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CONVEYER

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11 Claims. (Cl. 198—168)

This invention relates to a conveyor for trans-
porting flowable solid material in a continuous
stream.

In general, the object of the invention is to pro-
vide a novel and improved conveyor of the char-
acter specified in which provision is made for re-
ducing to a minimum the production of jams and
congestions during the transportation of the ma-
terial by the conveyor,

A further object of the invention is to provide a
novel and improved conveyor of the character
specified in which provision is made for facilitat-
ing the discharge of the material therefrom.

A still further object of the invention is to pro-
vide a novel and improved conveyor of the char-
acter specified in which the casing is constructed
in a manner such that during conveyance of the
material the natural compacting thereof is coun-
teracted and the friction of the material against
the casing is prevented from increasing.

Another object of the invention is to provide a
novel and improved conveyor of the character
specified in which provision is made for gradually
and progressively increasing the effective internal
sectional area of the conveyor and, in some in-
stances, for suddenly increasing said area so that
any tendency of the material being conveyed to
become compacted is counteracted and the ma-
terial is maintained in a loose flowable condition,
thus promoting efficient and economical con-
evoyer operation and facilitating the discharge of
the material from the conveyor.

With these general objects in view and such
others as may hereinafter appear, the invention
consists in the conveyor and in the various struc-
tures, arrangements and combinations of parts
hereinbefore described and particularly defined in
the claims at the end of this specification.

In the drawings illustrating the preferred em-
bodiment of the invention, Fig. 1 is a perspective
view with portions broken away illustrating a
conveyor embodying the present invention; Fig.
2 is an enlarged vertical sectional view of a por-
tion of the conveyor illustrated in Fig. 1 show-
ing the means for facilitating the discharge of the
material from the conveyor; Fig. 3 is a cross-sec-
tional view taken on the line 2—3 of Fig. 1; Fig.
4 is a perspective view of a modification with
portions omitted illustrating a curved portion of
a conveyor embodying the present invention; and
Fig. 5 is a detail taken on the line 5—5 of Fig. 4.

In the operation of conveyors of the type illus-
trated in the Redler Reissue Patent No. 18,445,
April 26, 1932, experience during practical use has
shown that variations in the effective cross-s sec-
tional area of the conveyor casing through which
flowable and substantially incompressible solid
material is being conveyed operate to set up con-
gestions which interfere with and in some cases
render impossible the conveyance of the material
through the conveyor casing. It has been dis-
covered that relatively small reductions in the
effective cross-sectional area of a conveyor cas-
ing, and particularly of a vertical run, have ren-
dered the operation of the conveyor through the
vertical run impossible. For example, it has been
found that a reduction in the effective cross-
sectional area of a conveyor casing is an amount
as small as that corresponding to a reduction of
one-eighth of an inch in diameter of the casing,
or, in other words, a very small percentage of
the effective cross-sectional area of the casing
has rendered the operation of the conveyor
through a vertical run impossible when operating
upon such substantially incompressible materials
as sand, cement and the like. Difficulties have
also been encountered in effecting the discharge
of the material being conveyed by conveyors
of the character above mentioned due to conges-
tion at the discharge opening and particularly
in cases where sticky material is being conveyed.

In accordance with the present invention, pro-
vision is made for gradually and progressively
increasing the effective cross-sectional area of
the conveyor casing in the direction of travel of
the transporting element in order to counteract
the natural tendency of the material to compact,
and provision is made for suddenly increasing the
effective sectional area of the conveyor casing at
those points in the casing where there is more
than a normal tendency for the material to com-
 pact in order to substantially eliminate jams and
congestion and to increase the efficiency and
utility of the conveyor; namely, around the dis-
charge opening and at curves of the conveyor
casing.

As above stated, the conveyor casing is intention-
ally made of progressively increasing size in
the direction of travel of the transporting mem-
ber; and in the practical construction of conveyors
it is preferred to construct the casing of sheet
metal and of sections arranged end to end, each
succeeding section being intentionally made of an
effective sectional area exceeding that of the pre-
ceding section by at least an amount correspond-
ing to the accuracy of the particular shop in
which the sections are made. For example, if
in any particular shop the construction is carried
out to an accuracy of one-thirty-second of an
inch then in accordance with the present inven-
tion each succeeding section of the conveyor casing will be designed at least one-thirty-second of an inch larger than that of the preceding section. The construction of conveyor casings in the manner set forth above insures against the possibility of slight restrictions in the sectional area of the conveyor casing and the accompanying disadvantages above mentioned.

Instead of varying the size of the conveyor casing, the function may be accomplished in varying ways by progressively increasing the effective cross-sectional area within the casing in the direction of travel of the transporting element and preferably by the introduction of tapered space-occupying members positioned within the conveyor casing and extending longitudinally thereof within those portions of the casing where it may be desired to vary the effective load carrying area.

As previously pointed out, it may be desirable to produce a sudden increase in the effective load carrying area of the conveyor casing, particularly at corners, and this may be accomplished in various ways, such as by varying the size of the conveyor casing at the desired section, or by the introduction of space-occupying members within the conveyor casing, as will be described.

In addition to the enlargement of the conveyor casing, it has been found of advantage to construct the casing so that it is suddenly enlarged in the immediate vicinity of the discharge opening in order to cause the material to assume a loosened condition and to facilitate the discharge thereof, and it has also been found that provisions of discharge openings upon a plurality of sides of the transporting element both within and without the enlargement of the conveyor casing at the point of discharge contributes to the ease and efficiency with which various materials may be discharged. In some instances, particularly where the conveyor is used to transport sticky materials, it has been discovered that the discharge of the material is decidedly facilitated by positioning an abutment or lug in the conveyor casing which is adapted to engage and displace the transporting member laterally of the conduit in order to set up vibrations in the transporting member to dislodge the material from the flights thereof, and this is most effective if the lug or abutment is placed in the immediate vicinity of the discharge opening, particularly in the vertical run of the conveyor, and where the tension in the transporting element is relatively great.

Referring now to the drawings, and particularly to Figs. 1 and 3 wherein I have illustrated a conveyor of the type forming the subject of the Redler reissue patent above referred to, and which comprises a conveyor casing 10 having a horizontal leg 12 and a vertical leg 13. An inlet 14 is provided in the horizontal leg 12 through which the solid flowable material to be conveyed is introduced into the casing to be conveyed through the casing by a plurality of conveyor flights 16 and discharged therefrom from a discharge opening 15 in the vertical leg 13 of the casing.

In accordance with the present invention, the succeeding sections of the conveyor casing illustrated in Fig. 1 are constructed so that each succeeding section has a larger effective cross-sectional area than the preceding section in the direction of travel of the transporting element. In order to provide a sudden increase in the effective internal area of the conveyor casing at the corner in the casing, in Figs. 1 and 3 I have illustrated the horizontal leg 12 of the conveyor casing 10 as being provided with a plurality of space-occupying members 20, 22 which are affixed to the inside of the casing and which extend to the point where it is desirable to suddenly increase the effective internal area. In some instances, and particularly where the conveyor flights are relatively large, for example, in a horizontal and vertical manner, it has been found desirable in addition to suddenly increasing the effective cross-sectional area at the corner in the conveyor casing, and to increase the effective cross-sectional area after the corner, and particularly when changing from a horizontal to a vertical or inclined run, and, accordingly, as illustrated in Figs. 4 and 5, this may be accomplished by the provision of an additional space-occupying member 24 affixed to the inside of the casing 10 and extending around the corner to the point where it is desired to suddenly increase the effective cross-sectional area. As illustrated in Figs. 4 and 5, it is preferred to position the additional space-occupying member 24 at the top of the conveyor casing 10 and to notch or recess the conveyor flights 16 so that they may be freely moved by the additional space-occupying member 24 and function in the usual manner. Referring now to Figs. 1 and 2, as previously stated, the discharge of the conveyor may be facilitated by the provision of discharge openings 15 and by suddenly enlarging the conveyor casing in the immediate vicinity of the discharge opening 15 and, accordingly, in Fig. 1, I have illustrated a conveyor casing being provided with a plurality of discharge openings 15 and, as shown in Fig. 2, the conveyor casing is constructed so that a sudden increase in the effective cross-sectional area takes place in the immediate vicinity of the discharge openings 15, thus causing the conveyed material to assume a more loose and freely flowing condition.

In some instances, and particularly where sticky flowable materials are being conveyed, the discharge of the material from the conveyor may be facilitated by the provision of an abutment or lug 30 positioned in the conveyor casing 10 and adapted to engage and displace the transporting member laterally of the conduit in order to set up vibrations in said transporting member and cause the material to be dislodged from the flights 16 thereof and, as illustrated in Fig. 2, it is preferred to place the abutment or lug 30 in the immediate vicinity of the discharge opening 15, particularly of a vertical run of the conveyor, where the tension in the transporting element is relatively great.

From the description thus far, it will be apparent that by constructing conveyors of the type described so that the effective cross-sectional area of the conveyor casing is increased, the tendency for the material being conveyed to compact and form jams or conceptions is counteracted. It will also be apparent that by constructing conveyor casings of the character described so that sudden enlargement in the effective cross-sectional area of the casing takes place at points where more than an ordinary tendency to compact and become congested exists, and particularly at corners and at the discharge opening of the conveyor casing, conceptions and jams of the material being conveyed are substantially eliminated and the efficiency
and utility of the conveyor is greatly increased. It will also be observed that in addition to facilitating the discharge of the conveyor, as above described, provision is made for further facilitating the discharge by provision of a plurality of discharge openings in the conveyor casing and by providing means for displacing and setting up vibration in the conveyor flights in order to dislodge the material from the flights.

While the preferred embodiment of the present invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. A conveyor for transporting flowing solid material in a continuous stream comprising a casing, a transporting member adapted to be drawn through the casing and provided with a plurality of open flights to effect transportation of the material in a mass, said casing comprising a plurality of sections adapted to be secured end to end with each succeeding section of slightly greater effective internal area than the preceding.

2. A conveyor for transporting flowing solid material in a continuous stream having, as a combination, a moving element of the open type and a casing the conveying area thereof being progressively enlarged in the direction of travel of said moving element.

3. A conveyor for transporting flowing solid material in a continuous stream comprising a casing, a transporting member adapted to be drawn through the casing and provided with a plurality of open flights to effect transportation of the material in a mass, said casing having the interior thereof increasing in area in the direction of travel of the transporting element.

4. A conveyor for transporting flowing solid material in a continuous stream comprising a casing, a transporting member adapted to be drawn through the casing and provided with a plurality of open flights to effect transportation of the material in a mass, said casing comprising a sheet metal structure made up of sections, the effective internal sectional area of a succeeding section being greater than that of the preceding section.

5. A conveyor for transporting flowing solid material in a mass, comprising a casing provided with an inlet and an outlet, a transporting member adapted to be drawn through the casing and provided with a plurality of open flights to effect transportation of the material in a mass, said casing having its walls suddenly enlarged in the immediate vicinity of said outlet.

6. A conveyor for transporting flowing solid material in a mass, comprising a casing a transporting member adapted to be drawn through the casing provided with a plurality of open flights to effect transportation of the material in a mass, said casing being provided with an inlet and an outlet, said outlet being open on a plurality of sides of the conveyor casing to permit the discharge of the material and said casing having its walls suddenly enlarged in the immediate vicinity of said outlet.

7. A conveyor for transporting flowing solid material in a mass, comprising a casing a transporting member adapted to be drawn through the casing provided with a plurality of open flights to effect transportation of the material in a mass, said casing having the conveying area thereof progressively increasing in area in the direction of travel of the transporting element and being provided with an outlet, said outlet being open on a plurality of sides of the conveyor casing and the internal area of said casing being suddenly enlarged in the immediate vicinity of said outlet.

8. A conveyor for transporting flowing solid material in a mass, comprising a casing provided with an inlet and an outlet, a transporting member adapted to be drawn through the casing provided with a plurality of open flights to effect transportation of the material in a mass, said casing having the interior thereof progressively increasing in area in the direction of travel of the transporting element, said outlet being open on a plurality of sides of the conveyor casing whereby the discharge of the material is facilitated.

9. A conveyor for transporting flowing solid material in a mass, comprising a casing provided with an inlet and an outlet, a transporting member adapted to be drawn through the casing and provided with a plurality of open flights to effect the transportation of the material in a mass, said casing having the interior thereof progressively increasing in area in the direction of travel of the transporting element, and means adjacent said outlet for displacing and setting up vibration in said transporting element.

10. A conveyor for transporting flowing solid material in a mass, comprising a casing, a transporting member adapted to be drawn through the casing and provided with a plurality of open flights to effect the transportation of the material in a mass, said casing having the internal sectional area thereof progressively increasing in the direction of travel of the transporting element and suddenly increased at points where the normal tendency of the material to jam or congest occurs.

11. A conveyor for transporting flowing solid material in a mass, comprising a casing, a transporting member adapted to be drawn through the casing provided with a plurality of open flights to effect the transportation of the material in a mass, said casing having the interior thereof progressively increasing in area, said outlet being open on a plurality of sides of the conveyor casing, and means adjacent said outlet for displacing and setting up vibration in said transporting element.