

Jan. 28, 1958

B. C. HAMLET

2,821,433

HOPPER DUMPING CLOSURE

Filed July 8, 1955

3 Sheets-Sheet 1

FIG. 1.

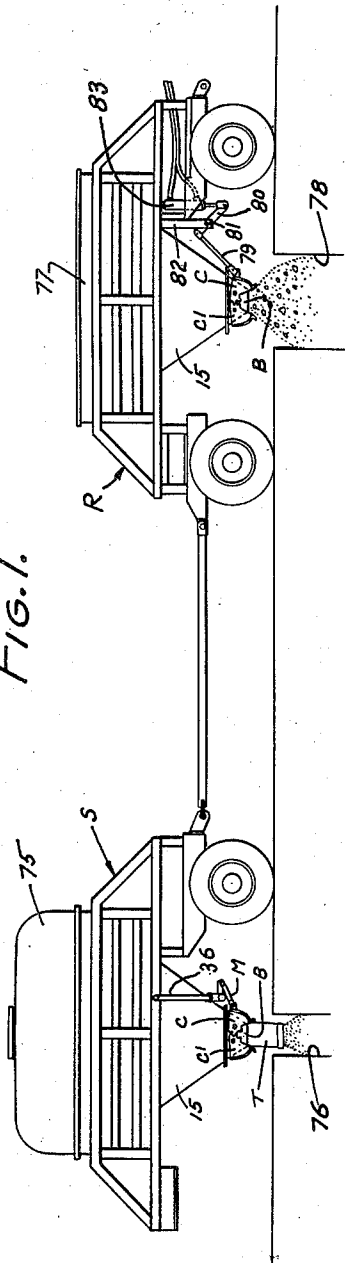


FIG. 5.

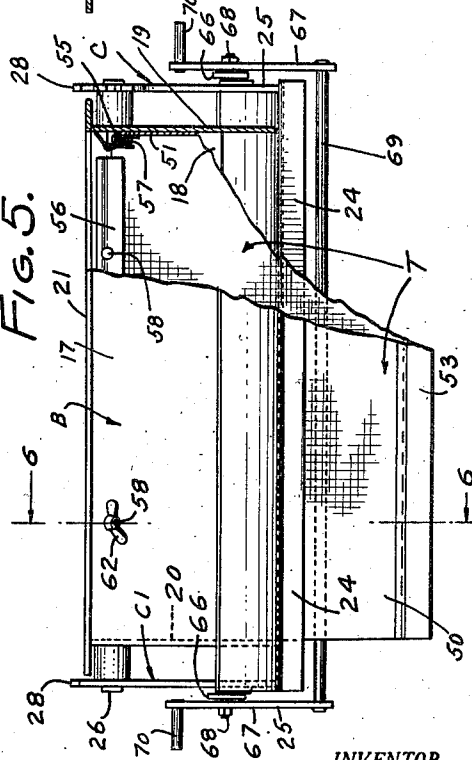
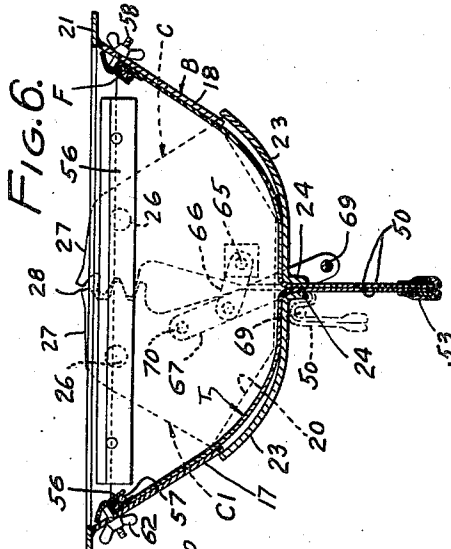


FIG. 6.



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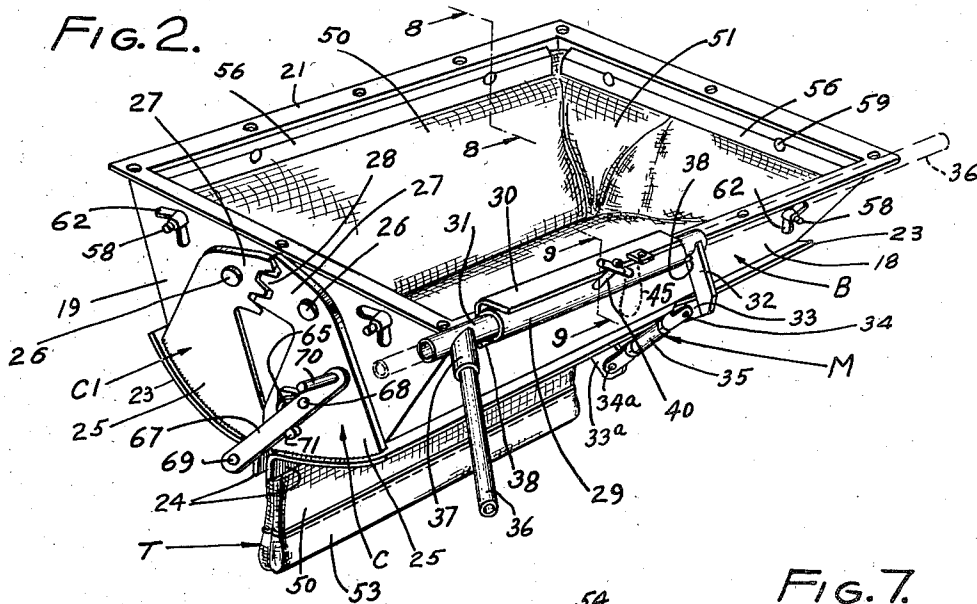
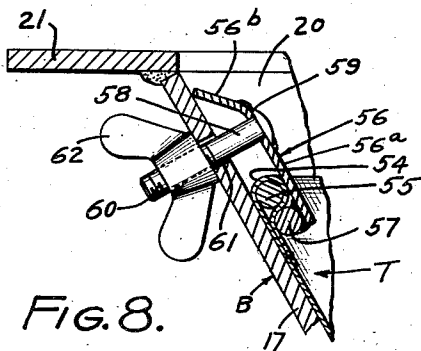
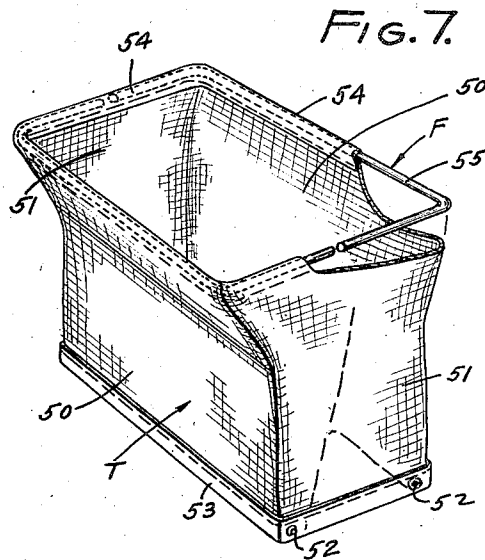
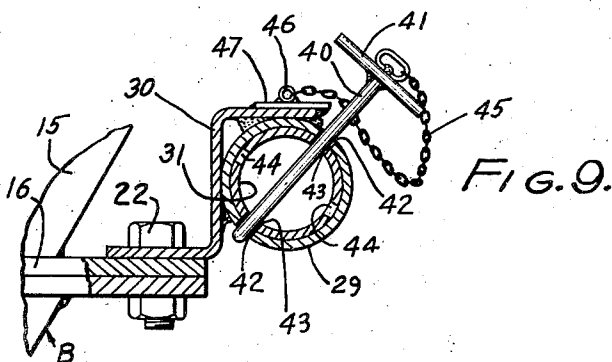
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3 Sheets-Sheet 2



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1

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HOPPER DUMPING CLOSURE

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5 Claims. (Cl. 298—30)

This invention relates to closures for controlling the discharge or dumping of materials from hoppers, and it has particular reference, although not necessarily, to closures for vehicle-carried hoppers designed for transporting dry cement or concrete aggregates. Such closures as heretofore designed are suitable either for dry cement or concrete aggregates but not for both since in the case of cement it is necessary to provide a flexible boot to prevent loss of the cement resultant of escaping by floating into the air as it is dumped, while in the case of the aggregates if a boot were used it would soon be destroyed by the wear and tear imposed thereon by the aggregates passing therethrough.

It is a purpose of my invention to provide a hopper dumping closure which is characterized by the inclusion therein of means affording ready attachment and detachment of a boot thereto so that according as the closure is used in the dumping of cement or concrete aggregates, the boot can be applied or removed.

A further purpose of my invention is the provision of a dumping closure having a pair of closure members so mechanically interconnected that when one member is moved to open or closed position the other member is caused to occupy a corresponding position, and a simple and durable mechanism associated with one of the closure members for moving it to either open or closed position. The mechanism is additionally novel in having embodied therein simple and effective means for locking it in either of two extreme positions to maintain the closure members in either closed or open position, and to thereby prevent accidental movement of the members from either of said positions.

Another purpose of my invention is the provision of a dumping closure having a body of chute form, on which the closure members and the operating mechanism therefor are mounted, and with which is associated means for detachably suspending a boot therein, so as to be opened or closed by the closure members.

Another purpose of my invention is to provide a novel construction of boot which affords ready manual folding thereof preliminary to closing the same by the closure members, and a manually operable means for so manipulating the boot as to seal it against any possible escape of dry cement when closed.

I will describe only one form of hopper dumping closure embodying my invention, and will then point out the features thereof in claims.

In the accompanying drawings:

Fig. 1 is a view showing in side elevation a semi-trailer designed for transporting dry cement, and having applied thereto one form of dumping closure, and mechanism for operating the same embodying my invention, and a trailer designed for transporting concrete aggregates, and having applied thereto the same dumping closure but with the boot omitted and another form of operating mechanism.

Fig. 2 is an enlarged detailed perspective view of the dumping closure with the boot embodied therein.

Fig. 3 is a further enlarged view showing the dump

2

closure in end elevation, and in closed position, and mounted on a hopper.

Fig. 4 is a view similar to Fig. 3 showing the dumping closure in open position.

Fig. 5 is a side elevational view of the dumping closure with parts thereof broken away and other parts in section.

Fig. 6 is a vertical sectional view taken on the line 6—6 of Fig. 5.

Fig. 7 is a detailed perspective view showing the boot of my invention in extended position.

Fig. 8 is an enlarged sectional view taken on the line 8—8 of Fig. 2.

Fig. 9 is an enlarged vertical sectional view taken on the line 9—9 of Fig. 2.

Referring more particularly to the drawings, in Figs. 3 and 4 is shown a hopper 15 having a rectangular mouth on the four edges of which is welded or otherwise secured a flat rectangular frame 16.

The dumping closure of my invention comprises a hollow metal body B constituting a chute that is tapered and of rectangular form and composed of inclined side walls 17 and 18 and vertical end walls 19 and 20 fixed to and spanning the ends of the side walls. The upper end of this body has fixed thereto a rectangular frame 21 of the same dimensions as the hopper frame 16 and to which it is secured by bolts 22. Such mounting of the body or chute B causes the walls thereof to be positioned so as to effect inclined continuations of the side and end walls of the hopper 15 and thus not impede the flow of material from the hopper through and out of the chute.

The chute or body B has mounted thereon two closure members C and C1 each partially controlling the mouth or lower end of the chute, and both mounted on parallel horizontal axes to occupy open and closed positions. Each closure member comprises a closure wall 23 transversely shaped as shown and exceeding the side chute wall 17 or 18 in length, and provided at its lower edge with an angular coextensive lip 24. To the ends of the wall 23 are welded or otherwise secured sector shaped end walls 25 which are pivotally mounted on the end walls 19 or 20 of the chute by aligned pins 26. The end walls 25 of both of the closure members C and C1 are formed with integral extensions 27, the confronting ends of which are provided with sectional gears 28 which constantly mesh one with the other so that when one closure member is moved to open or closed position a corresponding movement is imparted to the other closure member.

To move the closure members C or C1 to open or closed position a mechanism designated generally at M, which, in the present instance, is manually operable, and associated with the closure member C. This mechanism in its present embodiment comprises a bearing sleeve 29 welded to a Z-bar 30, the latter in turn being secured upon the hopper frame 16 by certain of the bolts 22. Rotatable in the sleeve 29 is a tubular shaft 31 having a length exceeding that of the sleeve and mounted therein so that its ends project from the ends of the sleeve.

Fixed on one end of the shaft 31 is an arm 32 provided with an angular ear 33 to which is pivoted as at 34 one end of a link 35, the other end of the link pivoted to an ear 33a, as at 34a, on the wall 23 of the closure member C. This link 35 may be made up of two clevises 35a connected adjustably by a threaded tube 35b to vary the length of the link as required to insure proper closing and opening of the closure members through operation of the mechanism.

The mechanism M also includes a handle 36 in the form of a short length of pipe which is insertable into a socket 37 fixed on and extending laterally from a projecting end of the shaft 31. The handle 36 as so mounted is accessible for manual turning of the shaft 31 in either direction. When the handle is not in use it is removed

3

from the socket and extended partly into the adjacent end of the shaft 31 as indicated in broken lines in Fig. 2. As shown in Fig. 2 stops 38 are fixed on the shaft 31 to confine the latter against appreciable movement longitudinally in the sleeve 29 yet allowing free rotation thereof as intended.

The mechanism M is operable manually to move the closure members C and C1 to the open position shown in Fig. 4 from the closed position shown in Fig. 3, by upwardly rotating the shaft 31 through the handle 36. Such shaft rotation moves the arm 32 upwardly thereby pulling the link 35 so as to swing the closure member C upwardly to open position, and through the sectional gears 28 simultaneously swinging the closure member C1 upwardly to open position. Obviously, to return the closure member to closed position, the shaft 31 is rotated in the opposite direction to swing such members simultaneously downward wherein the lips 24 are brought into contact with each other to completely close the closure against the escape of concrete aggregates, assuming, of course, that the closure is used without the boot yet to be described.

For releasably securing the closure members C and C1 in either fully opened or fully closed position, a simple and effective locking means is provided. This locking means comprises, in the present instance, a pin 40 having a handle 41 for extending it through a pair of diametrically opposed openings 42 in the sleeve 29 (see Fig. 9), and through either of two pairs of diametrically opposed openings 43 and 44 in the shaft 31, according as the shaft occupies the position shown in Fig. 3 or that shown in Fig. 4. To prevent loss of the pin 41, a chain 45 is secured to the handle 41 and to an eye 46 on a plate 47 welded to a bar 30.

When the closure of my invention is used on a hopper through which dry cement is adapted to be dumped, a boot T is employed to prevent escape and consequent loss of the cement into the air as it is dumped. This boot is shown in Fig. 7 as being constructed of suitable and flexible tough material such as nylon fiber, and it is of rectangular form so as to be accommodated within the chute B with its sides 50 converging at their upper portions, and its ends 51 creased along the broken lines shown to facilitate folding thereof inwardly for closing the lower end of the boot, and in which position it can be retained by snap fasteners 52 on a hem 53 at both ends of the boot.

The upper end of the boot T is folded upon itself and stitched to form sleeves 54 on all four edges thereof in which is received a wire frame F. This frame is made of two identical U-shaped sections 55 which can be moved outward relatively to hold the upper end of the boot extended at its edges to properly fit within the body B.

My invention also includes a simple and effective means for detachably mounting the boot T in the chute body B so that it can be applied and removed as required depending upon the type of material which is being dumped through the hopper. This means comprises, in the present instance, four metal bars 56 having flat portions 56a and angular portions 56b (see Fig. 8). Welded to one side of the flat portions 56a of the bars are rods 57. The several bars are adapted to be mounted on the inner sides and ends of the body B adjacent the upper edges thereof, by means of bolts 58 each welded at the head end to the bar as indicated at 59 and the other end screw threaded as at 60. Each bolt extends freely through a suitable opening 61 in a wall of the body B, with the threaded end projecting exteriorly of the body and upon which is mounted a winged nut 62.

As the boot T is mounted in the body B, the frame F is positioned between the bars 56 and the walls of the body and at the upper sides of the rod 57, all as fully shown in Fig. 8. By now adjusting the nuts 62 the bolts 58 can be drawn in a direction outwardly of the body thereby moving the bars to clamp the frame between the latter and the body walls, the rods 57 embracing the

4

boot below the frame, whereby the boot is fixedly suspended within the chute, and so that its lower end depends from between the closure members C and C1.

With the boot T so mounted in the chute body, its lower end is free to open when the closure members are moved to open position, and, conversely, when the closure members are moved to closed position the side walls 50 of the boot are moved toward each other and clamped one to the other by the lips 24. Incident to such closure of the boot, it is necessary to fold the ends 51 inwardly along the broken lines as shown in Fig. 7 where they can be retained by means of the snap fasteners 52. While the lips 24 serve to hold the boot in closed position as so folded, they are ineffective to seal the boot against the escape of dry cement, and for this purpose the following boot-folding means is provided:

Pivotaly mounted as at 65 on the end walls 25 of the closure C are links 66 on which levers 67 are fulcrumed as at 68. These levers 67 are mounted on opposite ends of a connecting rod 69 which extends across the bottom of the body B. Handles 70 are fixed to the other ends of the levers for operation thereof. For limiting swinging movement of the levers 67 in one direction to a position in which their fulcrums 68 are in past dead center positions with relation to link pivots 65, so as to lock the levers against accidental movement in the other direction, stop pins 71 are fixed on the walls 25 of the closure member C.

In operation of the boot-folding means, it occupies the position shown in Fig. 6 when the members C and C1 and closed, wherein the rod 69 is below and to one side of that portion of the boot depending from the lips 24. By now gripping and moving either handle 70 to the right, the levers 67 and the links 66 are swung in a clockwise direction about the pivots 65, the levers simultaneously swinging about their fulcrums 68 until they abut the stop pins 71 when they are held in past dead center positions as above described.

As a result of the above-described operation the rod 69 is swung upwardly to the position shown in Fig. 3 to elevate and fold the boot T along a line spaced from the lower end thereof, upwardly around one of the lips 24, and firmly against the wall 23 of the closure member C1. This manner of folding the boot so effectively closes it as to prevent any escape of cement or other dry material from the boot. Additionally, the rod 69 in engaging the lip 24 when in boot-folding position, serves to aid in securing the closure members in closed position.

Incident to moving the closure members to open position the levers 67 are first swung to their original positions (see broken lines Fig. 3) in which the rod 69 is moved clear of the lip 24, thus releasing the boot and allowing the whole mechanism to be swung with the closure member C to the position shown in Fig. 4. Thus by unlatching and unfolding the end of the boot the boot can be restored to fully open position for dumping.

To illustrate the use of my dumping closure with the boot T installed therein, a semi-trailer S is shown in Fig. 1 having a covered body 75 designed to contain dry cement or other similar material, and provided at its bottom with a hopper designated at 15 since it corresponds to the hopper shown in Figs. 3 and 4, and to which my closure is attached, so that when opened cement from the hopper can be dumped through the boot and into a ground pit 76. Since the boot spans the space between the body chute C and the pit, it functions to confine the dry cement against escape into the air.

To illustrate the use of my dumping closure with the boot T detached therefrom, a trailer R is illustrated in Fig. 1 which may be coupled to the semi-trailer S as shown, and which is provided with a body 77 designed to contain concrete aggregates. The bottom of the body 77 is likewise provided with a hopper 15 to which the closure of my invention is attached but devoid of the boot, so that when opened the aggregates can be dumped therefrom into a ground pit 78.

5

In Fig. 1 a slightly different mechanism for opening and closing the closure members C and C1 is illustrated. This mechanism comprises a link 79 connected to the closure member C and to a lever 80 fulcrumed as at 81 on a hanger 82. The lever 80 is connected to the piston of a ram 83, to which pressure fluid from a suitable source (not shown) can be supplied for operating the piston to move the lever in one direction or the other to open or close the closures through the links 79.

To adapt the dumping closure to either of the uses above described, the boot can be quickly applied or removed as required by attaching or detaching the bars 56 to or from the body B through mounting or dismounting the nuts 62 on the bolts 58.

Although I have herein shown and described only one form of hopper dumping closure embodying my invention, it is to be understood that various changes and modifications may be made therein without departing from the spirit of the invention and the spirit and scope of the appended claims.

What I claim is:

1. A dumping closure for hoppers, including: a pair of closure members each partially closing the mouth of a hopper, and pivoted horizontally on spaced axes to swing downwardly to closed position and upwardly to open position; means so interconnecting said members that when one member is moved to open or closed position the other member is likewise moved; and a mechanism operable to actuate one of the closure members, the mechanism comprising a bearing sleeve, a tubular shaft rotatable in said sleeve, which is of a length such that its ends project from opposite ends of the sleeve, an arm fixed on one end of said shaft, a link connecting the arm to the closure member, a crank on the other end of said shaft for turning thereof to one extreme position or the other for actuating the link to open or close the closure member, said sleeve having a pair of diametrically aligned openings therein, and said shaft having two pairs of diametrically aligned openings therein, with the openings of one pair so circumferentially spaced from those of the other pair that one pair or the other will register with the openings in said sleeve according as the shaft occupies one extreme position or the other, and a pin extendable through the openings in said sleeve and through one pair of registering shaft openings or the other for locking the shaft in one extreme position or the other.

2. A dumping closure including: a hollow rigid body shaped to form a chute, a pair of closure members; means for mounting said members on the chute for swinging movement to open and close the lower end of the chute; mechanism for operating said members; a flexible boot secured in the chute so that its lower end depends therefrom and between said members; and means operable to so fold said boot as to seal the lower end of the boot against the escape of material therefrom when said members are closed, said means comprising a pair of

6

links pivoted on opposite ends of one of said closures, a pair of levers pivoted on said links, a rod-like element fixed at its ends on said levers, and a handle on one of the levers for actuating the same so as to move said element to engage and fold said boot.

3. A dumping closure as embodied in claim 2, wherein the lever pivots are located above the link pivots and to one side thereof when said element is in boot folding position to releasably secure the element in said position.

4. A dumping closure, including: a hollow rigid body shaped to form a chute; a pair of sector shaped closure members pivoted on said body to open and close the lower end of the chute, said members having lips on the lower edges thereof coextensive in length therewith; mechanism for operating said members; a flexible boot secured in said body so that its lower end depends from the lower end of the chute and between said members to be clamped and closed by the lips when said members are in closed position; and means on one of said members for folding said boot upwardly about one of the lips after said members are closed.

5. A dumping closure, including: a hollow rigid body shaped to form a chute, a pair of closure members; means for mounting said members on the chute for swinging movement about parallel axes to open and close the lower end of the chute; mechanism for operating said members; a flexible boot; means for detachably securing the upper end of said boot in said chute so that its lower end depends therefrom between said members to be closed by the latter when in closed position, said last-mentioned means comprising a frame secured to the upper edges of said boot, the frame being in two parts relatively movable to spread apart the upper end of said boot, bars, and bolts fixed to the bars and extending through the walls of said chute for mounting the bars on said walls so that said frame can be positioned between the bars and the chute walls, and nuts on the bolts for adjusting the latter to bring the bars into clamping engagement with said frame.

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