip bar mounted for limited vertical movement therein, said bar being formed at its upper end with a cam surface adapted to cooperate with said finger to cause disengaging movement of said latch member, and being further formed adjacent its upper end with a recess adapted to receive said finger.

7. The combination with a pair of pivotally related reciprocable elements and a latch therefor, of latch operating means comprising a lever pivotally mounted on one of said elements and operatively connected to said latch, an angularly projecting finger on said lever, and a trip bar mounted for limited movement with said elements and biased toward a position corresponding to one extremity of the stroke of said reciprocable elements, said bar being formed with a recess adapted to receive said finger, and with a cam surface cooperable with said finger to effect disengaging movement of said latch and to guide said finger into said recess upon relative movement of said reciprocable elements and said bar in one direction.

8. The combination with a furnace having a door therein, of charging means therefor comprising a trackway leading to a point below said door, a winding drum separated from said trackway by said furnace, a car movable on said trackway, a cable secured to said car and to said drum, a platform disposed adjacent said furnace and carrying track rails registering with the rails of said trackway, means for elevating said platform to the level of the lower edge of said door, means retaining said platform in a substantially horizontal position during such elevation, and means for releasing said retaining means substantially at the completion of such elevation to permit tilting of said platform about a transverse axis and toward said door.

9. The combination with a furnace having a door, of charging means therefor comprising a guide bracket mounted adjacent said door and formed with a substantially vertical slot, the upper end of said slot being curved toward a plane passing through the center of said furnace and parallel with the plane of said door, a platform adapted to receive a charging car, means secured to said platform and engaging in said slot, and elevating means pivotally secured to said platform.

10. The combination with a furnace having a door, of charging means therefor comprising a guide bracket mounted adjacent said door and formed with a substantially vertical slot, the upper end of said slot being curved toward a plane passing through the center of said furnace and parallel with the plane of said door, a platform adapted to receive a charging car, means secured to said platform and engaging in said slot, elevating means pivotally secured to said platform, latch means normally preventing pivotal movement of said platform on said elevating means, and actuating means for said latch means operable to release said latch means when said slot-engaging means enters the curved portion of said slot.

GLEN J. WALKER.