May 12, 1936. H. W. THORNBURG 2,040,111

HOPPER

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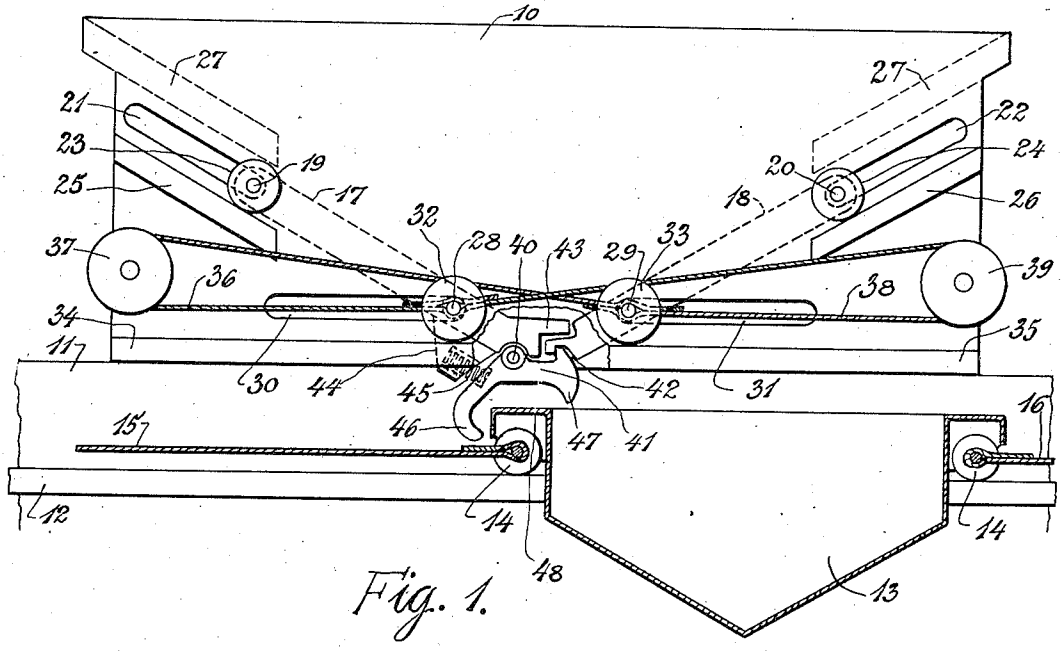


Fig. 1.

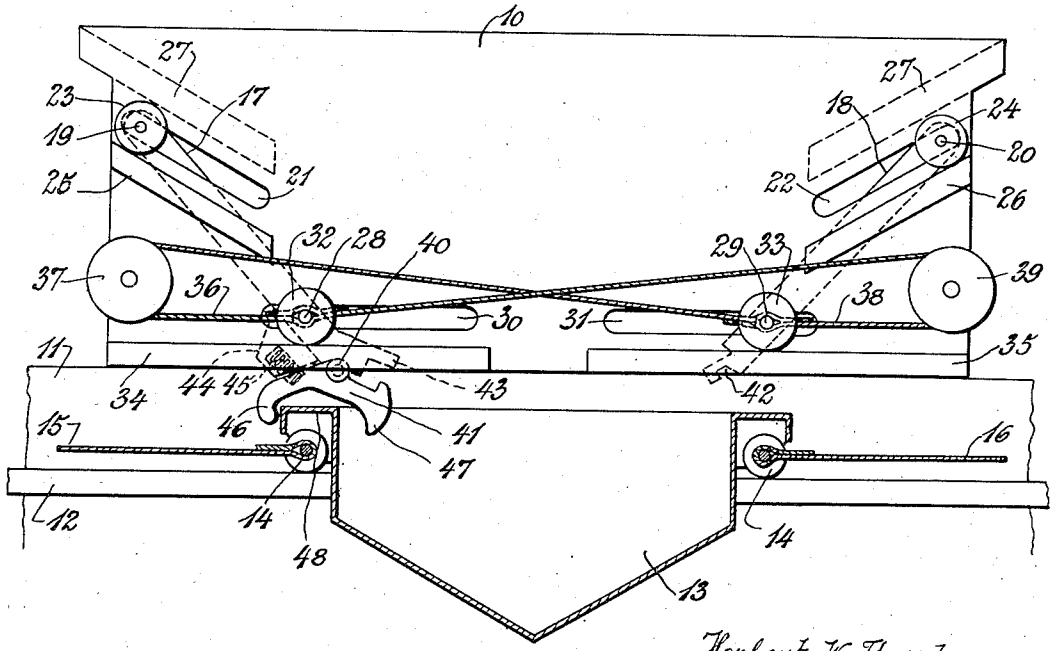


Fig. 2.

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HOPPER

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8 Claims. (Cl. 214—42)

My invention relates to new and useful improvements in hoppers, that are more or less continuously loaded, but whose contents are at intervals unloaded into travelling cars.

The principal object of my invention is to provide a hopper that is automatically opened to discharge its contents when a car arrives to receive them, and that is automatically closed when the loaded car is removed from beneath the hopper.

In addition to my principal object, I have worked out a number of novel and useful details, which will be readily evident as the description progresses.

My invention consists in the novel parts, and in the combinations and arrangements thereof, which are defined in the appended claims; and of which one embodiment is exemplified in the accompanying drawing, which is hereinafter particularly described and explained.

Throughout the description, the same reference number is applied to the same member or to similar members.

Referring to the accompanying drawing, it will be seen that:

Figure 1 is an elevation of the hopper of my invention, with its doors closed and locked, and with the movable car at the instant when, on moving to the left, it will begin to open the hopper doors, and thereby dump the contents of the hopper into the car.

Figure 2 shows the hopper with its doors completely open, from which position the car, now loaded, is ready to be hauled to the right, thereby closing the hopper doors.

The hopper, **10**, is supported on beams, of which the near one is shown at **11**. Each of the beams, **11**, also carries a rail, **12**, the said rails being on the inner sides of the beams. The rails **12** support the car, **13**, through the medium of its wheels, **14**, which are carried on axles attached to the car, **13**. The car is drawn along the rails **12**, by means of ropes **15** or **16**, which are actuated by machinery (not shown) placed at some convenient central station.

The bottom of the hopper, **10**, is closed by doors **17**, **18**. The upper edge of each door is provided with a shaft, numbered **19**, **20** respectively, which shafts project through slots **21**, **22**, in the front wall of the hopper, and similarly project through slots in the rear wall (not shown). The near end of each of these shafts carries a wheel, **23**, **24**, placed outside of the hopper, and running on guides **25**, **26**, which are attached to the outside wall of the hopper. A baffle, **27**, is shown above the upper edge of each door, which prevents the spilling of material through the slots **21**, **22**.

Similarly, the bottom edge of each door is provided with a shaft, numbered **28**, **29**, respectively, which shafts project through slots **30**, **31**, in the front wall of the hopper, and similarly project through slots in the rear wall (not shown). The near end of each of these shafts carries a wheel, **32**, **33**, placed outside of the hopper and running on guide rails, **34**, **35**, which are attached to the outer walls of the hopper.

Anchored to the near end of shaft **28** is a rope **36**, which passes around a sheave **37**, attached to the front side of the hopper, and thence to an anchorage on shaft **29**. A similar rope, **38**, is anchored to shaft **29**, and passes around a sheave **39**, attached to the front side of the hopper, and thence to an anchorage on shaft **28**.

The rear face of the hopper (not shown) is similar in all respects to the front face, just described, including all slots, guides, wheels, sheaves and ropes.

The lower edge of one door, **17**, carries pivoted thereto, as shown at **40**, a latch, **41**, approximately of the form shown, which is adapted to engage a notch, **42**, in the bottom edge of the other door, **18**; and, when so engaged, holds both doors locked together. Door **17** is also provided with a portion, **43**, which overhangs the latch, **41**, thus acting as a baffle, to prevent material discharged from the hopper becoming lodged on the latch, **41**, and thereby hindering the action of the latch. The under side of door **17** is also provided with a lug, **44**, which contains a socket for a compression spring, **45**, that yieldingly tends to rotate the latch in such a direction as to insure its proper closure into the notch **42** in door **18**. The latch **41** is also provided with downward depending lugs, **46**, **47**, as shown.

The car, **13**, is provided with a flange, **48**, so positioned as to engage the latch in the following manner. Suppose the circumstances to be as shown in Figure 1, with the car moving to the left. Flange **48** will push lug **46**, thereby disengaging the latch from the notch **42** in door **18**, and permitting the opening of the doors. The too sudden or too wide opening of the doors, which would cause the material to be dropped from the hopper before the car is in position to receive it all, is prevented by the fact that, when lug **46** is pushed to the left, lug **47** is pushed downward into the position shown in Figure 2, and is also engaged by the flange **48**.

As the car is drawn further to the left from the

position shown in Figure 1, door 17 is pushed to the left, the wheel 23 sliding upward and to the left, and the wheel 32 sliding horizontally to the left. Finally the door is opened to the position shown in Figure 2.

It will be readily seen that ropes 36 and 38 compel door 18 to move through stages that are exactly symmetrical with the motions of door 17.

When the car is drawn to the right, from the position shown in Figure 2, the engagement of flange 43 with lug 47, will draw door 17, back to the position shown in Figure 1. At the same time, ropes 36 and 38 will again compel an exactly symmetrical motion of door 18. By the compression of the spring 45, the latch will be allowed to enter the notch 42 in door 18, thereby locking the hopper securely.

The car may now be drawn away to the place where its contents are to be dumped. The mechanism necessary to empty the car, being no part of this invention, is not shown.

It is obvious that the unlatching of the doors 17 and 18 may alternatively be accomplished by other means than the movement of the car. Thus the doors may be unlatched by any one of the well known operator-controlled means for tripping a latch.

It is also evident that I have provided a hopper which may be provided with only a single dump-door, the latch in this case hooking into a fixed portion of the hopper.

Having now described and illustrated one form of my invention, I wish it to be understood that my invention is not to be limited to the specific form or arrangement of parts hereinbefore described, except in so far as such limitations are specified in the appended claims. Thus, for example, my invention may be applied to a hopper in which only one door, as 17 is movable, the door 18 being fixed. In such a case, the ropes 36, 38, and sheaves 37, 39, are of course omitted.

I claim:

1. In an earth-handling apparatus, the combination of: a traveling car, having an upwardly projecting portion for engagement with downwardly projecting portions on the hereinafter mentioned catch; a longitudinal member on which the car travels; a hopper, mounted on the longitudinal member above the travel of the car; sliding doors on the hopper, said doors being slidable diagonally divergently upward to open said hopper, one of said doors having a portion overlapping the other of said doors; a pivoted catch on one of the doors, said catch having a portion to hook it to the other of said doors, and having two downwardly projecting portions; and means constraining the two doors to symmetrical operation; the whole being so proportioned and arranged that the car, while moving into filling position beneath the hopper, will engage one of the projecting portions of the catch, thus uncatching and then opening the doors, and that the car, while leaving the filling position, will engage the other of the projecting portions of the catch, thus closing and then locking the doors.

2. In an earth-handling apparatus, the combination of: a traveling car, having an upwardly projecting portion for engagement with downwardly projecting portions on the hereinafter mentioned catch; a longitudinal member on which the car travels; a hopper, mounted on the longitudinal member above the travel of the car; sliding doors on the hopper, said doors being slidable diagonally divergently upward to open said hopper, a pivoted catch on one of the doors, said catch having a portion to hook it to the other of said doors, and having two downwardly projecting portions; and means constraining the two doors to symmetrical operation; the whole being so proportioned and arranged that the car, while moving into filling position beneath the hopper, will engage one of the projecting portions of the catch, thus uncatching and then opening the doors, and that the car, while leaving the filling position, will engage the other of the projecting portions of the catch, thus closing and then locking the doors.

3. In an earth-handling apparatus, the combination of: a traveling car; a longitudinal member on which the car travels; a hopper, mounted above the travel of the car; sliding doors on the hopper; a pivoted catch on one of the doors, said catch having a portion to hook it to the other of said doors; and means constraining the two doors to symmetrical operation; the whole being so proportioned and arranged that the car, while moving into filling position beneath the hopper, will engage the catch, thus uncatching and then opening the doors, and that the car, while leaving the filling position, will engage the catch, thus closing and then locking the doors.

4. In an earth-handling apparatus, the combination of: a traveling car; a longitudinal member on which the car travels; a hopper, mounted above the travel of the car; sliding doors on the hopper, said doors being slidable in such a manner to open said hopper, that the upper end of each door will move in a path more nearly vertical than the path of the lower end of the door; means for locking said doors together; means constraining the two doors to symmetrical operation; means whereby the car, while moving into filling position beneath the hopper, will unlock and then open the doors; and means whereby the car, while leaving the filling position, will close and then lock the doors.

5. In an earth-handling apparatus, the combination of: a traveling car; a longitudinal member on which the car travels; a hopper, mounted above the travel of the car; a bottom-dump door on the hopper, movable into a more vertical position, to open the hopper; a second bottom-dump door for the hopper, constrained to open and close with the first-mentioned door; means so constraining it; latch-mechanism for the doors; and means on the car engageable with the latch-mechanism; the whole being so proportioned and arranged that the car, while moving into filling position beneath the hopper, will unlatch the doors, and that the car, while leaving the filling position, will close and then latch the doors.

6. In an earth-handling apparatus, the combination of: a traveling car; a longitudinal member on which the car travels; a hopper, mounted above the travel of the car; a bottom-dump door on the hopper, movable into a more vertical position, to open the hopper; latch-mechanism for the door; and means on the car engageable with the latch-mechanism; the whole being so proportioned and arranged that the car, while moving into filling position beneath the hopper, will unlatch the door, and that the car, while leaving the filling position, will close and then latch the door.

7. In an earth-handling apparatus, the combination of: a traveling car; a longitudinal member on which the car travels; a hopper, mounted above the travel of the car; sliding doors on the hopper, said doors being slidable in such a manner to open said hopper, that the upper end of each

door will move upwardly and the lower end will move outwardly; means for locking said doors together; means constraining the two doors to symmetrical operation; means whereby the car, while moving into filling position beneath the hopper, will unlock and then open the doors; and means whereby the car, while leaving the filling position, will close and then lock the doors.

8. In an earth-handling apparatus, the combination of: a traveling car; a hopper, mounted above the travel of the car; a bottom-dump door on the hopper; means constraining the lower portion of the door to outward horizontal movement; means constraining the upper portion of the door to inclined upward-outward movement; latch mechanism for the door; and cooperating mechanism placed in operative condition by the movement of the car to certain predetermined positions, to automatically unlatch and open the door, and to automatically close and latch the door.

HERBERT W. THORNBURG.