United States Patent

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[54] **END CAP AND LOCKING MECHANISM FOR PNEUMATIC DISCHARGE ARRANGEMENT**
6 Claims, 7 Drawing Figs.

[52] U.S. Cl. **302/52,** 220/57
[51] **Int. Cl.** **B65g 53/40**
[50] **Field of Search** ..... 302/52; 292/259, 256; 220/57, 55.7; 160/(Inquired); 49/(Inquired)

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ABSTRACT: A pneumatic discharge outlet for the hopper of a railway car comprises a cup-shaped cap adapted to fit over the end of a pneumatic tube for closing the same. A bail-shaped member is hingedly connected adjacent the end of the pneumatic tube and has pivotally connected thereto the cap which in the closed position is in sealing engagement with a gasket supported on a flange connected to the pneumatic tube adjacent one end thereof. A locking arrangement is pivotally connected to the flange of the pneumatic tube and is adapted to engage end portions of the bail-shaped member to lock the same in the closed position and also to exert a pressure on the cap which will compress the gasket to provide for effective sealing between the cap and the end of the pneumatic tube. The locking mechanism includes a manually actuated camming element operable to exert pressure for effectively sealing the cap relative to the end of the pneumatic tube.

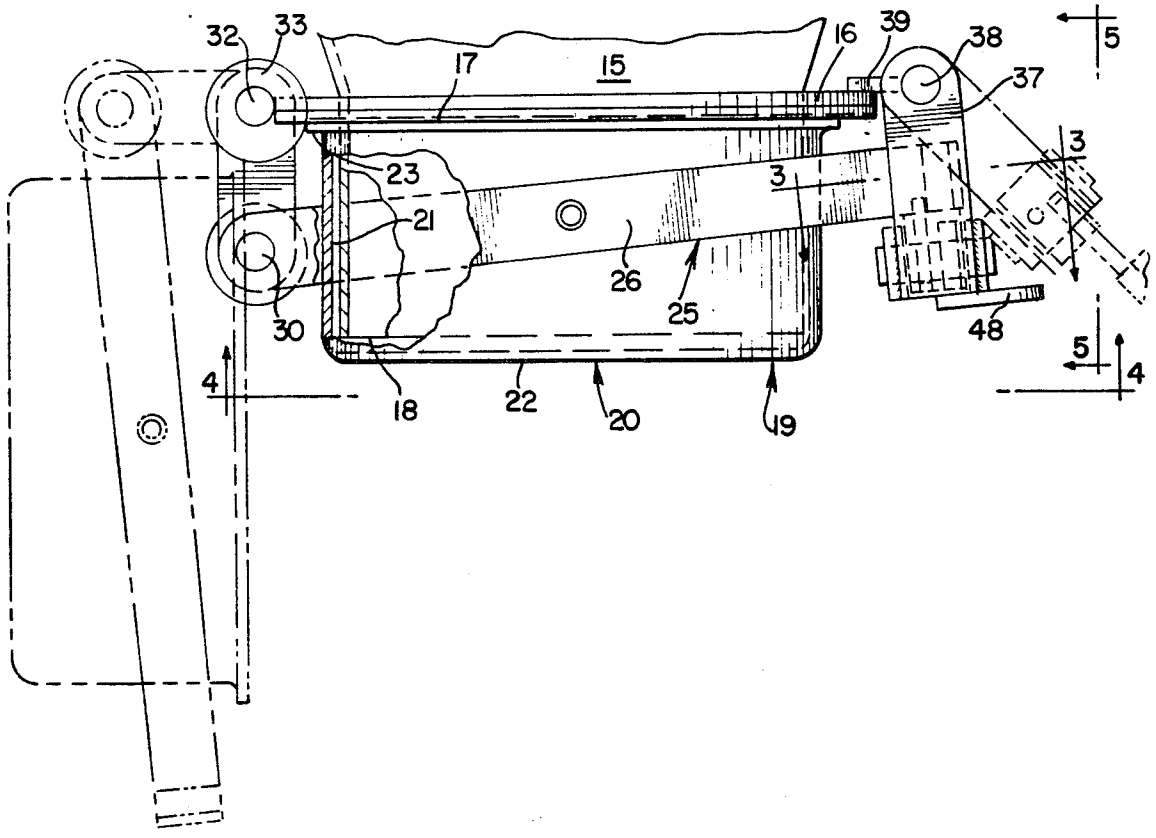


FIG. 1

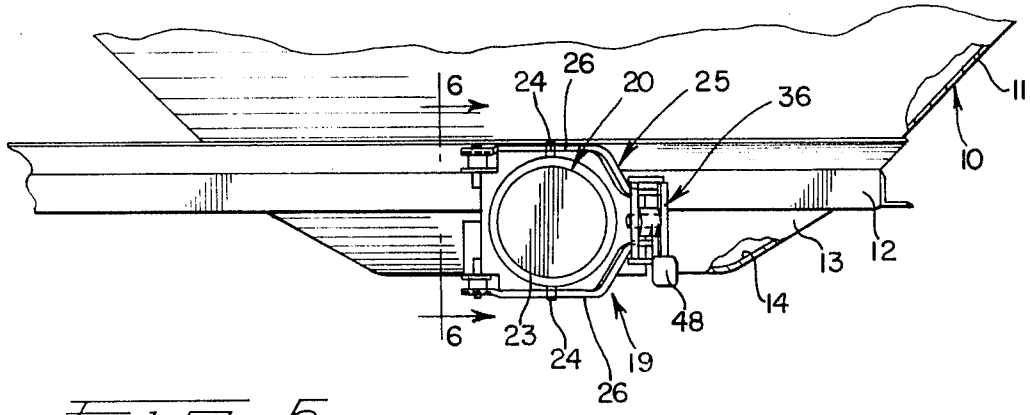


FIG. 5

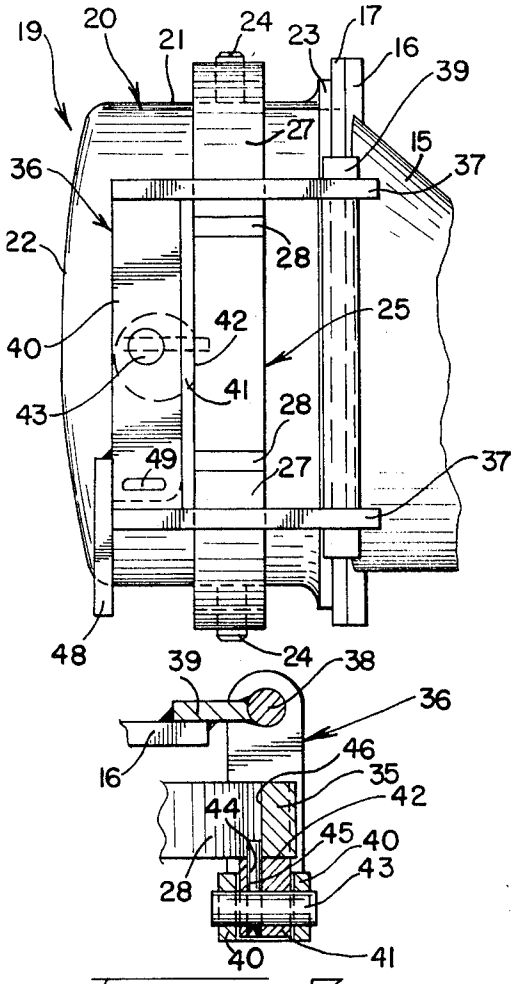


FIG. 7

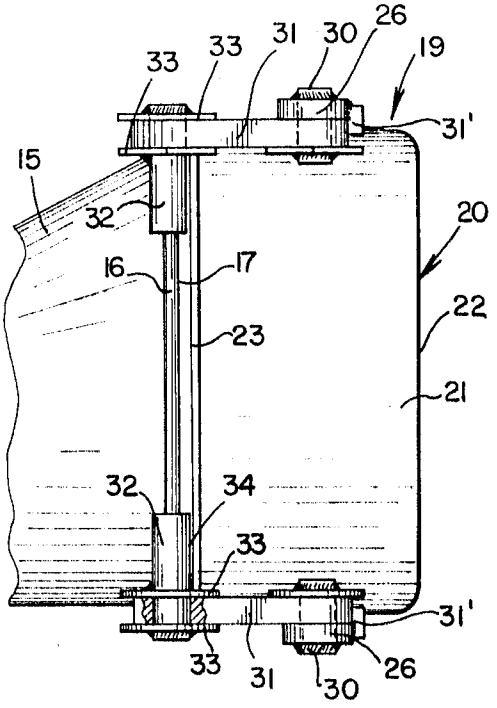


FIG. 6

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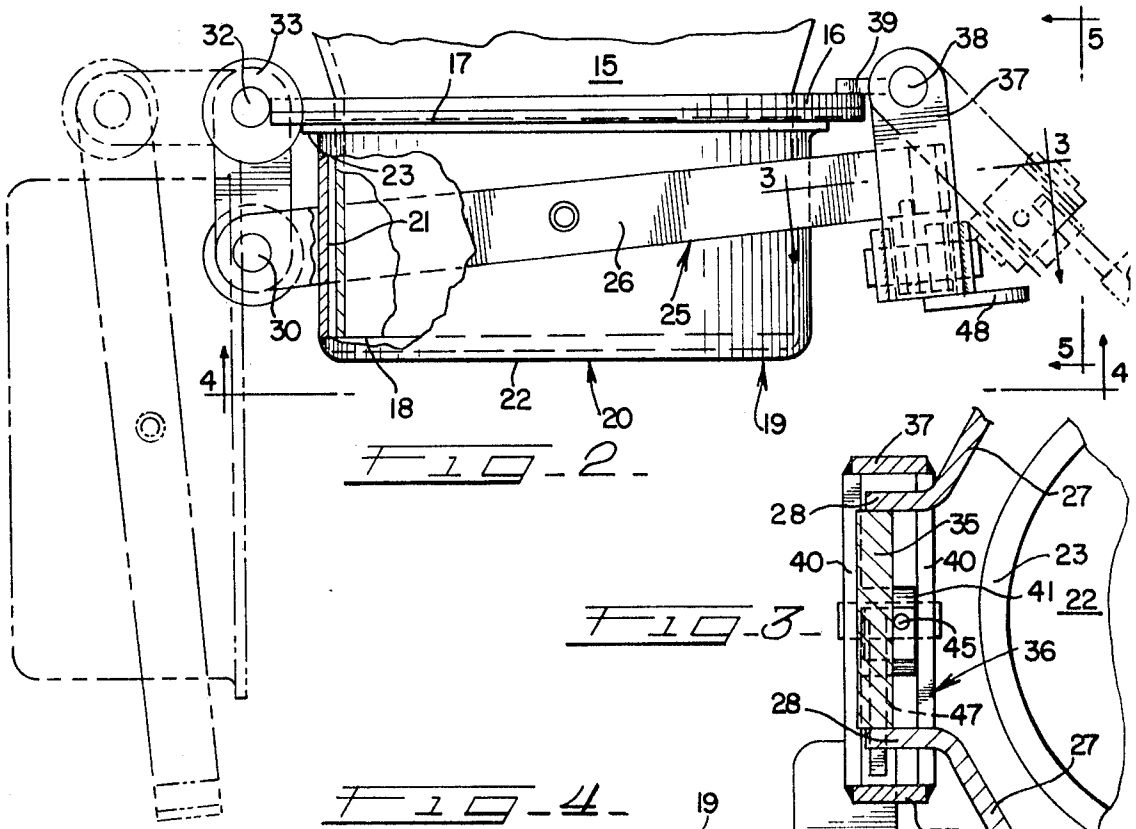
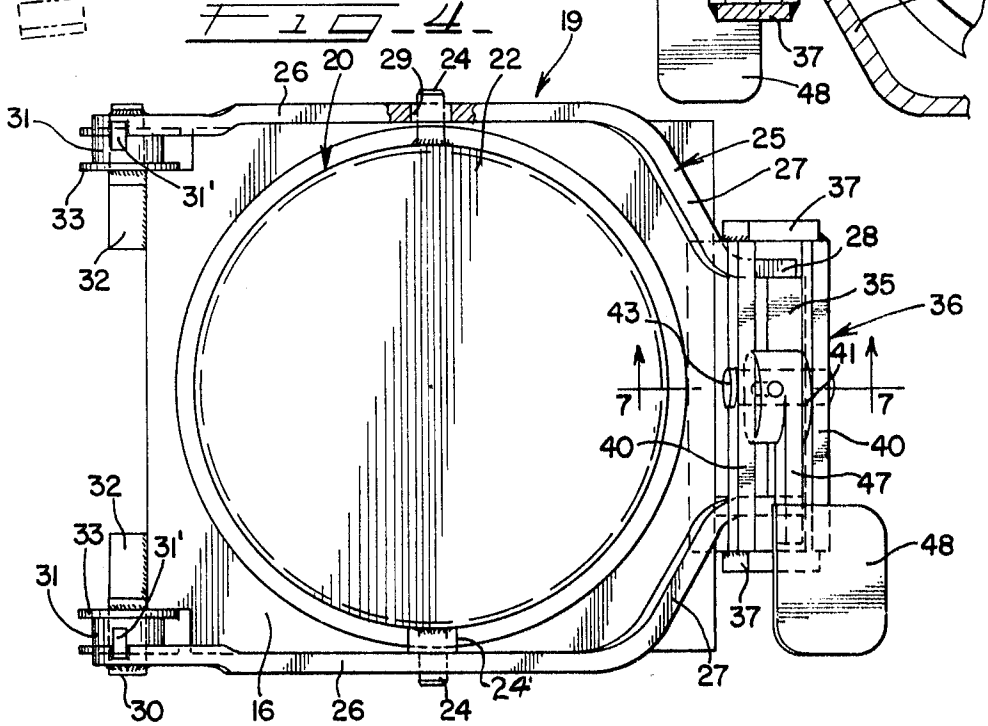


FIG. 2

FIG. 3

FIG. 4



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END CAP AND LOCKING MECHANISM FOR PNEUMATIC DISCHARGE ARRANGEMENT

SUMMARY

In pneumatic discharge arrangements for hoppers a pneumatic tube conventionally extends transversely underneath a railway hopper car. The tube is provided with opposite open ends which are normally closed by means of conventional cup-shaped end caps supported on bail-shaped members hingedly supported adjacent the ends of the pneumatic tube so that closure cap can be moved between open and closed positions. It is particularly important that the end caps effectively perform their sealing function so as to prevent the contamination and loss of comminuted materials during transit of the hopper car.

The present invention provides an improved mechanism for locking the end cap over the end of the pneumatic tube and to exert a positive pressure against a resilient gasket provided on the circumferentially extending flange disposed in proximity adjacent the end of the pneumatic tube. The mechanism includes a rotatable cam which has a camming surface urging the bail-shaped member to maintain the cap in effective sealing engagement. The camming arrangement also provides effective locking means so that the bail-shaped member is in a locked and closed position achieving effective sealing required for over-the-rail operation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a portion of a railway hopper having at its lower end a pneumatic discharge arrangement;

FIG. 2 is an enlarged plan view, with portions broken away disclosing means for locking a closure cap in its closed position;

FIG. 3 is a cross-sectional view taken substantially along the line 3–3 of FIG. 2;

FIG. 4 is a side elevational view taken substantially along the line 4–4 of FIG. 2;

FIG. 5 is a side elevational view taken substantially along the line 5–5 of FIG. 2;

FIG. 6 is a view of an end portion of a pneumatic duct and sealing cap therefor, taken substantially along the line 6–6 of FIG. 1; and

FIG. 7 is a cross-sectional view taken substantially along the line 7–7 of FIG. 4.

DETAILED DESCRIPTION

The lower portion of a hopper structure **10** is disclosed in FIG. 1. The hopper structure **10** comprises a plurality of sloping walls **11** which are suitably supported on a rectangular frame **12** in turn suitably supported underneath a conventional railway hopper car (not shown). The structure **10** is provided at its lower end with a pan **13** which, as shown in FIG. 1, is provided with a chamber **14** adapted to receive and discharge material by pneumatic means from the hopper structure **10**. The pan **13** includes a tubular conduit **15** which is open on opposite sides and is adapted to be connected to a suitable pneumatic system whereby material within the hopper may be discharged and conveyed through a pneumatic conveying system. The tubular conduit **15** is provided adjacent its open end with a gasket **17**. Only one side of the tubular conduit **15** and related structure is disclosed since the sides are symmetrical. The gasket **17** of resilient construction, such as rubber, plastic, etc., is suitably bonded to the circumferential flange **16**. As best shown in FIG. **2**, and as indicated at **18**, the end of the tubular conduit **15** is open.

A closure cap and lock mechanism is generally designated at **19** and comprises a cup-shaped cap **20** including a cylindrical wall **21** and an end wall **22**. The end of the cylindrical wall **21** is provided with a peripheral flange **23** adapted, as best shown in FIG. **2**, to be seated against the gasket **17** in the closed position of the cap **20**. The cap **20**, as shown in FIG. **4**, is provided with opposite outwardly extending hinge members **24** which cooperate with the bail-shaped member generally designated at **25**. The bail-shaped member **25** comprises a pair of arms **26** straddling the cap **20**, said arms **26** including converging portions **27** which are connected to parallel end portions **28**. The arms **26**, as shown in FIG. **4**, are provided with openings **29** which are engaged by the hinge members **24** to permit limited swiveling movement of the cap **20** relative to the arms **26**. As best shown in FIG. **6**, pins **30** extend through ends of arms **26**, are rigidly connected thereto and are also welded to links **31**. A collar **24'** acts as a spacer between the cap **20** and the lower arm **26** to support the cap thereon for relative swiveling movement. Elements **31'** also overlap portions of the arms **26** and links **31**, as best shown in FIG. **6**, in relative welded relation to provide a rigid L-shaped connection between the links **31** and the arms **26**.

As best shown in FIGS. **4** and **6**, hinge members **32** are rigidly secured to the circumferential flange **16** encircling the tubular conduit **15**. As best shown in FIG. **4**, the flange **16** has its outer edges of relative rectangular configuration. Each hinge member **32** has connected thereto washers **33** in relative spaced relation. The washers **33** are suitably welded to the hinge members **32** and disposed therebetween are the links **31** which are pivotal relative to the hinge members **32** which extend through bores **34** provided in said links **31**.

As best shown in FIGS. **3**, **4**, and **7**, a crossmember **35** is suitably connected to the ends of the parallel end portions **28** of the bail-shaped member **25**. A locking bail is generally designated at **36** and includes a pair of parallel arms **37** which are hingedly mounted on hinge pins **38** suitably supported by a plate **39** on the circumferential flange **16**. As best shown in FIG. **7**, the lower ends of the arms **37** have connected thereto in parallel and spaced relation a pair of plates **40** which rotatably support therebetween a cylindrical cam **41** having a cam surface **42**. The cam **41** is rotatable on a pivot pin **43** suitably carried on the spaced plates **40**. The cam **41** also includes a bore **44** which has fixed therein a pin **45** adapted, as shown in FIG. **7**, to engage the inner surface **46** of one of the crossmembers **35**. The cam **41**, as best shown in FIG. **4**, includes an arm **47** to which a tab **48** is connected. As best shown in FIG. **5**, one of the plates **40** is provided with an opening **49** adapted to register with a similar opening (not shown) in the arm **47** within which a suitable car seal may be inserted which prevents hinging movement of the arm **47** and rotation of the cam **41** thus maintaining the cap **20** in the locked position shown in FIG. **2**.

THE OPERATION

When the railway car has reached its destination, end caps **20** are removed and one end of the tubular conduit **18** is connected to a suitable pneumatic discharge arrangement for withdrawing materials from the hopper **10**. To move the cap **20** to the open position the car seal is removed from the openings and the operator then manually grasps the tab **48** moving the arm **47** in a direction outwardly from the pan **13** whereupon the camming surface **42** is disengaged from the crossmember **35** and the pin **45** is disengaged from the edge **46** of the member **35** whereupon the bail-shaped member **36**, as best shown in FIG. **7**, may be pivoted outwardly and the bail-shaped member **25** carrying the cap **20** may be moved to the dotted line position shown in FIG. **2**. In this position the tubular conduit has its open end available for connection to a suitable pneumatic discharge arrangement. After the discharge of material has been effected the cap **20** is returned to its closed position, shown in FIG. **2**, and the bail-shaped member **36** is moved into position straddling the end portions **28** whereupon rotation of the cam **41** is again effected and the camming surface **42** applies a pressure forcing the ends **28** toward the pan **13**, in turn causing the flange **23** of the cap **20** to engage the gasket **17** in tight sealing relation. When the pin is in the position shown in FIG. **7** against the surface **46** hinging movement of the bail **36** is prevented and the cap **20** is securely locked in position whereupon a suitable car seal again may be inserted.

An effective end-cap-sealing arrangement and locking means therefore has been disclosed and described.

I claim:

1. A closure mechanism for the pneumatic duct of a hopper discharge arrangement comprising:

a cup-shaped cap in the closed position being in nested relation over the open end of a tubular portion of said duct,

means hingedly connecting said cap to said duct including a bail having a pair of arms straddling said cap,

means on said cap and arms providing for swiveling movement of said cap relative to said bail,

a transverse member connecting end portions of said arms,

a locking assembly including a pair of transversely spaced straps hingedly connected to said duct and being hingedly movable to a locked position straddling the end portions of said arms,

a bracket connecting said straps, and

camming means rotatably mounted on said bracket, said camming means being movable into camming relation with said transverse member to maintain said cap in a closed and locked position.

2. The invention in accordance with claim 1,

said transverse member including one side engaged by said camming means in said camming relation, and a projecting member on said camming means engaging a second side of said transverse member.

3. The invention in accordance with claim 2,

said bracket comprising a pair of parallel supports between which said camming means is mounted.

4. The invention in accordance with claim 3,

said camming means comprising a cylindrical cam and an actuating finger connected thereto.

5. The invention in accordance with claim 4,

said finger and bracket including means accommodating a locking seal.

6. The invention in accordance with claim 5,

said means hingedly connecting said cap comprising a pair of extension elements connected to said arms in L-shaped relation, and

hinge members on said duct hingedly connected to said extension elements.