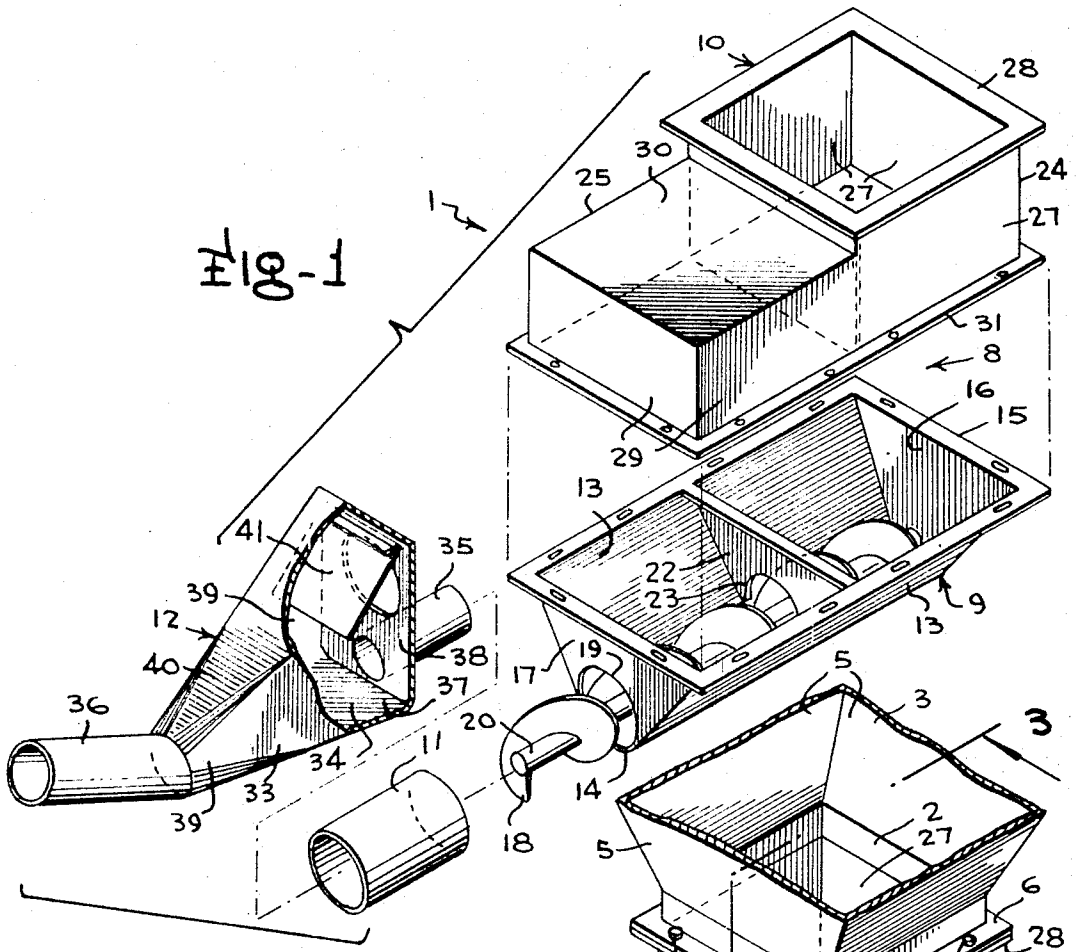
Aug. 12, 1969 J. S. HERR 3,460,869

AIR LOCK

Filed Oct. 9, 1967 2 Sheets-Sheet 1

Fig-1



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AIR LOCK

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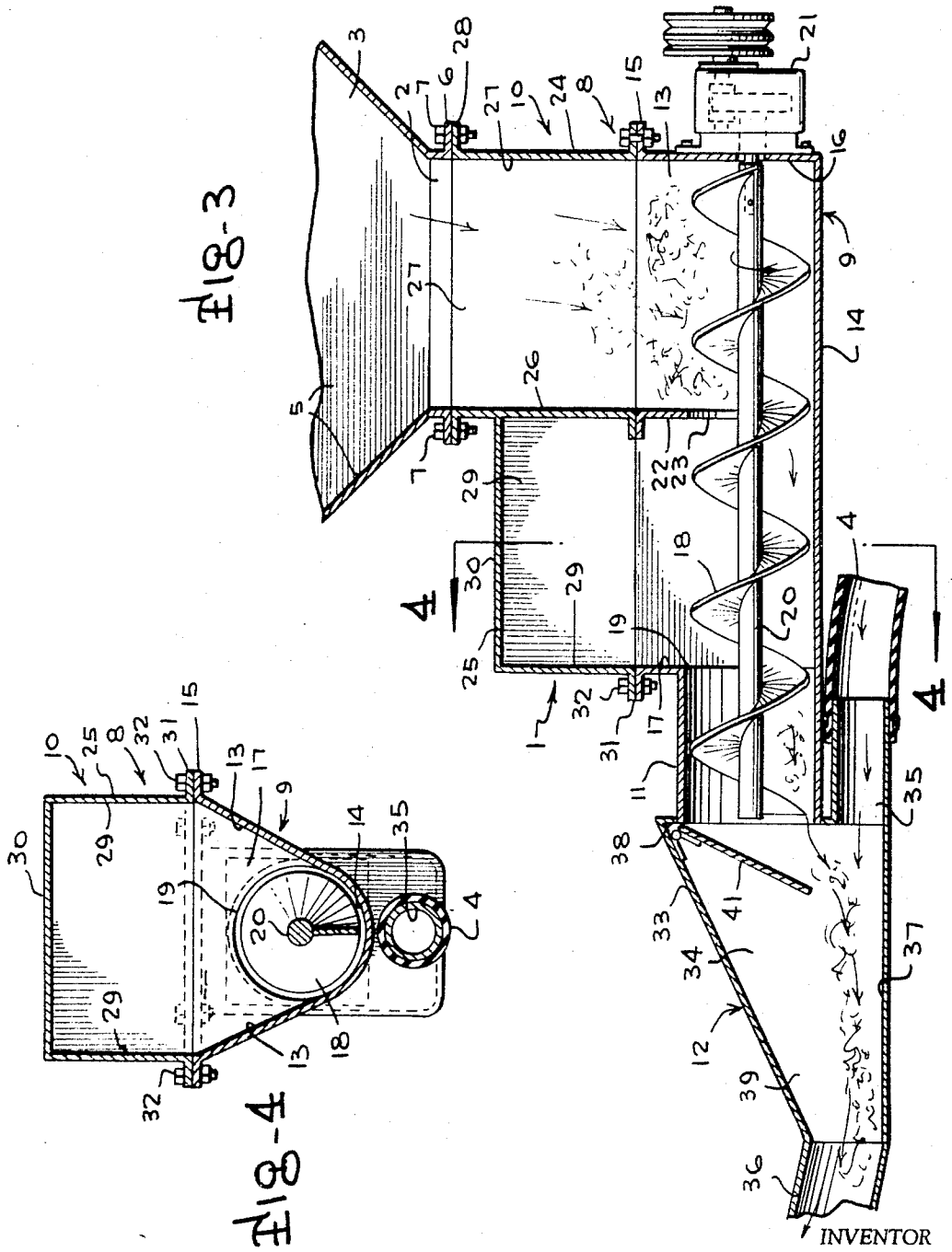


FIG-3

FIG-4

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AIR LOCK

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U.S. Cl. 302—50 6 Claims

ABSTRACT OF THE DISCLOSURE

Air lock for introducing material into an air conveyor line while preventing blow back to a material supply container, wherein a receiver including a material chamber connected to the container outlet and a surge chamber are side-by-side with an auger running through them conveying material from the material chamber through the surge chamber to a pick-up chamber for entrainment in a conveying airstream. A gravity operated door covers the material inlet to the pick-up chamber. Pressure in the pick-up chamber is communicated to the surge chamber where it expands to prevent blow back to the material container.

BACKGROUND OF THE INVENTION

This invention relates to air locks for use in air conveying systems, and more particularly to air locks which have no moving gates, plates, etc., but remain in open condition during operation.

Air locks are normally provided in conveying systems where it is desirable to admit material to be conveyed into a moving stream of air. The purpose of the lock is to allow free flow of material into the airstream, but prevent flow of air into the material container, or hopper. In some instances, material has been dropped from above into the airstream for feeding without using a conventional air lock, but an occasional blow back will occur which disrupts the feed and creates a major problem.

SUMMARY OF THE INVENTION

The general object of the present invention is to provide an air lock which will assure steady feed without blow back.

A more specific object is to provide such an air lock wherein the prevention of blow back is accomplished without the use of mechanically operated valves.

Another object is the provision of an air lock having an auger type feed from the supply container to the airstream, with the auger extending through two adjacent chambers, one a material receiving chamber and the other a surge chamber.

A further object of the invention is to provide an air lock which will include a surge chamber to serve as an air cushion by permitting expansion of reverse flowing air in the material outflow passage and prevent blow back at the material supply outlet.

Other objects of the invention will become apparent from the following description of one practical embodiment thereof, when taken in conjunction with the drawings which accompany, and form part of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a perspective view with the various components making up the air lock shown separated for clarity;

FIGURE 2 is a perspective view of the air lock in assembled form;

FIGURE 3 is a vertical, longitudinal section through the air lock assembly, taken substantially on the line 3—3 of FIGURE 2; and

FIGURE 4 is a vertical, transverse section through the air lock in the region of the surge chamber, and is taken on the line 4—4 of FIGURE 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The air lock **1** of the present invention is adapted to be connected to the outlet **2** of a container or hopper **3**. The air lock is designed to transfer material emerging from the hopper outlet to an air conveying line **4**.

The hopper **3** is shown as having downwardly converging sides **5** forming the outlet **2**. The bottom of the hopper outlet has a peripheral flange **6** which is connected by suitable bolts **7** to the inlet end of the air lock **1**.

The air lock consists essentially of a receiver **8**, divided into a base section **9** and a header section **10**, a feed tube **11** and a material pick-up chamber **12** which is included in the air conveying line **4**. Material (usually granular material) flows from the hopper **3** into the receiver **8** and is carried through the base section **9** and feed tube **10** to the material pick-up chamber **12** where it is entrained in the airstream flowing through the line **4**.

The base section **9** of the receiver **8** is in the form of and elongated trough having its longitudinal sides **13** converging downwardly to a rounded bottom **14**. A mounting flange **15** extends around the upper edges of the side walls and the end walls **16** and **17**. A floating auger **18** is positioned in the bottom of the trough and extends through an opening **19** in the wall **17** and along the feed tube **11** which is connected to the wall **17** about the opening **19**. The shaft **20** of the auger extends through the end wall **16** of the trough and is suitably connected to a drive means **21** mounted on the end wall **16**. The base section is divided into two compartments by means of a baffle **22** which extends the full height and width of the trough, except for an arcuate opening **23** at the bottom to allow passage of the auger **18**. The compartment between the baffle and the end wall **16** forms the base of a material chamber, and the compartment between the baffle and the end wall **17** forms the bottom portion of a surge chamber.

The header section **10** of the receiver also has two sections, a material chamber **24** and a surge chamber **25**. The two chambers are in end to end alignment and have a common dividing wall **26**. Material chamber **24** is open top and bottom, and consists only of four vertical walls **27** with horizontally extending mounting flanges **28** extending about the upper edges of the wall for attachment to the flanges **6** of the hopper. The surge chamber has three vertical walls **29** and the common dividing wall **26** and a top **30**. The bottom of the header section of the surge chamber is open for free communication with the surge chamber compartment of the base section of the receiver. There is a surrounding flange **31** at the bottom of the header section which extends completely around the material and surge chambers for mating with the flange **15** to secure the base and header sections of the receiver together. The two sections can be joined by bolts **32**. When the upper and lower sections are in assembled relation, the common dividing wall **26** of the header section is in vertical alignment with the baffle **22** of the base section so that the two form a continuous dividing wall between the material chamber and the surge chamber.

The feed tube **11** is simply a length of tubular material forming a housing about the extended portion of the auger **18**, and of sufficient length to extend from the receiver base. The tube provides a confining passage for the material while moving from the base section to the material chamber.

Material pick-up chamber **12** actually includes a housing **33**, which encloses the pick-up chamber proper **34**, an air inlet duct **35**, connected to the air line **4**, and a com-

bined air and material discharge **36**, connected to an appropriate conveying line for carrying the material to a desired point of deposit. The housing **33** is approximately triangular in vertical section, with a horiozntal bottom **37**, a vertical back wall **38**, generally triangular side walls **39** and an inclined top wall **40**. Air inlet duct **35** opens through the back wall **38** near the bottom, and the feed tube **11** opens through the back wall near the top so that it is above the air inlet opening. A gravity operated door **41** is hinged at its top at the top of the opening of the feed tube into the back wall so that it will close the tube opening when no feed is being fed through the tube, or when pressure builds up within the pick-up chamber **34**. It has been found that a better entrainment of the material with the air, and a more even flow rate of the entrained material is obtained if the discharge tube **36** inclines slightly from the end of the pick-up chamber.

When the air lock is to be put into operation, the various elements are assembled as described, and the assembled lock is attached to the outlet of a container or hopper **3** by bolting the air lock flange **28** to the bottom flange **6** of the hopper. If the hopper has a gate, or other valve, it will be open to allow material to flow out into the material chamber **24** and the material compartment of the base section of the air lock. The air inlet duct **35** will be connected to the air line **4**, and the discharge tube will be connected to an appropriate conveying line. Auger drive means **21** will be put into operation so that the auger will rotate and feed material lengthwise of the trough in the base section of the receiver through the opening at the bottom of the baffle **22**, through the base of a surge chamber and through the feed tube **11**, forcing the door **41** to swing open and the material to flow into the pick-up chamber **34**. If the material chamber **24** is kept filled with a steady supply of material, the flow of material into the pick-up chamber **34** will be even. As the material falls into chamber **34**, it is entrained with the airstream moving from duct **35** through chamber **34** and out the discharge **36** and will be entrained with the stream and carried through the discharge and the conveying line. If there is a build-up of material in the conveying line, or for some other reason there is a pressure build-up in the pick-up chamber **34**, air may blow back through feed tube **11** into surge chamber **25**. The build-up of pressure may be so quick that the blow back will occur before door **41** can close. As the air under pressure emerges from the feed tube **11** into chamber **25**, it can expand and the pressure will be reduced. Thus, the air is controlled and there is no leakage of the air back into the supply hopper.

In testing the device, the top of the surge chamber was placed at the plane of the base section of the receiver, and it was found that considerable blow back occurred. It was only after the upper section of the surge chamber was raised an appreciable extent (for example, four to six inches) that the lock functioned to practically eliminate

blow back into the hopper. The considerable cushioning area within the upper section of the surge chamber allows for adequate expansion and pressure reduction so that the blow back does not go into the feed hopper.

While in the above one practical embodiment of the invention has been disclosed, it will be understood that the particular construction and arrangement of parts shown and described are merely by way of example and the invention may take other forms within the scope of the appended claims.

I claim:

1. Air lock to feed material from a source of supply to an air conveying line while preventing air blow back to the source of supply comprising, a chamber to receive material from the source of supply, a pick-up chamber through which the air line will flow, a feed tube extending from the chamber to receive material to the pick-up chamber, an auger in the feed tube to move material from the chamber to receive material to the pick-up chamber, a valve for automatically closing the end of the feed tube at its connection to the pick-up chamber, and a surge chamber through which the feed tube passes, the feed tube extending along the bottom of the surge chamber and open along its top to the surge chamber and the surge chamber being of greater depth than the auger to provide an expansion space above the auger.

2. Air lock as claimed in claim **1** wherein, the surge chamber is in communication with the chamber to receive material from the source of supply.

3. Air lock as claimed in claim **1** wherein, the chamber to receive material and the surge chamber are separated by a common wall, and the common wall has an opening at its bottom through which the auger extends and which provides communication between the surge chamber and the chamber to receive material.

4. Air lock as claimed in claim **3** wherein, there is an air inlet to the pick-up chamber, and the feed tube has an outlet to the pick-up chamber above the air inlet.

5. Air lock as claimed in claim **4** wherein, the valve at the end of the feed tube is gravity operated.

6. Air lock as claimed in claim **5** wherein, there is a discharge line from the pick-up chamber at an inclined angle to the angle of the air inlet.

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