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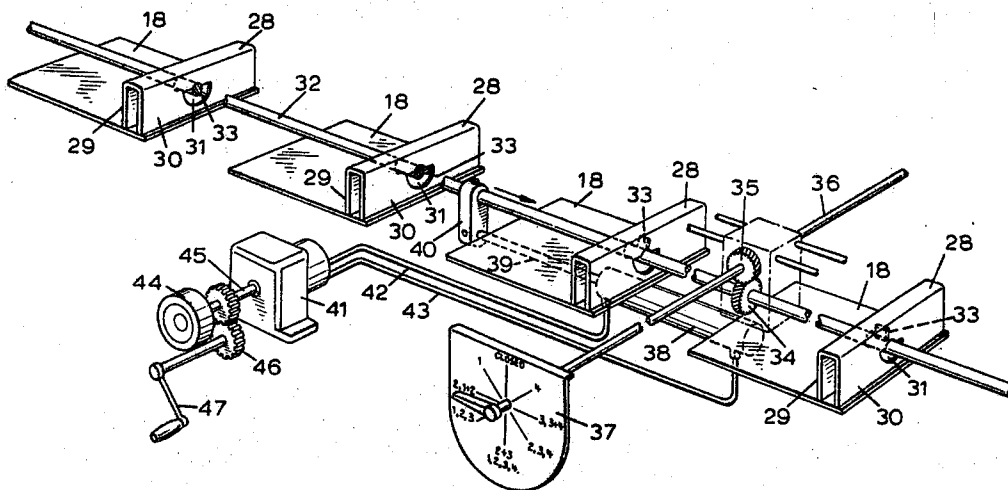
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[54] **SELECTIVE HOPPER CAR GATE OPERATING MECHANISM**
 9 Claims, 4 Drawing Figs.

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 105/311, 105/378
 [51] Int. Cl. **B61d 7/02,**
 B61d 7/20, B61d 7/28
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 282RP, 286, 288, 289, 377; 105/240, 243, 253,
 282, 287, 307, 311, 378

ABSTRACT: A mechanism for selectively operating a series of closure members in spaced alignment comprises a series of abutments carried on a shaft which is both longitudinally movable and rotatable about its axis. The abutments cooperate with gates in abutment members connected to the closure members and are selectively engageable with the closure members, individually and in groups, by appropriate rotation of the shaft about its axis.



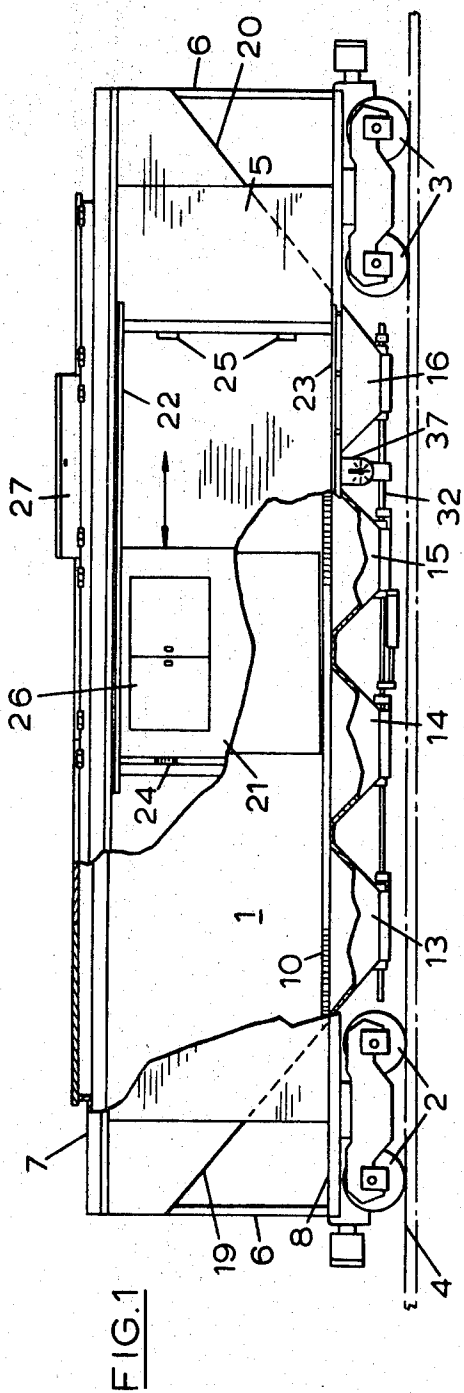


FIG. 1

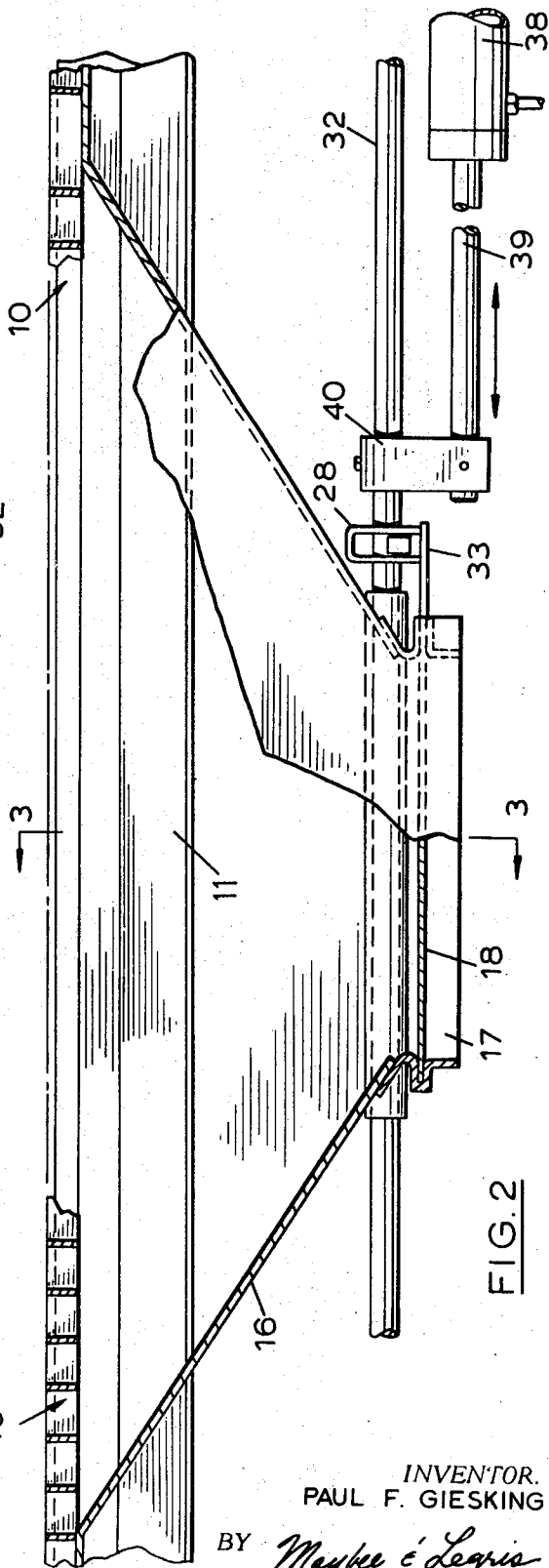


FIG. 2

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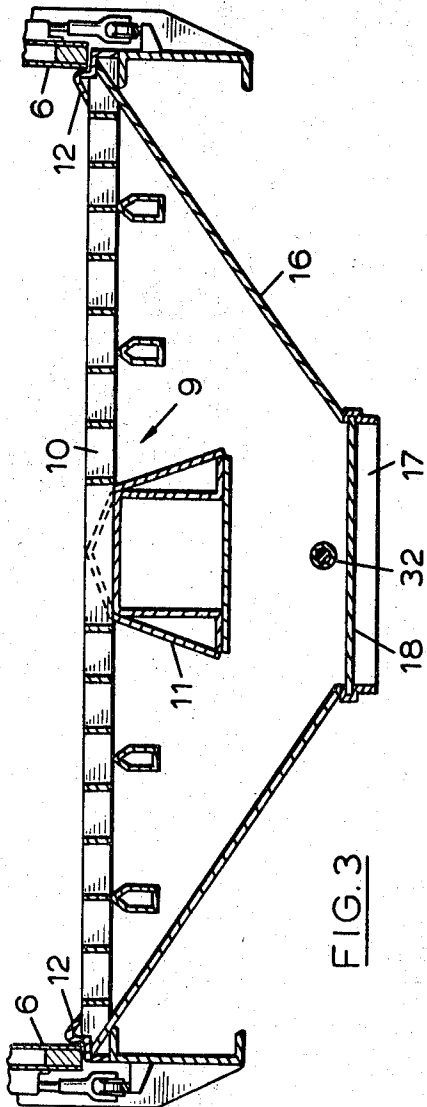


FIG. 3

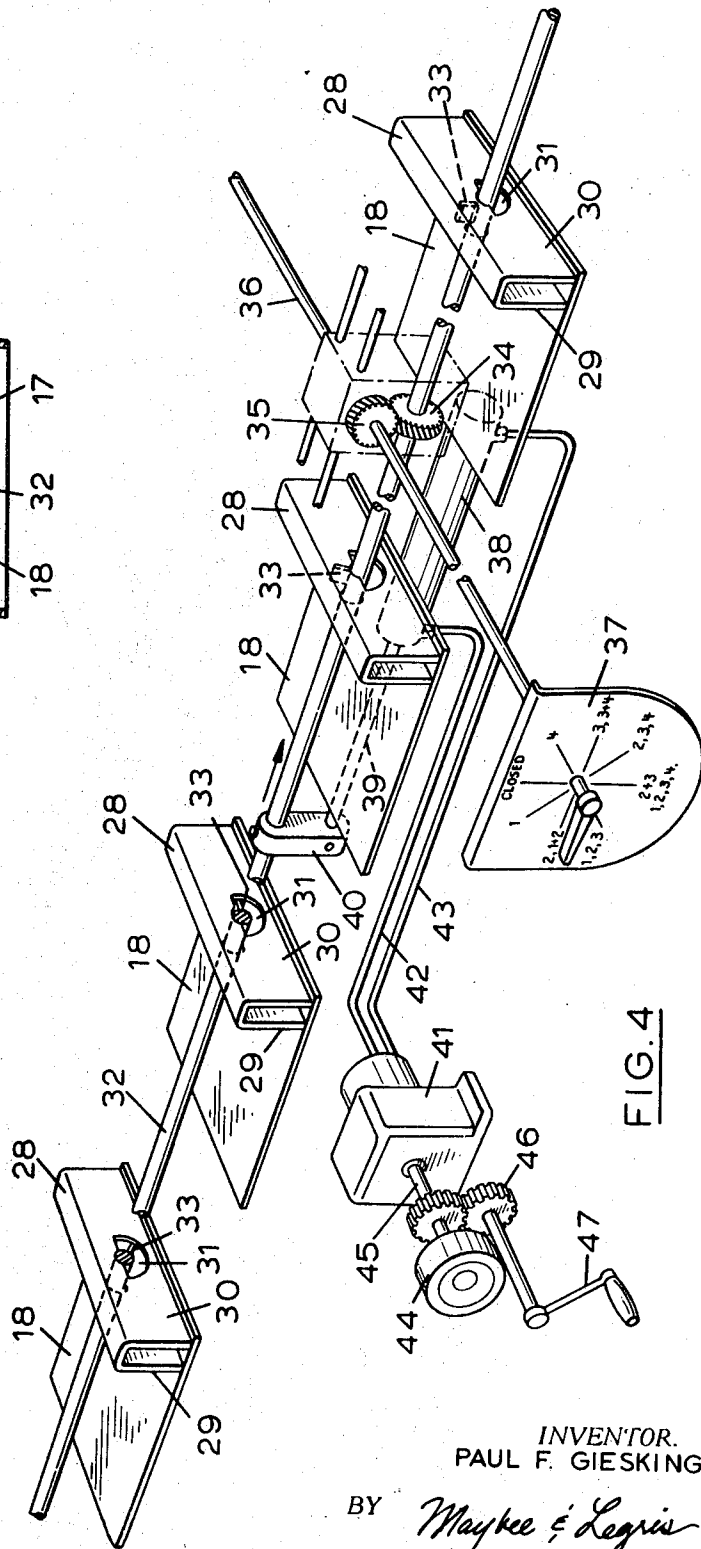


FIG. 4

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SELECTIVE HOPPER CAR GATE OPERATING MECHANISM

BACKGROUND OF THE INVENTION

This invention relates to mechanisms for selectively operating a series of closure members arranged in spaced alignment, and it is an object of the invention to provide a relatively simple system for selectively operating a series of closure members individually or in groups by a common operating mechanism.

The invention is primarily, but not exclusively, concerned with means for operating the hopper closure members of hopper cars, in which a number of discharge hoppers are arranged longitudinally beneath the car. In known hopper cars the closures that close each of the hoppers are merely slidably mounted steel plates which are movable to either of two positions whereby the individual hopper is open or is closed. Each closure has its own rack and pinion device whereby it can be opened or closed manually.

SUMMARY OF THE INVENTION

According to the present invention, a mechanism for selectively operating a series of closure members in spaced alignment and longitudinally movable by power means; a series of longitudinally and angularly spaced radial abutments are rigidly mounted on the shaft, and these abutments are selectively engageable, by appropriate rotation of the shaft, with abutment members each connected to a respective closure member, the abutment members being separately movable in the direction of the shaft for operating the respective closure members.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the invention is illustrated by way of example in the accompanying drawings in which:

FIG. 1 is a side elevation, partly broken away, of a dual purpose freight car according to the invention;

FIG. 2 is an enlarged elevation, partly in section, of a hopper and its closure mechanism;

FIG. 3 is a section on line 3-3 in FIG. 2; and

FIG. 4 is a partly diagrammatic, general perspective view of an arrangement for selectively operating the closure members of the hoppers.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The dual purpose freight car shown in FIG. 1 comprises a boxlike car body 1 with an undercarriage providing sets of running wheels 2, 3, which run on rails 4. The car body has sidewalls 5, endwalls 6, a roof section 7 and a floor section 8, the floor section 8 comprising an elongated open frame structure 9. Supported on the open frame structure of the floor section 8 is a horizontal grating 10, which constitutes a freight-carrying floor surface through which granular materials can pass. To facilitate the passage of granular materials through the grating and to ensure that no grain will be retained on the tops of the grating bars, the latter are preferably crowned or peaked to an angle of about 45°; similarly, a longitudinally extending center sill 11, the side sills 12, and bearer beams of the floor frame structure 9 are crowned or peaked either by shaping these members or by the use of sheet metal or other fairing.

A plurality of discharge hoppers 13, 14, 15 and 16 are suspended in longitudinally spaced relationship from the floor frame structure 9 and located beneath the grating 10 to receive granular materials therefrom. Each hopper has a discharge outlet 17 at its bottom end and a closure 18 therefor. (see FIGS. 2 and 3)

The car body 1 is fitted with a pair of sloping end members 19, 20 which provide sloping surfaces extending from the endwalls 6 to the floor section 8, the grating 10 covering substantially the whole of the floor area between these surfaces.

Each sidewall 5 of the car is provided with an access opening fitted with a grain-tight, plug type door 21 which is longitudinally slidable between rails 22, 23, the end positions of the door being determined by end stops 24, 25. The plug type door 21 itself is formed with a grain access opening in its upper portion and is fitted with a door 26 cooperating with the access opening. The roof section 7 of the car includes an elongated hatch opening extending longitudinally of the car, and is provided with a hatch cover consisting of a plurality of individually operable hinged sections 27.

The closure members 18 of the hoppers take the form of sliding plates which are selectively operated by a common operating mechanism. This operating mechanism will now be described with particular reference to FIG. 4.

FIG. 4 shows a series of four closure members 18, arranged in spaced alignment; these closure members cooperate respectively with the discharge outlets of the hoppers 13, 14, 15 and 16 of FIG. 1. For moving the closure members in the direction of their alignment, a series of separate abutment members 28, each connected to a respective closure member, is provided. Each abutment member 28 comprises a pair of upstanding, parallel walls 29, 30 which are secured to the upper side of a respective sliding plate 18 and are spaced in the direction of alignment of the closure members. Each of the walls 29, 30 is formed with a semicircular opening 31 through which a common operating shaft 32 extends. As shown in FIG. 1, this shaft 32 extends longitudinally beneath the car body 1 and is mounted in such a way as to permit longitudinal movement of the shaft in the direction of its axis and rotational movement of the shaft about its axis, the shaft extending through the hoppers 13, 14, 15 and 16 and being positioned above the closure members thereof.

The shaft 32 carries a series of radial abutments 33, which are longitudinally spaced in the direction of the shaft and angularly spaced about the shaft axis. Each abutment is located, for a given longitudinal position of the shaft, between the pair of walls 29, 30 of a respective abutment member 28. Each semicircular opening 31 is formed as a gate for engaging a respective abutment 33 according to its angular position. In the particular configuration shown in FIG. 4, the rotational position of the shaft 32 is such that two of the abutments 33 on the left hand side of the drawing will pass through the respective openings 31 when the shaft 32 is moved longitudinally in either direction, whereas the other two abutments on the right hand side of the drawing will engage their respective abutment members 28; thus, with this configuration, longitudinal movement of the shaft 32 will operate the closure members of the hoppers 15 and 16 only. It will be appreciated that the shaft 32 may be rotated to any one of a number of predetermined positions for operating any selected one of a number of combinations of one, two, three or four closure members.

Rotation of the shaft 32 to any selected position is effected by a helical gear 34 mounted on the shaft, which gear meshes with a helical gear 35 on a transverse shaft 36 supported from the frame of the car. An indicator plate 37 is provided for showing the rotational setting of the transverse shaft 36 and hence the operative positions of the abutments 33 with respect to the gates 31. Longitudinal movement of the shaft 32 in either direction, for opening and closing the closure members, is effected by means of a two-way hydraulic cylinder 38 whose piston rod 39 is connected to a coupling 40 connected to the shaft 32. The cylinder 38 is connected to a hydraulic pump and reservoir 41 through fluid supply lines 42, 43. Connected in the hydraulic circuit is an operating valve (not shown) having "Open," "Hold" and "Close" positions, whereby to ensure that working fluid is supplied to the appropriate inlet of the cylinder 38 when required. The pump 41 may be driven by a portable mechanical unit, for which purpose a rubber-tired drive wheel 44 is mounted on the drive shaft 45 of the pump. Alternatively the pump may be driven manually through suitable gearing 46, a crank handle 47 being provided for this purpose.

I claim:

1. Mechanism for selectively operating a series of closure members in spaced alignment, comprising:

- a. a series of separate abutment members each connected to a respective closure member, the abutment members being separately movable in the direction of said alignment for operating the respective closure members;
- b. a shaft extending in the direction of said alignment;
- c. mounting means for the shaft, said mounting means permitting longitudinal movement of the shaft in the direction of its axis and rotational movement of the shaft about its axis;
- d. a series of radial abutments rigidly mounted on the shaft, the abutments being longitudinally spaced in the direction of the shaft and angularly spaced about said axis, the abutments being positioned on the shaft for selective engagement with the respective abutment members by rotation of the shaft; and
- e. power means connected to the shaft for moving the shaft longitudinally in either direction whereby to move the selectively engaged abutment members for operating the closure members.

2. A hopper arrangement comprising:

- a. a plurality of hoppers disposed in spaced alignment, each hopper having an outlet at its lower end;
- b. a series of closure members cooperating with said outlets;
- c. a series of separate abutment members each connected to a respective said closure member, the abutment members being individually movable in the direction of said alignment for operating the respective closure members;
- d. a shaft extending in the direction of said alignment;
- e. mounting means for the shaft, said mounting means permitting longitudinal movement of the shaft in the direction of its axis and rotational movement of the shaft about said axis;
- f. a series of radial abutments rigidly mounted on the shaft, the abutments being longitudinally spaced in the direction of the shaft and angularly spaced about said axis, the abutments being positioned on the shaft for selective engagement with the respective abutment members by rotation of the shaft; and
- g. a power means connected to the shaft for moving the shaft longitudinally in either direction whereby to move the selectively engaged abutment members for operating the closure members.

3. A hopper arrangement according to claim 2, in which the closure members are horizontally disposed sliding plates constrained to slide in the direction of said alignment.

4. A hopper arrangement according to claim 3, in which

each abutment member comprises a pair of upstanding walls secured to one side of a respective sliding plate, the walls being spaced in the direction of said alignment, each wall being formed with an opening through which the shaft extends, and each opening being formed as a gate for engaging a respective shaft abutment according to its angular positions.

5. In a hopper car adapted for the transportation of grain and like granular material, the car having an elongated body mounted on a frame structure,

- a. a plurality of discharge hoppers carried by the frame structure, the hoppers being located beneath the car body in longitudinally spaced relationship, each hopper having an outlet at its lower end;
- b. a series of closure members cooperating with said outlets;
- c. a series of separate abutment members each connected to a respective closure member, the abutment members being individually movable in the longitudinal direction for operating the respective closure members;
- d. a shaft extending longitudinally beneath the car body;
- e. mounting means for the shaft, said mounting means permitting longitudinal movement of the shaft in the direction of its axis and rotational movement of the shaft about said axis;
- f. a series of radial abutments rigidly mounted on the shaft, the abutments being longitudinally spaced in the direction of the shaft and angularly spaced about said axis, the abutments being positioned on the shaft for selective engagement with the respective abutment members by rotation of the shaft; and
- g. power means connected to the shaft for moving the shaft longitudinally in either direction whereby to move the selectively engaged abutment members for operating the closure members.

6. A car according to claim 5, in which the shaft extends through the hoppers and is positioned above the closure members, said abutments and abutment members being located within the respective hoppers.

7. A hopper car according to claim 6, in which the power means comprises a double acting hydraulic cylinder carried by the frame structure, and means providing hydraulic connections to the cylinder.

8. A hopper car according to claim 7, in which the car body includes a floor section constituted by a grating supported on the frame structure, the hoppers being located beneath the grating.

9. A hopper car according to claim 8, in which there are four hoppers, the closure members thereof being operable by the shaft in any selected one of a number of combinations of one, two, three or four closure members according to the rotational position of the shaft.

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