(54) Rotary pipe and fixed channel auger with intermediate outer supporting elements
Rotierendes Rohr und befestigte Schnecke mit äusseren Zwischen-Trägerelementen
Tuyau rotatif et vis hélicoidale fixée avec éléments de support extérieurs intermédiaires

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BACKGROUND OF THE INVENTION

The present invention relates to a rotary pipe and fixed channel auger conveyor with intermediate outer supporting elements.

As is known there are at present used several industrial open conveying systems of the belt, roller, bucket, truck, chain type, which are affected by noise and difficult maintenance problems, in addition to having a comparatively high installation cost.

Comparatively noiseless conveying systems, which do not cause any alterations of the materials, are the so-called closed systems, including the augers, or Archimedean screws, including a helical surface which turns inside a pipe which may be integral therewith or be separated therefrom.

They are conventionally used in several systems for conveying solid materials, either in a granular or liquid condition, or for mixing different materials.

Also known is an auger sorter, in which the auger is fixed and has a vertical axis.

In this device, the auger operates as a slightly slanted fixed channel, for discharging at a low speed loose materials and the like.

The conveying augers usually comprise two different types of assemblies: the first includes the spiral which is separated from the perimetrical pipe and is called, perhaps not properly, auger; the second has its full or partial spiral affixed within the rotary pipe and is usually called "rotary tube".

The industrial type of auger is mainly used for horizontal conveyance.

Relatively it is also used for conveying materials on slight slopes, these materials consisting of loose solid materials or dense liquids. For conveying granular solid materials there are conventionally used vertical augers.

The conveying device is loaded at any set region of the path, and it is likewise unloaded, by opening the bottom of the channel. The drive is provided by a longitudinal central shaft, of hollow construction, usually made of steel and supported by supporting elements spaced from one another by 2.5-3.5 m.

Several types of spirals are used and, more specifically, an iron sheet spiral, a ribbon or belt spiral, a blade spiral including a plurality of blades operating as the blade elements of a propeller, and allowing the advancing speed of the material to be changed by changing the angles of the blades, as well as a fixed-spiral auger made of a manganese steel alloy for conveying materials having high abrading properties.

Only by using comparatively great diameter shafts it has been possible to make great length of augers, having a length up to 50 m; the diameter of the shaft being increased from 140 to 300 mm and that of the outer channel from 400 to 630 mm, the supporting elements being spaced by 7-8 up to a maximum of 10 m and, for greater spacings, several series arranged augers must be provided.

These prior auger devices, however, are affected by great problems: in fact, the volumetric mass of material which can be conveyed, that is the conveying capability of the auger is greatly reduced, the power required for driving the auger increasing proportionately to the resistances to the movements and, simultaneously, the device has a poor reliability and requires frequently maintenance operations.

Independently from its size, the spiral is interrupted at each supporting element, with consequent great difficulties from the conveyance standpoint, and with the possibility of jams, if powder or paste materials are conveyed.

Moreover, the intermediate supporting elements are subjected to a high corrosion and, because of friction, the temperature can excessively increase so as to cause fires or explosions, whereas some types of chemical products tend to cure under high temperatures, so as to cause the above mentioned jams.

In order to reduce the maintenance difficulties, prior auger devices include a half-cut bearing element, which can be opened in order to access the support member without disassembling the auger and, usually, several augers are series arranged with consequent greater costs for the motors, electric controls and so on.

The document "SOVIET PATENT ABSTRACTS Q3, week 8947 Jan 10 1990, DERWENT PUBLICATIONS LIMITED Q35 SU-1459 984 discloses a conveyer corresponding to the preamble of the main claim.

SUMMARY OF THE INVENTION

Thus, the aim of the present invention is to solve the above disclosed problems and overcome the drawbacks affecting the intermediate supporting elements at present provided for supporting auger assemblies used for industrial closed conveying systems.

Within the scope of the above aim, a main object of the present invention is to provide a supporting element which allows the conveyance capability of the auger to be increased, without increasing the size of the outer channel and the diameter of the driving shaft.

Another object of the present invention is to obtain the above mentioned results without increasing the labour necessary for assembling the auger systems or the cost thereof.

Yet another object of the invention is to provide an auger apparatus for conveying materials which has a very reduced power consume, and a very high conveyance capability.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by an auger conveyor according to the main claim.
BRIEF DESCRIPTION OF THE DRAWINGS

The characteristics and advantages of the auger conveyor, provided with outer intermediate supporting elements, according to the present invention, will become more apparent hereinafter, from the following detailed disclosure of some preferred embodiments thereof, which are illustrated by way of a merely indicative, but not limiting example in the figures of the accompanying drawing, where:

Figure 1 illustrates a side view of the auger conveyor, in which the rotary pipe has been shown partially cross-sectioned; and

Figure 2 is a front cross-sectional view of the auger according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the figures of the accompanying drawings, the fixed pipe and rotary pipe auger according to the invention comprises a screw or auger element formed by plurality of alternated screw or spiral portions 1 within an outer fixed pipe or channel 2 and, of portions of the same spiral 3 clamped within an outer rotary pipe 4 which can turn rigidly with the spiral portion clamped thereby.

The rotary pipe portions 4 have a like length and bear on outer supporting elements 5.

Said supporting elements 5 are substantially formed by pairs of centering rollers 6, which are connected by shafts 7 parallel to the axis 8 of the spiral 3.

In a preferred embodiment, the pairs of rollers 6 are three in number, and are symmetrically spaced on the circumference of the pipe portion 4.

At the centering rollers 6, the outer surface of the rotary pipe portions 4 is provided with guides or tracks 9 having a circular crown arrangement.

In particular, the tracks 9 are specifically processed in order to provide good sliding properties.

The fixed pipe or channel portions 2 and rotary pipes 4, alternatively, can be made as an outer jacket, at the end superimposed portions thereof, so as to define a single containing tubular body.

The mutual sealing of said fixed channel or pipe portions 2 and rotary pipe portions 4 is assured by suitable gaskets 11 made of any suitable abrasion resisting material.

The outer roller supporting shafts 7 are supported by a supporting frame 12 which is welded to the fixed outer channel 2.

The rollers 6 have the rims thereof provided with an edge portion 14 adapted to abut on the inner face of the sliding guides 9.

From the above disclosure and the figures of the accompanying drawings, it should be apparent that the invention fully achieves the intended aim and objects.

In particular, there are solved the technical and economic problems of prior supporting elements which are at present used inside the channels, with respect to the conveyance capability of the auger, the resistance to the movement, reliability and maintenance.

Moreover, there are enhanced the conveyance properties for loose materials such as cereals, meals, cement powders, as well as wood meals and pastes.

In fact, owing to the invention, it is possible to achieve, since the cost increase of the new supporting elements is counterbalanced by the smaller diameter of the fixed pipe or channel portions, with a consequent smaller consume of materials, the high longitudinal extensions necessary in the processing industries, without increasing the cost for unit of length.

Claims

1. An auger conveyor including at least one fixed pipe portion (2) and at least one rotary pipe portion (4) arranged in series and encompassing a rotary spiral (1) and outer supporting elements (5) for supporting said at least one rotary pipe portion (4), characterized in that said auger conveyor comprises a plurality of said series arranged fixed pipe portions (2) and rotary pipe portions (4) the portions of said rotary spiral (1) encompassed and clamped by said rotary pipe portions (4), said spiral pipe portions (4) have a like length and that said outer supporting elements (5) substantially comprise for each said rotary pipe portion (4) respective pairs of centering rollers (6), each pair connected by a shaft (7) parallel to the axis of said rotary spiral (1), and engaging with circular low sliding friction tracks (9), provided on the outer surface of each said rotary pipe portion (4).

2. An auger conveyor, according to Claim 1, characterized in that said pairs of centering rollers (6) are three in number, and are symmetrically spaced on the circumference of the rotary pipe portions (4).

3. An auger conveyor, according to Claim 1, characterized in that said fixed pipe portions (2) and said rotary pipe portions (4) form a jacket defining a single tubular spiral containing body.

4. An auger conveyor, according to Claim 1, characterized in that said fixed channel portions (2) and rotary pipe portions (4) are sealed by abrasion resistant material seals.

5. An auger conveyor, according to Claim 1, characterized in that said shafts (7) are supported by a supporting frame (12) welded to said fixed outer pipe portion (2).

6. An auger conveyor, according to Claims 1 and 5, characterized in that said shafts (7) bear roller elements (6) having rim portions (13) provided with
respective edge portions (14) adapted to abut against the inner surface of the sliding tracks (9) of said rotary pipe portions (4).

Patentansprüche

1. Ein Schneckenförderer, umfassend zumindest einen unbeweglichen Rohrabschnitt (2) und zumindest einen rotierenden Rohrabschnitt (4), der in Reihe angebracht ist und eine rotierende Spirale (1) einschließt, sowie äußere Trageteile (5), um diesen mindestens einen rotierenden Rohrabschnitt (4) zu tragen, dadurch gekennzeichnet, daß dieser Schneckenförderer eine Vielzahl von diesen in Reihe angebrachten unbeweglichen Rohrabschnitten (2) und rotierenden Rohrabschnitten (4) umfaßt, wobei die Abschnitte dieser rotierenden Spirale (1) von diesen rotierenden Rohrabschnitten (4) umgeben und festgehalten werden, daß all diese rotierenden Rohrabschnitte (4) die gleiche Länge besitzen, und daß diese äußeren Trageteile (5) im wesentlichen für jeden dieser rotierenden Rohrabschnitte (4) entsprechende Paare von Zentrierrollen (6) umfassen, wobei jedes Paar durch eine zur Achse dieser rotierenden Spirale (1) paralleler Welle (7) verbunden ist und mit kreisförmigen Gleitflächen (9) niedriger Reibung in Verbindung steht, die auf der Außenflächen von jedem dieser rotierenden Rohrabschnitte (4) bereitgestellt sind.

2. Ein Schneckenförderer nach Anspruch 1, dadurch gekennzeichnet, daß drei dieser Paare von Zentrierwalzen (6) vorhanden sind, die symmetrisch entlang dem Umfang dieser rotierenden Rohrabschnitte (4) angeordnet sind.

3. Ein Schneckenförderer nach Anspruch 1, dadurch gekennzeichnet, daß diese unbeweglichen Rohrabschnitte (2) und diese rotierenden Rohrabschnitte (4) eine Umhüllung bilden, die einen einzelnen Rohrenförmigen, die Spirale enthaltenden Körper festlegen.

4. Ein Schneckenförderer nach Anspruch 1, dadurch gekennzeichnet, daß diese unbeweglichen Rohrabschnitte (2) und diese rotierenden Rohrabschnitte (4) mittels Dichtungen aus abriebfestem Material abgedichtet sind.

5. Ein Schneckenförderer nach Anspruch 1, dadurch gekennzeichnet, daß diese Wellen (7) von einem Tragegestütz (12) getragen werden, das mit diesem äußeren unbeweglichen Rohrabschnitt (2) verschweißt ist.

6. Ein Schneckenförderer nach den Ansprüchen 1 und 5, dadurch gekennzeichnet, daß diese Wellen (7) Rollenteile (6) tragen, die umgeschlagene Bereiche (13) besitzen, die mit entsprechenden Randbereichen (14) ausgestattet sind, die angepaßt sind, sich gegen die Innenfläche der Gleitführungen (9) dieser rotierenden Rohrabschnitte (4) abstützen.

Revendications

1. Un convoyeur à vis comprenant au moins une section (2) à tuyau fixe et au moins une section (4) à tuyau rotatif arrangées en série et renfermant une spirale rotative (1), de même que des éléments de support extérieurs (5) pour supporter ladite section (4) à tuyau rotatif mise en œuvre au moins une fois, caractérisé en ce que ledit convoyeur à vis comprend une multiplicité desdites sections (2) à tuyau fixe et desdites sections (4) à tuyau rotatif arrangées en série, les sections de ladite spirale rotative (1) étant renfermées et serrées par lesdites sections (4) à tuyau rotatif, en ce que lesdites sections (4) à tuyau rotatif ont toutes la même longueur et que lesdits éléments de support extérieurs (5) compriment en substance pour chacune desdites sections (4) à tuyau rotatif de correspondantes paires de rouleaux de centrage (6), chaque paire étant reliée par une tige (7) parallèle à l’axe de ladite spirale rotative (1) et s’engageant dans des gisseries circulaires (9) à bas frottement mises en place sur la surface externe de chacune desdites sections (4) à tuyau rotatif.

2. Un convoyeur à vis selon la revendication 1, caractérisé par l’existence de trois paires de rouleaux de centrage (6), symétriquement arrangées le long de la circonférence des sections (4) à tuyau rotatif.

3. Un convoyeur à vis selon la revendication 1, caractérisé en ce que lesdites sections (2) à tuyau fixe et lesdites sections (4) à tuyau rotatif forment une enveloppe définissant un seul corps tubulaire contenant la spirale.

4. Un convoyeur à vis selon la revendication 1, caractérisé en ce que lesdites sections (2) à tuyau fixe et lesdites sections (4) à tuyau rotatif sont étanchées par un matériau résistant à l’abrasion.

5. Un convoyeur à vis selon la revendication 1, caractérisé en ce que lesdites tiges (7) sont supportées par une charpente de support (12) soudée à ladite section (2) à tuyau fixe extérieure.

6. Un convoyeur à vis selon les revendications 1 et 5, caractérisé en ce que lesdites tiges (7) supportent des rouleaux (6) avec des rebords (13) dotés de respectives zones latérales (14) adaptées à porter sur la surface interne des gisseries (9) desdites sections (4) à tuyau rotatif.