Feb. 19, 1963 W. HOBBS, JR 3,077,975

CONVEYOR

Filed Feb. 24, 1960

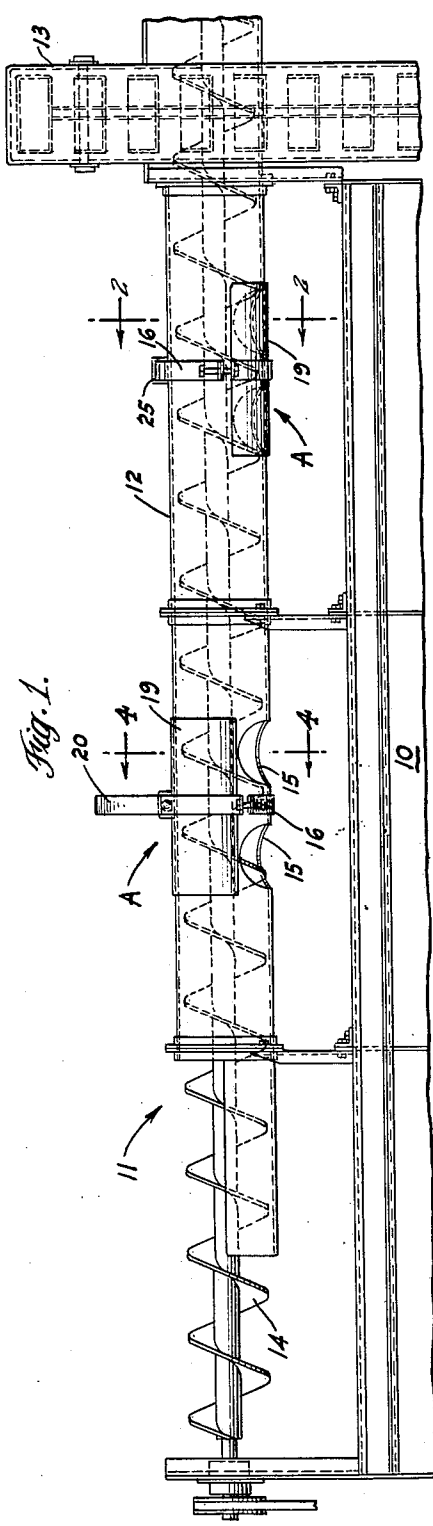

Fig. 1.

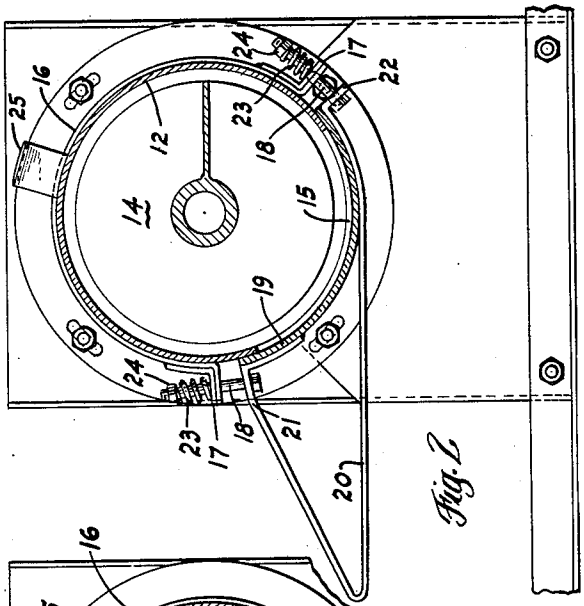

Fig. 2

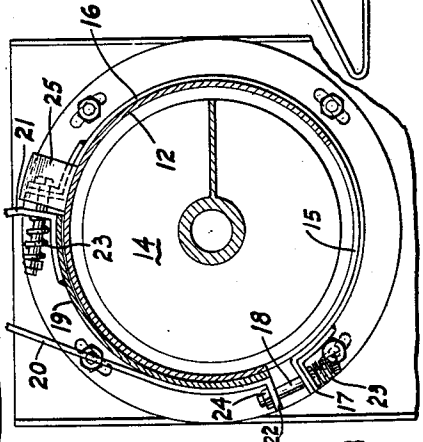

Fig. 4.

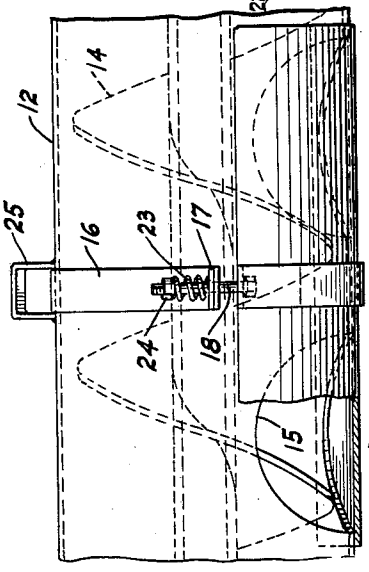

Fig. 3.

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CONVEYOR

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This invention relates, generally, to conveyors and is primarily concerned with conveyors adapted to handle granular material. More specifically, the invention relates to an improved slideable closure for a conveyor dispensing port.

It has long been deemed expedient to transport granular material through conduits by use of forced air, augers or other well known conveying means. A typical example of such an arrangement, in the agricultural field, would be the filling of grain bins from an overhead conveyor. Normally, grain is propelled through a tube or other conduit and dispensed therefrom through discharge openings located at predetermined points along the length of the conduit. Usually some form of manually operable door is provided at each opening for regulating the rate of discharge of the grain. Sliding doors are widely employed, since they allow accurate control of the size of the discharge opening for flow regulating purposes. One commonly employed method of mounting these doors is to pass a strap (usually metal) around the conduit and attach its ends to the door whereupon the door and strap may be rotated around the conduit to selectively cover or uncover the discharge port. This method of mounting sliding doors on grain conduits is generally preferred over the well known "grooved track" mounting; since track grooves readily become clogged with the granular material being dispensed.

The conduit doors and their mounting structures are subject to the corrosive effects of moisture and grain juices when wet grain is handled and considerable amounts of dust when dry grain is handled. In the case of portable grain bins, the conveyors are frequently operated and stored out-of-doors. Hence, the corrosive effects of the elements are added to those of the grain itself. As time goes on, the conduits and door mounts are subject to increasing frictional forces as a result of corrosion. The doors become harder to slide.

A problem of major importance with sliding doors on grain conduits is jamming resulting from grain becoming wedged between two relatively movable parts; such as, the door and the conduit, or the mounting strap and the conduit. Since the door must slide through the path of the discharging grain, it is almost impossible to prevent some kernels from being carried between the conduit and the door. Other kernels will "splash" into positions where they will be pinched between the door or strap and the conduit when the door is again moved. In the case of strap mounted doors these trapped kernels, in effect, increase the diameter of the conduit by the thickness of the trapped kernel. This effective expansion of the conduit increases the frictional force between the door, or strap, and the conduit. The result is a locking or jamming of the door. This is, at best, an annoyance to the operator. If the door jams in open position, the result may be grain spillage due to bin overflow; thus, causing a shut down of the entire conveyor mechanism as well as a loss of grain.

The primary object of this invention is to provide an inexpensive, rugged, jam-proof slidable closure for a conveyor conduit.

A further object of the invention is to provide a resilient mounting means for a slidable closure wherein said closure may be moved outwardly from its conduit to readily free matter trapped between the closure, or its mounting, and the conduit.

It is a further object of this invention to provide a slidable closure for a conduit whereby the frictional force opposing movement of said closure may be readily regulated.

A further object of this invention is to provide a slidable closure for a conduit port wherein said closure may be oscillated about said conduit, or moved a limited radial distance therefrom, but will not move out of alignment with said port.

A further object of the invention is to provide mounting means for a slidable closure which will automatically compensate for normal wear and corrosion from the elements.

Further objects and advantages of this invention will become apparent from the following description and recital in the appended claims.

In the drawings:

FIG. 1 is a side elevation of an auger tube on which two slidable closure members constructed in accordance with this invention are mounted; one closure member being shown in closed position and the other in open position.

FIG. 2 is an enlarged section taken on the line 2—2 of FIG. 1 showing the closure member in closed position.

FIG. 3 is a side view of FIG. 2 looking toward the right in FIG. 2. A portion of the cover is broken away to show the discharge opening in the auger tube.

FIG. 4 is an enlarged section taken on the line 4—4 of FIG. 1 showing the cover in full open position.

With reference to the drawings, particularly FIG. 1, the numeral 10 indicates the top portion of a grain bin. Disposed above bin 10 and carried thereby is an auger conveyor generally indicated by the numeral 11. In filling the bin, grain is deposited in conduit, or tube, 12 by a conventional bucket elevator 13. The grain is then conveyed through conduit 12, from right to left in FIG. 1, by the auger 14. As the grain passes discharge openings 15 in conduit 12, it falls therethrough into bin 10. In accordance with this invention, slidable closures, indicated generally at A, are provided on conduit 12 to regulate the effective size of the openings 15 and, thereby, control the rate of discharge.

As best seen in FIGS. 2 through 4, a strap 16 extends partially around tube 12. Each end of strap 16 carries a bracket 17, a portion of which extends radially away from tube 12. The radially extended portion of each bracket 17 is provided with an aperture, not shown, to loosely receive the bolt 18. In the disclosed embodiment of the invention, each end of the strap 16 is bent outwardly to supplement the strength of the brackets 17. In this case, an aperture, not shown, is also provided in the outwardly bent portion of the strap for reception of the bolt 18. An arcuate closure plate 19 is disposed against conduit 12. Plate 19 carries a handle 20. Brackets similar to the brackets 17 carried by strap 16 may be provided on closure plate 19 or, as shown in FIGS. 2 and 4, portions of handle 20 may be conveniently formed to serve as brackets as shown at 21 and 22. Bracket portions 21 and 22 of handle 20 are also apertured to loosely receive bolt 18. Closure plate 19 is retained against tube 12 by strap 16 and bolts 18. A coil spring 23 is carried by each bolt 18 and is positioned between one end of the bolt and one of the brackets. It does not matter which end of bolt 18 carries the spring or which bracket the spring abuts so long as the spring is placed to bias two cooperating brackets toward each other. The nut 24 received on each bolt 18 completes, with springs 23 and flanges 17, 21 and 22, a resilient connection between plate 19 and each end of strap 16.

The tendency of the resilient connection is to contract about tube 12 in response to the forces of springs 23. This serves to bias the plate and strap toward each other and radially inwardly toward tube 12. The nuts 24 on bolts 18 provide a convenient means for adjusting the tension of springs 23. Adjustment of springs 23 regulates the force with which strap 16 and plate 19 "grip" conduit 12. As best seen in FIGS. 1 and 3, the strap 16 and the brackets 17, 21 and 22 all lie in a common vertical plane perpendicular to the axis of conduit 12. The U-shaped bracket 25 is carried by conduit 12 with its legs straddle strap 16. This arrangement permits the strap to move around, or radially away from, tube 12, but not longitudinally therealong. The extent of radial movement of the strap is governed by the limits of the resilient connections provided by bolts 18, springs 23 and brackets 17, 21 and 22, not by bracket 25.

In operation, the closure plate and its mounting strap are rotated about conduit 12 by handle 20 to move plate 19 to any desired position. Upon release of handle 20 by the operator, the plate 19 will be held in position by the force of the springs 23 acting to contract the connections between strap 16 and plate 19. Consequently, the effective size of opening 15 may be controlled by the operator. Adjustment of nuts 24 will change the tension of springs 23 and vary the gripping force between strap 16, gate 19 and tube 12. Thus, the force required by the operator, to rotate the closure assembly about the tube may be adjusted. Within the limits of springs 23 the closure assembly will automatically compensate for changing conditions of the surface of tube 12; for example, normal wear or corrosion. It is virtually impossible for this closure assembly to be jammed by material wedging between the strap or plate and the tube. By varying his point of grasp and direction of application of force on handle 20, the operator may either compress both springs 23 and move plate 19 radially away from tube 12; compress one of the springs and extend the other (as shown in FIG. 4) to relieve the pressure on one end of strap 16 and one edge of plate 19; or, similarly, he may relieve the pressure on the other end of strap 16 and the other edge of plate 19. These actions serve both to free any grain trapped between the strap and plate and to reduce the area of the plate and strap bearing against tube 12. This reduction of contact area between the closure assembly and tube 12 facilitates rotation of the assembly about the tube; since the relatively rough, i.e., unpolished, surface of plate 19 need not be dragged over the similarly rough surface of tube 12.

Both resilient connections are necessary for satisfactory performance of this closure assembly. In the case of a single resilient link, jamming is, at best, relieved for only one direction of travel of the closure plate and undesirable deflection leading to a poor fitting closure assembly and ultimately to fatigue failure of the strap may occur. As will be readily seen in FIGS. 2 and 4; regardless of the direction of rotation of plate 19 about conduit 12, the strap 16 will only be subject to tension. The strap is always "pulled" around the tube by the connection on the trailing edge of plate 19. If only one resilient connection were provided, the strap would be "pushed" in one direction of rotation and "pulled" in the other. This would necessitate the use of a stronger, stiffer strap member; such a strap member must be preformed to fit the conduit, while the present strap may be

flexible enough to be merely wrapped around the conduit when the device is assembled.

While this invention has been described in connection with a particular embodiment thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as fall within the scope of the invention of the limits of the appended claims.

Having thus described my invention, what I claim is:

1. A conveying mechanism for granular material comprising, an elongated conduit having a discharge opening intermediate the ends thereof, means to convey material through said conduit, a closure member for said opening disposed against the outer periphery of said conduit, and means mounting said closure member for angular adjustment about the conduit to open and close the discharge opening and for movement radially outwardly from the conduit to compensate for material becoming wedged between the closure member and conduit, said means comprising a strap extending around said conduit and having its ends positioned adjacent the closure member, and means resiliently connecting the ends of said strap to said closure member and biasing the strap and closure member radially inwardly against the conduit.

2. A conveying mechanism for granular material as recited in claim 1 comprising means mounted on said conduit to prevent said strap from moving longitudinally along said conduit.

3. A conveying mechanism for granular material as recited in claim 1 wherein a handle is mounted on said closure member for slidably rotating the closure member for slidably rotating the closure member and strap about said conduit conduit to selectively open and close the discharge opening.

4. A conveying mechanism for granular material as recited in claim 1 wherein said means resiliently connecting the ends of said strap to said closure member comprises a pair of apertured brackets on said closure member and projecting radially outwardly from the conduit, an apertured bracket at each end of the strap and projecting radially outwardly from the conduit, a first bolt extending through one of the brackets on said closure member and one of the brackets on said strap, a second bolt extending through the other bracket on said closure member and the other bracket on said strap, a first spring on said first bolt interposed between one end of the bolt and one of the brackets through which said first bolt extends, a second spring on said second bolt interposed between one end of the bolt and one of the brackets through which said second bolt extends, and separate means on each of said bolts for adjusting the tension of the spring carried thereby.

References Cited in the file of this patent

UNITED STATES PATENTS

2,217,124	Massure	Oct. 8, 1940
2,515,455	Lipton	July 18, 1950
2,559,616	Hapman	July 10, 1951

FOREIGN PATENTS

465,906	Canada	June 13, 1950