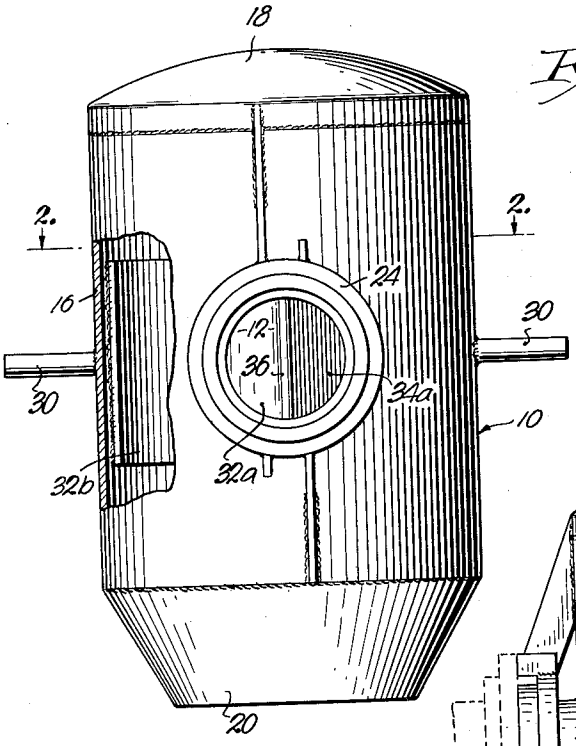
Sept. 26, 1961 G. M. PRO 3,001,771

DISCHARGE RECEIVER FOR AIR MOTIVATED MATERIALS

Filed Nov. 17, 1958

Fig. 1.



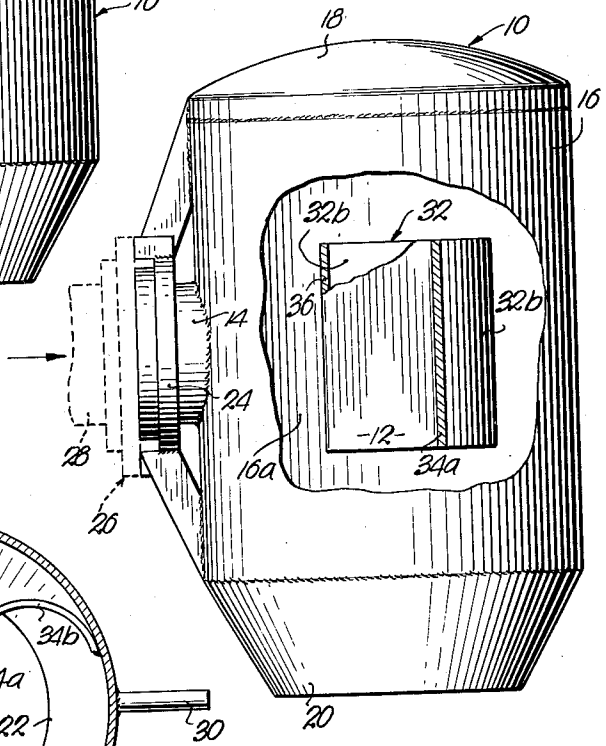


Fig. 2

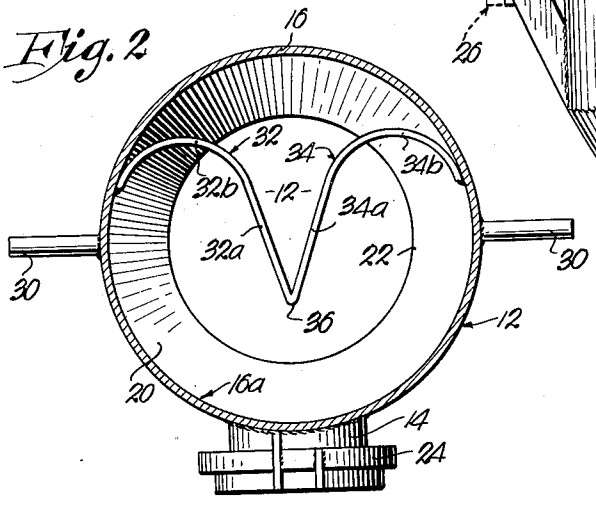


Fig. 3.

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DISCHARGE RECEIVER FOR AIR MOTIVATED MATERIALS

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This invention relates to the handling of materials, especially those which are moved from a source of supply to a point of use as by the use of air, and has for its primary object the provision of a combined receiver and feeder which improves upon similar structures heretofore known or used in the elimination of shock without, at the same time, causing separation of the ingredients which make up the materials.

The invention has been designed for, and has its primary use, in the field of cementitious material such as concrete and more particularly, to the placement or delivery of the concrete to a zone of use such as in a building wall, a slab such as the floor of a building, or in virtually any structure employing building materials of that nature.

The practice of conveying concrete from a mixer or other source to a point of use through conduit structure with air as the motivating means, is fast becoming a universally accepted concrete-handling method in the building industry generally. The problems incident to such method depend upon many factors, including the consistency of the concrete, the ratio of ingredients used therein, the distances of conveyance, the height to which the concrete must be elevated, ambient temperatures and humidity, and many other factors.

Oftentimes, the aforementioned factors are such that the substances flow from the discharge end of the conveying tube smoothly, continuously and without the presentation of any difficult problems. More often however, the concrete is necessarily motivated at extremely high velocities and, particularly when the concrete is heavy and not particularly fluid, the flow from the discharge end of the tube is in the form of slugs intermittently spaced with a resultant jerky action, making it difficult, if not impossible, to direct the same as may be desired or necessary into the forms or along other areas of use and placement.

Many attempts have heretofore been made to provide a structure at the discharge end of the conveying tube for receiving the materials and feeding the same in a manner to eliminate the aforementioned problems, especially the shock incident to the impact of the slugs into the receiver, but without appreciable success. It is not especially difficult to reduce the velocity of the materials, but in so doing, all prior structures with which I am familiar, are inherently defective in that the shock is not eliminated, the high noise level is not reduced and no provision is made for preventing separation of the materials within the receiver and prior to flow therefrom to a point of use.

Accordingly, it is the most important object of the present invention to provide a structure of the aforementioned character that can be easily and conveniently handled by workmen because of not only the velocity reduction inherent therein, but because of the elimination of shock incident to the materials being forced into the receiver at such high velocities.

Another equally important object of the present invention is to provide a combined receiver and feeder that not only completely eliminates the undesirable factor of separation of the components of the materials, but actually serves as a mixer, or as a re-admixer, to the

end that the ingredients are even more fully mixed as they flow from the devices than at the time of entrance thereinto.

The manner of eliminating the aforementioned problems and accomplishing the results above enumerated, will be made clear as the following specification progresses, reference being had to the accompanying drawing wherein:

FIG. 1 is a side elevational view of a discharge receiver for air motivated materials made pursuant to my present invention, parts being broken away and in section to reveal details of construction;

FIG. 2 is a transverse, cross-sectional view taken on line 2—2 of FIG. 1; and

FIG. 3 is an elevational view taken at right angles to FIG. 1, parts being broken away and in section for clearness.

The combined receiver and feeder forming the subject matter of the instant invention as illustrated in the drawing, comprises essentially a hollow body broadly designated by the numeral 10 and baffle structure 12 contained therewithin for deflecting materials entering the body 10 by way of inlet tube 14.

For reasons which will hereinafter become apparent, it is to be preferred that the body 10 have a circular, cross-sectional configuration as shown in FIG. 2 and, therefore, body 10 includes an elongated, normally upright, cylindrical side wall 16. The upper end of the wall 16 may be closed in any suitable manner such as by use of a dome-shaped head 18. The outlet end of the body 10 is in the form of a frusto-conical spout 20 terminating in an outlet 22. It becomes apparent, therefore, that the course of the materials changes within the body 10 since such materials are directed thereinto horizontally and discharge from the body 10 in a substantially vertical direction by force of gravity.

Manifestly, the tube 14 communicates directly with the interior body 10 through the side wall 16 thereof and has a ring unit 24 thereon adapted to receive a quick-connect coupling 26 that permits attachment to the tube 14 of a conveying tube or conduit 28 through which the materials are air motivated from a source of supply thereof (not shown).

In this respect, it is to be pointed out at this juncture that in the case of concrete with which the device is primarily usable, extremely high velocities are usually necessary in order to cause materials of such character to move along the tube 28 without stoppage and clogging. This is especially true when the concrete must be conveyed over long distance or to great heights. Consequently, the feeding of the concrete into the tube 28 is normally controlled so that the same takes the form of slugs of varying sizes and densities and when such slugs discharge from the tube 28 there is normally a substantial shock incident thereto, making it difficult for the operators to hold and control the device through use of handles 30 extending laterally from the side wall 16.

In common parlance, the heavy concrete slugs discharge from the tube 28 in "cannon ball" fashion, and when the device shown in the drawing is not attached to the tube 28, the latter jerks and whips in all directions to such extent that it is virtually impossible for workmen to handle or control the same. The inherent dangers to the workmen and the difficulty of proper placement of the concrete becomes, therefore, quite obvious.

In accordance with the principles of the instant invention, therefore, the structure 12 is mounted in the body 10 within the path of travel of the slugs as the same move at great force across the body 10 from tube 14 to the opposite side of wall 16.

Baffle structure 12 comprises two identical portions 32

and 34 made from relatively heavy, initially flat stock and formed to present flat sections 32*a* and 34*a* respectively, as well as arcuate sections 32*b* and 34*b* respectively. The two portions 32 and 34 are vertically straight, but manifestly, the entire baffle structure 12 may be tipped to slope in any desired direction if so desired. However, as shown, the flat sections 32*a* and 34*a* diverge as the sections 32*b* and 34*b* are approached and merge along an upright line of joinder 36 that is spaced inwardly from the inlet tube 14. It is to be noted particularly that the edge or line 36 of the structure 12 is in direct alignment with the inlet 14 so that the material entering the body 10 is effectively and fully intersected by the baffle structure 12. The terminal edges of the arcuate sections 32*b* and 34*b* are preferably attached directly to the inner face of the side wall 16 as by welding. Consequently, there is presented in the wall 16 an arcuate innermost face portion 16*a* that continues from the outer edge of section 32*b* to the outer edge of section 34*b* without interruption except by the inlet tube 14 centrally disposed within the arcuate face portion 16*a* of side wall 16.

The vertical length of the baffle structure 12 may be varied, but as illustrated, it terminates both at its uppermost and at its lowermost ends in spaced relationship to the top 18 of the body 10 and the funnel-shaped spout 20 respectively. This presents a continuous, uninterrupted air space around the structure 12 therebehind, therebelow and particularly thereabove.

It is obvious that when the device is placed in use, the materials entering the body 10 through inlet tube 14 and projected diametrically across the wall 16 of body 10 at high velocity, strike the baffle structure 12 and are immediately sub-divided by the intersecting action of the leading edge 36. Such materials impinge upon the flat sections 32*a* and 34*a* and thence upon the concave surfaces of sections 32*b* and 34*b*. This means that the materials are deflected in opposite directions laterally with respect to the initial horizontal path of travel thereof, from the tube 14 toward the structure 12. Then, as such materials flow along the arcuate sections 32*b* and 34*b* they commence spinning spirally in opposite directions and such spinning continues as the materials flow from the baffle structure 12 to the inner face 16*a* of side wall 16. The oppositely rotating materials continue to spin until the same re-admix substantially within that zone of the body 10 that is located between inlet tube 14 and the upright edge or line 36. Consequently, it is seen that the two spinning portions of the materials not only re-form into a homogeneous mass, but mix with and tend to break up the slugs themselves entering through tube 14.

By the time the materials have gravitated toward the lower edge of the baffle structure 12, the velocity thereof will have been considerably expended and the force of the vertical movement through the spout 20 will be essentially gravitational. The various changes in the direction of movement of the materials from horizonal to lateral, by action of the sections 32*a* and 34*a*, and thence spirally because of the presence of sections 32*b* and 34*b* and, finally in a vertical direction for discharge through the outlet 22, not only dissipates the velocity, but removes the shock.

It is not at all difficult for workmen to handle the device and they can, with ease, move the same from point to point along a form or over an area of placement. They need not fear any danger nor be confronted with the annoyance of a high noise level. The impingement of the materials upon the structure 12 is such that the sound of the shock waves is appreciably dissipated and certainly, to be preferred over a construction wherein the high velocity slugs are forced with great impact against a flat surface or even one that is merely arcuate, as for example, that face of the wall 16 opposite the inlet 14.

The baffle structure 12 is advantageous also because of the fact that it is inherently better able to withstand the cutting action of the materials because of the high aggregate content and the device is not likely to become damaged even over long periods of use. Still further, the inherent cementitious character of the materials always presents problems of gumming or setting up and hardening within a receiver of this character, but by virtue of the nature of the structure 12, no such problem is presented in the instant invention.

It is to be pointed out further that the structure 12 provides a smooth and gradual change in the path of travel of the materials within the body 12 and that there is a counterbalancing or compensating action which contributes to the shock elimination above referred to. The very fact that the materials are split and move laterally in opposite directions, and the fact that they take on a spinning action in opposite directions, eliminates the jerking and flipping around of the body 10. Splitting of the load and counterbalancing of the forces has much to do with the new and advantageous results emanating from the invention.

Equally important is the elimination of separation of the materials. Such separation may be caused by a centrifuge action, by impact of the materials upon surfaces differing from those presented by structure 12, and by improper consideration for the air itself, which naturally enters the body 10 with the materials in between the slugs thereof. Consequently, if the materials were merely permitted to strike a flat or a single arcuate surface, much of the heavy aggregate would gravitate first from the outlet 22, resulting in a high degree of separation in the completed building structure. By the same token, if the materials were permitted merely to spin spirally in one direction, the heavy materials would be thrown tangentially to the inner surface of the wall 16 and a similar separation of the materials would occur. In the instant invention, however, any such adverse effect of centrifugal action is compensated by the re-admixing prior to discharge as above explained.

Finally, the body 10 is provided with adequate space not consumed by the materials themselves for receiving the high pressure air entering thereinto. More particularly, there is presented an air cushion or surge chamber within the body 10 above the baffle structure 12 acting to permit expansion and contraction, receiving the air as it enters the body 10 in intermittent gusts. By virtue thereof, such air does not surge from the outlet 22 in great gusts, carrying therewith the heavy particles and causing undesired separation.

It is, therefore, seen from the foregoing that many problems incident to the handling of cementitious materials, particularly when motivated at high velocities through use of air, have been eliminated, and while many changes may be made in specific details of construction, it is desired to be limited only by the spirit of the invention as defined by the scope of the appended claims.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. A combined receiver and feeder assembly for materials containing a number of ingredients, said assembly comprising an upright body provided with a cylindrical side wall having an inlet through which said materials may be directed horizontally into the body with force, the body having a bottom outlet through which said materials may gravitate from the body; and baffle structure in said body within the path of travel of the incoming materials, said structure including a pair of normally upright portions joined to present a leading, vertical edge aligned with and spaced inwardly from said inlet, said portions having concave surfaces facing said inlet and diverging from said edge away from the inlet and having terminal edges merging with the inner face of said wall, whereby all the incoming materials are intersected, deflected laterally in opposite directions and caused to impinge on said wall prior to gravitation through said outlet.

2. A combined receiver and feeder assembly for materials containing a number of ingredients, said assembly

comprising an upright body provided with a cylindrical side wall having an inlet through which said materials may be directed horizontally into the body with force, the body having a bottom outlet through which said materials may gravitate from the body; and baffle structure in said body within the path of travel of the incoming materials, said structure including a pair of normally upright portions joined to present a leading, vertical edge aligned with and spaced inwardly from said inlet, said portions diverging from said edge away from the inlet and having terminal edges attached to the inner face of said wall, each of said portions being provided with a flat section and an arcuate section, the flat sections being between the arcuate sections and said leading edge, the arcuate sections having the trailing edges and being provided with concave surfaces facing said inlet, whereby all the incoming materials are intersected, deflected laterally in opposite directions and caused to spiral toward the inlet and readmix between the latter and said leading edge prior to gravitation through said outlet.

3. The invention of claim 2, wherein the body has a top enclosing the side wall and spaced above the baffle structure, presenting an air cushion above the latter.

4. A combined receiver and feeder assembly for materials containing a number of ingredients, said assembly comprising a hollow body having an inlet therein through which said materials may be directed into the body with force, said body having an outlet beneath said inlet through which said materials may gravitate therefrom; and baffle structure in said body within the path of travel of the incoming materials, said structure including a pair of deflecting portions each provided with a concave surface substantially facing said inlet and having a margin spaced inwardly from said inlet, the margin of one of said portions being disposed proximal to the margin of said other portion to present an edge aligned with the inlet, said portions diverging away from said inlet and said edge and being secured to said body, whereby all the incoming materials are intersected and deflected in opposite directions and caused to impinge on said body prior to discharge from said body through said outlet.

5. A combined receiver and feeder assembly for materials containing a number of ingredients, said assembly comprising a hollow, a body provided with a first wall having an inlet through which said materials may be directed into the body with force, said body having an outlet beneath said inlet through which said materials may gravitate therefrom; and baffle structure in said body within the path of travel of the incoming materials, said structure including a pair of deflecting portions each being provided with a concave surface substantially facing said inlet and a margin spaced inwardly from said inlet, the margin of one of said portions being disposed proximal to the margin of said other portion to present an edge aligned with the inlet, said portions diverging away from said inlet and said edge and being secured to the first wall, whereby all the incoming materials are intersected and deflected in opposite directions and caused to impinge on said second walls prior to discharge from said body through said outlet.

6. The invention of claim 5, wherein said portions are provided with terminal edges merging with the respective first wall at spaced points thereon.

7. The invention of claim 6, wherein each of said portions is provided with a convex outer surface being in tangential engagement with the respective points on said first wall, and said terminal edges being spaced from said inlet on opposed sides of the latter.

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