March 15, 1955 B. S. SNOW 2,704,229

CHOKE-BAFFLE

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FIG. 1

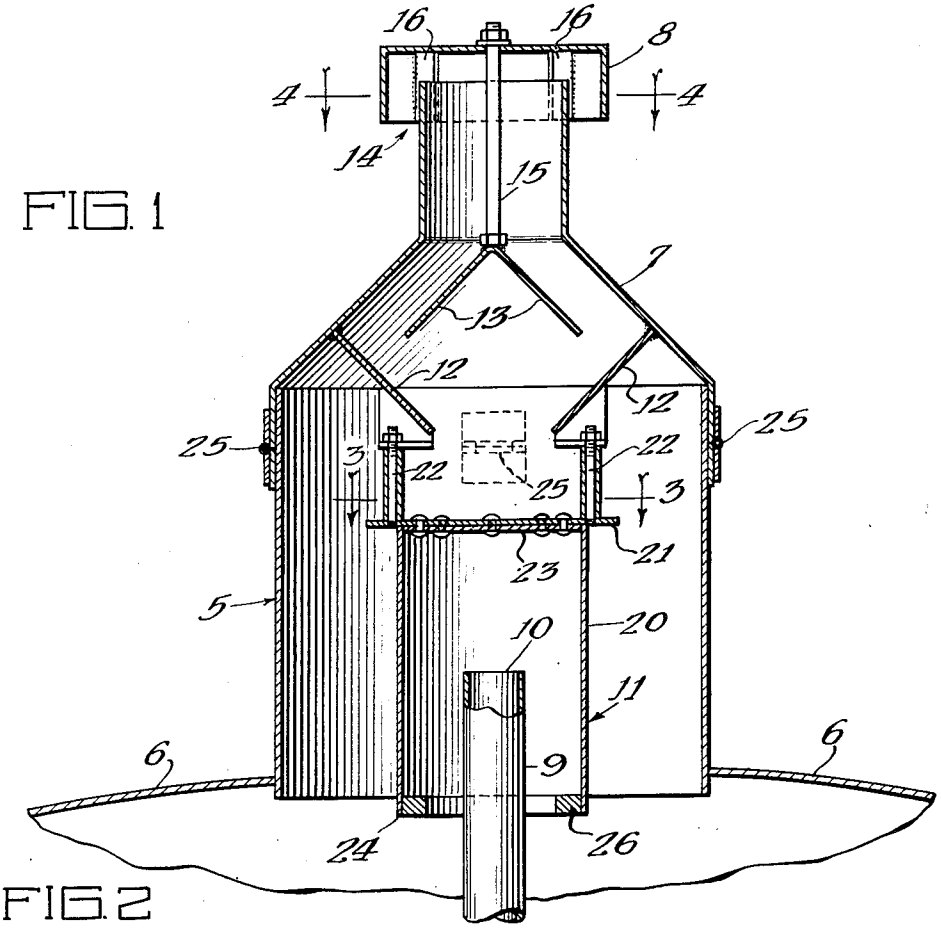
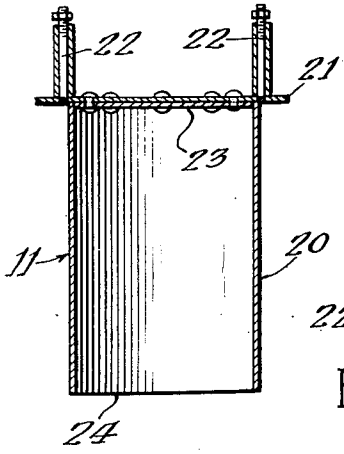


FIG. 2



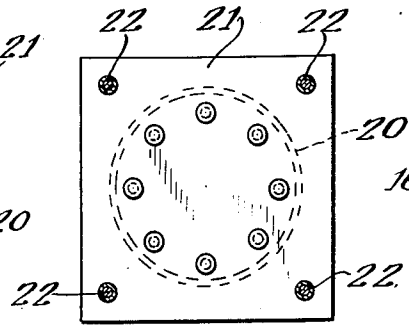
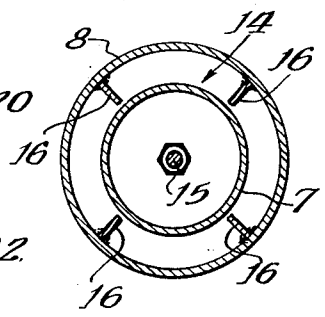


FIG. 3

FIG. 4



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CHOKE-BAFFLE

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FIG. 5

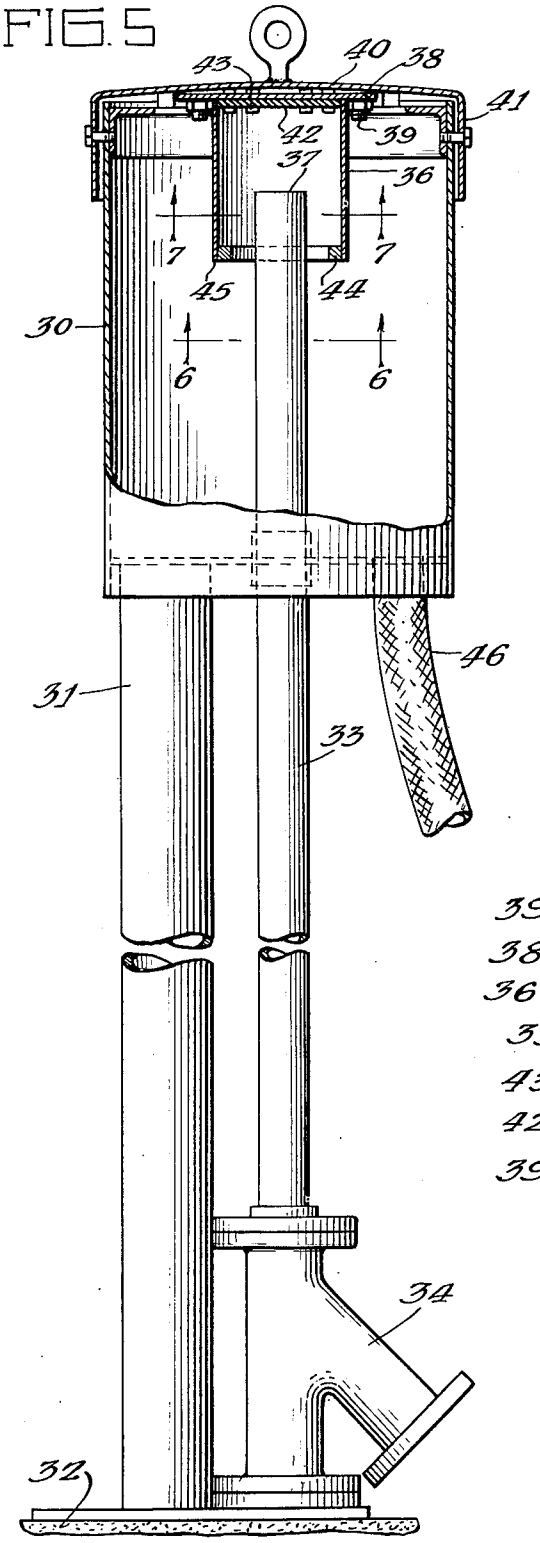


FIG. 6

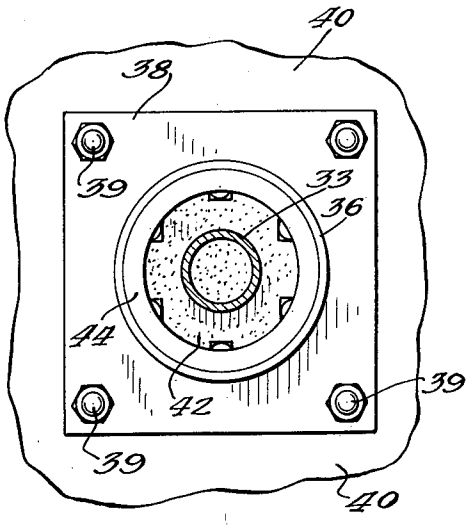
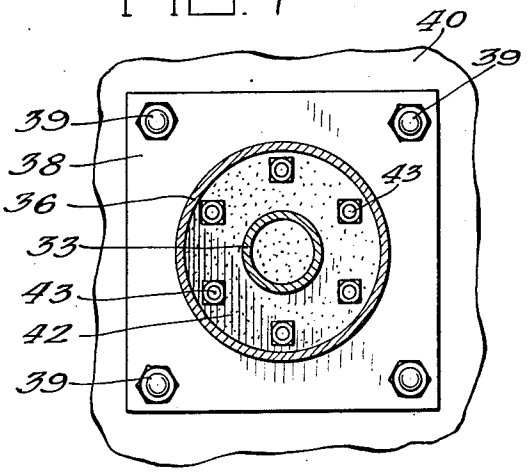


FIG. 7



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CHOKE-BAFFLE

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Application January 15, 1953, Serial No. 331,341

7 Claims. (Cl. 302—59)

This invention relates to a device for use with a pipe line transporting granular material by gas pressure, and more particularly to such a device for automatically stopping flow of material from the pipe line at a predetermined instant.

This application is a continuation-in-part application of my copending application Serial No. 182,035 filed August 29, 1950, now abandoned.

In many places, such as railway locomotive yards, and the like, dry sand or other granular material can be transported most conveniently to storage vessels in pipe lines by air pressure usually available at 60 to 100 pounds per square inch. However, it has been found that operators are not warned sufficiently in advance that the vessels are full to stop the flow before spilling sand over the yards.

The primary object of this invention is to provide an effective, inexpensive device to automatically stop flow of material through the pipe line when the vessel is full.

A further object of the invention is to provide at the discharge end of the pipe line, a baffle structure into which the material is discharged and will lodge to stop-up or choke the pipe line when the previously discharged material has reached a predetermined level.

Another object of the invention is to provide a baffle structure which will automatically stop flow of material through the pipe line when the vessel is full and will further automatically permit more material to enter storage after material is withdrawn from the full vessel.

A particular embodiment of the invention is illustrated in the accompanying drawings, in which—

Fig. 1 is an elevational view in section through the uppermost portion of a storage vessel for granular material, embodying the choke-baffle of this invention;

Fig. 2 is an elevational sectional view of the choke-baffle removed from the vessel;

Fig. 3 is a plan view, taken as indicated at line 3—3 in Fig. 2;

Fig. 4 is a plan sectional view, taken as indicated at line 4—4 in Fig. 1;

Fig. 5 is a broken side elevational view, partly in section, of a track side locomotive sanding tank including the apparatus of this invention;

Fig. 6 is a fragmentary enlarged sectional view, looking upwardly toward the choke-baffle and taken substantially along line 6—6 in Fig. 5; and

Fig. 7 is a sectional view similar to Fig. 6, taken substantially along line 7—7 in Fig. 5.

One particular embodiment of a system in which the present invention may be used is disclosed in my copending application Serial No. 125,908, filed November 7, 1949, now Patent No. 2,614,002, October 14, 1952. The system disclosed therein is intended for the storage of sand in a vessel until such time as it is needed to fill the sand boxes of railway locomotives. The sand is dry and may easily be blown through a pipe line by compressed air. The specific embodiment of the choke-baffle illustrated in the drawings is one adapted for use in a storage vessel for such dry sand.

In Fig. 1, a cupola structure 5 is mounted on the top portion of a storage vessel 6 and is provided with a weather hood 7 topped by a cap 8. A pipe line 9 is supported within the vessel to convey sand from the railway car to the vessel. Both sand and air are discharged from the open end 10 of the pipe line into the

choke-baffle 11. The air is allowed to escape through the top of the cupola structure, the sand being prevented from escaping and caused to fall downwardly into the storage vessel 6. A pair of opposed plate baffles 12 are arranged in the lower portion of the weather hood 7, and a second pair of plate baffles 13 are arranged generally perpendicular to the baffles 12, to provide a tortuous path upwardly through the cupola to an air outlet space 14 beneath the cap 8. The cap 8 is supported on a central rod 15 attached to the baffles 13, and is held in place about the upper portion of the weather hood 7 by spaced vanes 16. Thus, the air may escape from the vessel through the cupola structure, but the granular material is prevented from escaping by the baffles which are sloped downwardly to deflect the sand into the storage portion of the vessel 6.

The choke-baffle 11 has a cylindrical body portion 20 closed at one end by a plate 21 provided with four posts 22 for suspending the choke-baffle from the lower inclined baffles 12. An abrasion resistant rubber pad 23 is positioned in the upper closed end of the cylindrical body 20 and fastened to the plate 21 to act as a baffle for the incoming granular material. The opening out of the body 20 is restricted by an annular ring shelf member 26 extending inwardly toward the pipe line 9. The inner periphery of the ring is spaced from the pipe line to permit material to flow out of the body through the space or opening so formed.

In operation, sand carried through the pipe line 9 discharges through the open end 10 entirely within the body 20 of the choke-baffle. The sand and air are intermingled, and not all sand will impinge upon the rubber pad 23 but will impinge upon other material within the body. The sand loses its velocity by impinging on other material backed up by the rubber pad 23 and falls downwardly around the pipe line 9 into the storage vessel. As the level of sand rises in the vessel and reaches the lower edge portion 24 of the body 20, the sand blown into the body compacts itself instead of flowing outwardly into the storage portion. The ring 26 prevents the air from cutting the sand away from the edge 24 as usually occurs without the shelf provided by the ring thus holding the material within the body 20. This action continues until the whole body is filled, and possibly also a portion of the pipe line 9 adjacent the discharge end 10, stopping flow of both sand and air out of the pipe line. This choking action causes the blowing apparatus to stop operation, thus warning the operator that the vessel is full. As sand is withdrawn from the storage vessel, the upper level recedes and the sand within the body may flow downwardly into the storage vessel, so that more sand may then be introduced into the vessel. The pipe line 9 is preferably extended about half way into the body 20 and the shelf provided by the ring is preferably below the open end 10 and may most conveniently be placed at the lower edge 24 of the body 20.

Sand or other granular material transported by air or other gas pressure is very abrasive, and after continued use, some parts may of necessity have to be replaced. The weather hood portion 7 of the cupola 5 may be removed from the cupola by removing king pins 25 and lifting the upper portion 7 from the cupola. All the baffles and the choke-baffle may thus be removed in one piece from the upper portion of the storage vessel for inspection and repair.

Figures 5–7 illustrate a track-side sander from which locomotive sand boxes are filled by gravity. As contrasted to the storage vessel 6 of Figure 1, these small vessels 30 may be emptied and filled many times daily as each vessel holds about enough sand for one locomotive box. The automatic stopping and starting of sand flow into the vessel is, therefore, of particular importance in this instance.

The vessel 30 is held in elevated position on a fifteen foot high pipe tower 31 mounted on a block foundation 32. The transmission pipe line 33 leads from a fitting 34 connected by underground piping with the main storage tank 6, upwardly into vessel 30. Sand is carried into the vessel by air pressure where it discharges within a choke-baffle 35. The body 36 of the choke-

baffle is cylindrical and the pipe line ends at 37 about midway into the body. A plate 38 closes the upper end of the body and supports the choke-baffle on four posts 39 extending down from the cover 40 on the vessel 30. A small annular space is provided between the downturned flange 41 of the cover and the sides of the vessel 30 for an air escape passage.

In operation, incoming sand and air impinges upon a rubber pad 42 secured to plate 38 as by rivets 43, and loses a considerable portion of its velocity. The sand falls by gravity through an opening from the body formed between the pipe line 33 and the inner periphery of an annular ring shelf member 44 secured to the body below the open end 37 of the pipe line. This shelf prevents the air from cutting around the lower edge 45 of the body when the sand piles up to the level of the lower edge. When the sand reaches this upper level, communication out of the body will be stopped by sand being compacted in the body and possibly also in the upper portion of the pipe line.

When flow of sand into the vessel 30 is stopped because the vessel has filled to the desired level (the lower level of the choke-baffle), the air pressure remains to start flow again as soon as sand is taken from the vessel through one or more gravity flow hoses 46. Taking of sand from the vessel 30 lowers the level and uncovers the outlet from body 36, so that the air pressure can again fill the vessel in the manner described above. Difficulty has been experienced in the past in automatically stopping flow; however, the provision of the present apparatus with the shelf 44 has solved the problem. A specific example of a choke-baffle for such a vessel 30 is one having a body of six inch pipe used with a two inch transmission pipe 33 and a shelf leaving a five inch diameter opening through which pipe 33 extends. The open end 37 of the pipe 33 is spaced about four inches from the rubber pad 42.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, for some modifications will be obvious to those skilled in the art.

I claim:

1. A choke-baffle, for the discharge end of a pipe line transporting granular material by gas pressure, comprising: an inverted cup-like body whose closed end forms a baffle, an open end pipe line for granular material positioned within the body to discharge material by gas pressure entirely within the body toward said baffle; an annular ring secured in the open end of the cup-like body to extend toward the pipe, said pipe being substantially centered within the ring leaving an annular space therebetween for escape of discharged material, the ring being below the open end of the pipe to retain material compacted within said body when sufficient material has been discharged to repose at the level of the lower edge of the body whereby the pipe line is closed automatically from further discharge of material.

2. A choke-baffle as specified in claim 1, wherein the cup-like body is supported in the upper portion of a storage vessel for granular material and an air opening is formed by the vessel portions above the body.

3. A choke-baffle for automatically keeping a storage vessel for granular material from overflowing, comprising: an open transmission pipe line extending upwardly within the storage vessel to near the top thereof for discharging granular material transported by gas under pressure into the vessel; an inverted cup-like body over the discharge opening with the closed end forming a baffle against which incoming material may impinge; an inwardly extending shelf member secured to the open end of the body and defining an opening between its inner periphery and the pipe line for flow of material from said body into the storage vessel, and said pipe line discharge opening being positioned between the baffle and shelf whereby the body and shelf member may retain a compacted mass of material within the body when sufficient material has been discharged to repose within the vessel at the level of said opening between the shelf and pipe line.

4. A choke-baffle as specified in claim 3, wherein the cup-like body is cylindrical and the shelf is annular defining an annular discharge opening from the body adjacent the pipe.

5. In an elevated sand storage tank for filling the sand boxes of locomotives by gravity, means for admitting sand to the tank, comprising: an open-end pipe line extending upwardly into the tank and being connected with a source of sand and gas under pressure to carry the sand therethrough; a choke-baffle positioned over the open end of the pipe line to receive therein all sand discharged into the tank, said choke-baffle having a body of inverted cup-like shape with the closed end forming a baffle against which incoming sand may impinge, said pipe line opening within the body; an annular ring extending inwardly from the lower edge of the body and surrounding the pipe line in spaced relation thereto, said ring being positioned below said pipe line open end to automatically retain a compacted mass of sand in said body when the tank has been filled to the lower level of said body whereby further discharge of sand from the pipe line is automatically stopped.

6. In a storage vessel for granular material, means for admitting material to the vessel, comprising: an upright pipe line; a source of gas under pressure directed into the pipe line to carry the granular material; and a choke-baffle positioned to receive therein all material discharged from said pipe line, said choke-baffle having a body of inverted cup-like shape with the upper closed end forming a baffle, said pipe line extending into the body and being smaller than the body with its open end facing said baffle; a shelf member secured to the body below said pipe line open end and extending inwardly toward the pipe line, the inner periphery of said shelf member being spaced from the pipe line to provide an opening about the pipe for flow of the material from the body, said shelf preventing continued flow of material out around the lower edge of the body when material reposes in the vessel at the lower level of the body whereby further flow out of the pipe line is closed.

7. Apparatus as set forth in claim 6, wherein the vessel is provided with an opening in its top portion for escape of gas from the vessel.

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