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Toló-forgató szárító

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmat az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

Push and turn dryer

Description



The invention relates to a push and turn dryer comprising a beatable flatbed for accommodating material to be dried, in particular granular material, and comprising an agitator which can be traversed across the flatbed, according to the preamble of claim 1.

Known from GB-A 2 246 911, which is the closest prior art, is a device for processing granular material in a drying container, on the side wall of which there is arranged at least one rotatably driven hollow cylinder that extends into the dry material. Attached on the cylinder is a blower that supplies air from top to bottom, which air flows into the material via openings in the lower third of the hollow cylinder. The outer wall of the hollow cylinder carries a zigzag-shaped mixer screw.

A similar drying device is known from the German utility model 1 993 481 and serves in particular for drying grains or other cereals. They are heated on the sieve bottom of a flatbed from underneath and are continuously mixed by the agitator that is moved in the longitudinal direction of the flatbed. The agitator provided for this purpose consists of a row of blades or paddles which are secured on a common tube with a horizontal rotation axis. Mounted in the tube is a coaxial shaft which, at its end, carries a pinion that meshes with a toothed rack, whereby the traverse embodied in this manner can be traversed across the flatbed by means of a motor. The intensity of the mixing of this construction depends on the fact that as many blades or paddles as possible are attached on the tube closely next to one another because the blades always collect only the same narrow area of the material in front, without a mixing with the adjacent strip of granular material taking place.

US-A 3 592 446 relates to a grain elevator having a high cylindrical container in which a central column carries a height-adjustable traverse on which a tube is secured which extends over the entire diameter of the cylindrical container. On one half the tube, agitator screws protrude downwards which, however, extend only into the uppermost layer of the material but not to the container bottom in which a discharge opening with a screw conveyor is provided. On the other half of the tube, a paddle screw, an endless chain with drive paddles as well as a manually adjustable pivotable scraping blade are attached.

It is an object of the invention to embody a push and turn dryer of the design as outlined above in such a manner that even with a small number of blades arranged next to one another, intensive and gentle mixing and drying of the material as well as leveling and subsequent emptying across the entire width of the flatbed can be ensured.

To solve this object, it is provided according to the invention that the traverse of the agitator is connected to a lifting member so that the turning worms can be vertically displaced between a raised rest position and a lowered operating position. Thus, the agitator can be lifted off when it is not needed so that it does not come in contact with the sensitive material. Further, a rake blade which also is connected to the lift drive, is assigned to the traverse, parallel to the row of turning worms. The traverse and the rake blade,

which both can be displaced vertically, can be accommodated in a housing that can be displaced horizontally on the trough.

In this regard it is of advantage if the axes of the turning worms lie in a common plane and the respective adjacent axes are driven in the opposite direction by a common motor, which is fastened to the traverse.

In addition to the turning worms and the rake blade, a dust cyclone, which is connected to an exhaust blower and which comprises bag filters, which are arranged in parallel to the row of the turning worms, can be provided in the housing.

A discharge worm, which extends transversely to the traversing direction in the housing, can be provided below the bag filters.

Effective collecting and mixing the material is achieved when, according to a further feature of the invention, the turning worms, which are arranged next to one another, are embodied as disk-shaped, single-start coils, which are arranged horizontally and which partially overlap one another.

The invention provides a push and turn dryer which achieves the given object in an optimal manner and which, furthermore, has the advantage that it, in contrast to the push and turn dryer of the prior art explained at the beginning, allows gentle mixing and drying of the material, which is in particular essential in the case of grains and seeds, e.g. pumpkin seeds, the shell of which is very sensitive in wet conditions and can be easily damaged.

The invention will be explained below by way of two exemplary embodiments which are illustrated in the drawing. In the figures:

Figure 1 shows a top view of a push and turn dryer,

Figure 2 shows a cross-sectional view of the push and turn dryer of Figure 1,

Figure 3 is a schematic top view of the agitator of the push and turn dryer,

Figure 4 is a perspective illustration of one of the disk-shaped turning worms,

Figure 5 is a top view of a refined variant,

Figure 6 shows the view of the variant of Figure 5, wherein the turning worms are extended downwards and are indicated in the upwardly retracted position,

Figure 7 shows the view of the closed dryer of the Figures 5 and 6,

Figure 8 shows the view of the row of turning worms in the traverse of Figures 5 and 6,

Figure 9 shows the side view of the traverse of Figure 8,

Figure 10 shows the view of the rake blade arranged in the housing,

Figure 11 shows the side view of the rake blade of Figure 10,

Figure 12 shows the schematic side view of the housing with turning worms, rake blade and a bag filter,

Figure 13 shows the housing of Figure 12 without bag filter and discharge worm,

Figure 14 shows an illustration corresponding to Figure 13, with extended turning worms,

Figure 15 shows an illustration corresponding to Figure 14, with retracted turning worms and extended rake blade, and

Figure 16 shows the schematic illustration of an exhaust unit between the row of the turning worms and the rake blade.

The push and turn dryer 10 according to the invention illustrated in Figures 1 and 2 is composed in a manner known per se of a rectangular trough 12 which has two side walls 14 that are parallel to one another and which is closed at both ends by in each case one transverse wall 16. A drying chamber 18, which is supplied with hot air by a blower, which is not shown, and is closed at the top by a flatbed 20 formed as a perforated bottom, is formed within the trough 12.

A traverse 22 formed as a box-shaped beam is supported on the upper edge of the two side walls 14. The traverse 22 can be displaced in a manner known per se on the two side walls 14 in the longitudinal direction of the trough 12 (cf. the longitudinal arrows in Figure 3) by means of an electric motor 24 via a rack and pinion gear 26.

A row of vertical axes 28 arranged next to one another is rotatably mounted in one plane in the traverse 22, wherein each axis 28 carries a turning worm 30 at its lower end. On each axis 28, at its end protruding beyond the traverse 22, a drive wheel 32 is fastened, which is formed as a pulley, gear wheel or chain wheel. A common belt or a common chain 34 driven by another electric motor 36, which is fastened to the traverse 22 outside of the trough 12, is guided over the drive wheels 32. As illustrated in Figure 1, the

belt or the chain 34 is guided in zigzag over the drive wheels 32 so that the turning worms 30 of the agitator 38 embodied in this manner rotate alternately in opposite directions (cf. Figures 1 and 3).

In Figures 2 to 4 it is illustrated that the turning worms 30, which lie in a common plane above the flatbed 20, are embodied as disk-shaped, single-start coils, which are arranged horizontally and which overlap one another. Thereby, complete mixing of the material to be dried is ensured across the entire width of the flatbed 20 because the material is not collected in narrow strips only, as in the case of blades and paddles according to the prior art, but is raised by each turning worm 28 and partially transferred to the adjacent turning disk.

The refinement of Figures 5 to 16 show a housing 66 that extends across the trough 12 and - like the traverse 22 of Figures 1 and 2 - can be displaced on the toothed rack 26 of the trough 12 by means of an electric motor 24 and two lateral pinions 44 (cf. Figures 12 and 15). In addition to the row of turning worms 20 of the agitator 38, the housing 22 accommodates a rake blade 40 (cf. Figures 10 and 11) as well as an optional exhaust unit 42 (cf. Figure 12).

In a further configuration of this variant, the row of turning worms 30 is assigned a common lifting member 46 that is composed of a vertical toothed rack 48 and a sprocket 50 driving the latter and being driven by a motor 52. The sprockets 50 arranged on both sides are coupled to one another by a connecting shaft 68.

In the same manner, the rake blade 40 also has a lift drive 54 including a motor 52', which rotates on both sides in each case one sprocket 50' via a connecting shaft 68', which sprocket is engaged with a vertical toothed rack 48'. Thus, there is the possibility to carry out a leveling of the material at a desired height by means of the rake blade 40 and to push out the material entirely or in batches in an extremely gentle manner.

The exhaust unit 42, optionally accommodated between the rake blade 40 and the agitator 38 with the turning worms 30 in the housing 66, is composed of an exhaust blower 56, which is attached on the housing 66 and driven by a motor 70 and via which, as shown in the sketch of Figure 16, the dust 58 created during drying and mixing is sucked into a dust cyclone 60. The latter comprises a row of bag filters 62, in which coarse materials, such as, for example, shell portions, are retained while cleaned waste air is discharged to the outside in the direction of the arrow A of Figure 16. Below the row of bag filters 62 there is a discharge worm 64 which discharges the coarse materials into a collection container, which is not illustrated.

Figure 7 shows a view of the closed push and turn dryer 10, the transverse wall 16 of which is composed of two inspection covers.

As schematically shown in Figures 14 and 15, this variant of the inventions provides the possibility to first extend the agitator 30 with the turning worms 30 out of the housing 66 downwards into the trough 12 so as to effect good mixing and drying of the material by traversing once or multiple times. At the end of this procedure, the agitator 38 is retracted vertically into the housing 66 while the rake blade 40 is extended downwards so that it pushes out the dried material during the subsequent feed motion of the housing 66. This can take place in batches in that the rake blade 40 pushes out the material first in the front region of the trough and thereafter in adjacent regions.

The possibility to divide the trough 12 over its length by means of one or more partition walls and to only use the agitator 38 with the turning worms 30 as well as the rake blade 40 and the exhaust unit 42 on one portion of the trough is not illustrated. In this way, the push and turn dryer 10 also can process smaller amount, if needed.

Furthermore, the variant of the invention illustrated in Figures 5 to 16 has the advantage that with the aggregates retracted (agitator 38 and rake blade 40), the housing 66 can be moved to an adjacent push and turn dryer 10 via rails which are not illustrated.

Toló-forgató szárító

Szabadalmi igénypontok

1. Toló-forgató szárító egy fűhető, szítafénkként kialakított laposággal (20) szárítandó, főként szemcsés anyag felvételére és egy a laposág (20) felett járatható keverőszerkezettel (38), amely egy a keverőszerkezet (38) mozgatói irányára keresztirányban elrendezett keresztartót (22) tartalmaz, amelyen egy sor forgathatóan meghajtott lapát van ágyazva, amelyek a laposág (20) felett elrendezett forgatócsigákként (30) vannak kiképezve, amelyek mindegyike egy saját, függőleges tengelyen (28) keresztül a keresztartón (22) forgathatóan van ágyazva, ahol a forgatócsigák (30) tengelyei (28) egy közös síkban helyezkednek el, *azzal jellemezve*, hogy a keverőszerkezet (38) keresztartója (22) egy emelőszervvel (46) van összekötve a forgatócsigák (30) függőleges kitolásához egy lesüllyesztett munkahelyzetbe és a függőleges visszahúzásukhoz egy megemelt nyugalmi helyzetbe, és hogy a keresztartóhoz (22) a forgatócsigák (30) sorával párhuzamosan egy ürítőpajzs (40) van hozzárendelve, amely egy emelő hajtással (54) van összekötve egy lesüllyesztett munkahelyzetbe való kitoláshoz és egy megemelt nyugalmi helyzetbe való visszahúzáshoz.

2. Az 1. igénypont szerinti toló-forgató szárító, *azzal jellemezve*, hogy a forgatócsigák (30) mindenkor szomszédos tengelyei (28) egy közös, a keresztartóra (22) felerősített motor (36) által szembeforgóan vannak meghajtva.



3. A 2. igénypont szerinti toló-forgató szárító, azzal jellemezve, hogy mindegyik tengelyre (28) egy a motor (36) közös szíj- vagy lánchajtása (34) által forgásba hozott hajtókerék (32) van felerősítve.
4. Az előző igénypontok bármelyike szerinti toló-forgató szárító, azzal jellemezve, hogy a keresztartó (22) és az űritőpajzs (40) egy a vályú (12) felett járatható házban (66) vannak elhelyezve.
5. A 4. igénypont szerinti toló-forgató szárító, azzal jellemezve, hogy a házban (66) egy elszívóventilátorhoz (56) csatlakoztatott porciklon (60) van elrendezve, amely tömlős porszűrőket (62) tartalmaz, amelyek a forgatócsigák (30) sorával párhuzamosan vannak elrendezve.
6. Az 5. igénypont szerinti toló-forgató szárító, azzal jellemezve, hogy a tömlős porszűrők (62) alatt egy kihordócsiga (64) van elrendezve, amely a házban (66) a mozgatási irányra keresztirányban terjed ki.
7. Az 5. vagy 6. igénypont szerinti toló-forgató szárító, azzal jellemezve, hogy a tömlős porszűrők (62) a forgatócsigák (30) sora és az űritőpajzs (40) között vannak elrendezve.
8. Az 1-3. igénypontok bármelyike szerinti toló-forgató szárító, azzal jellemezve, hogy az egymás mellett elrendezett forgatócsigák (30) tárcsaszerű, egybekezdésű csigalevélként vannak kialakítva, amelyek vízszintesen vannak elrendezve és egymást kölcsönösen átfedik.

Fig. 2

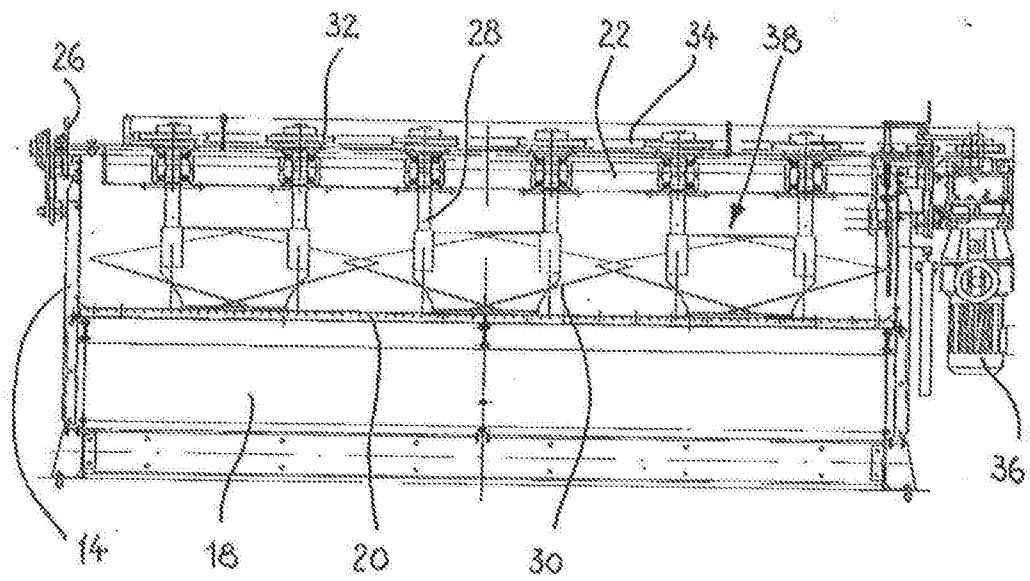
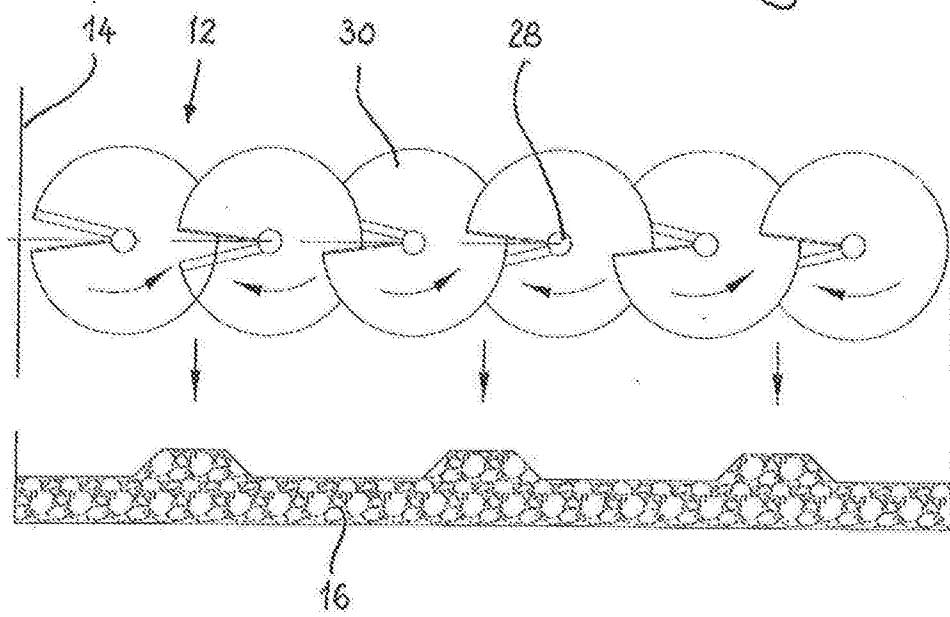


Fig. 3



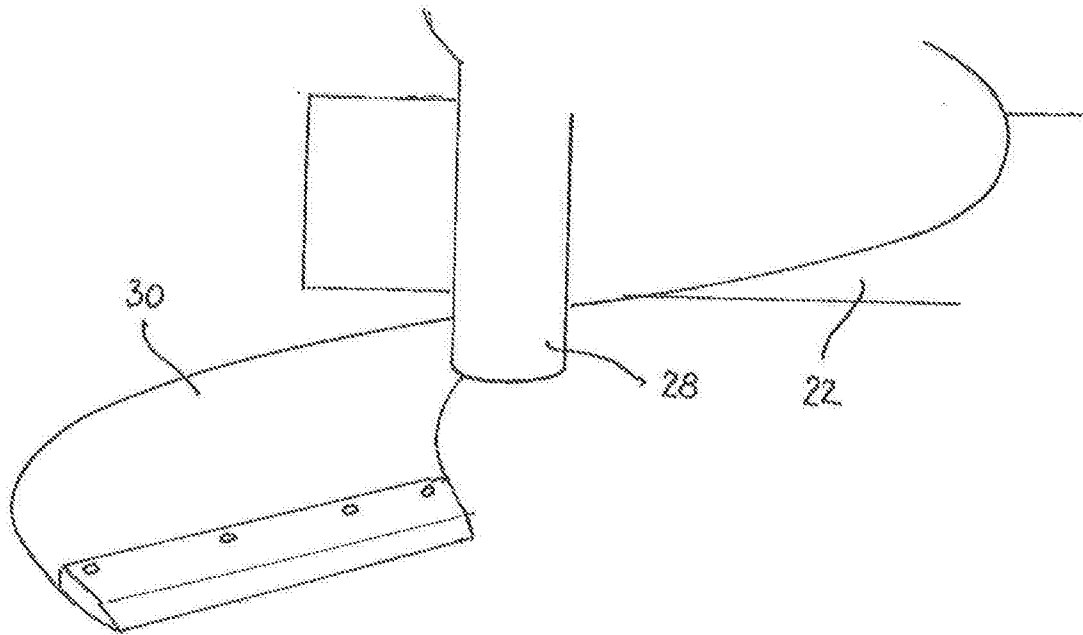


Fig. 4

Fig. 5

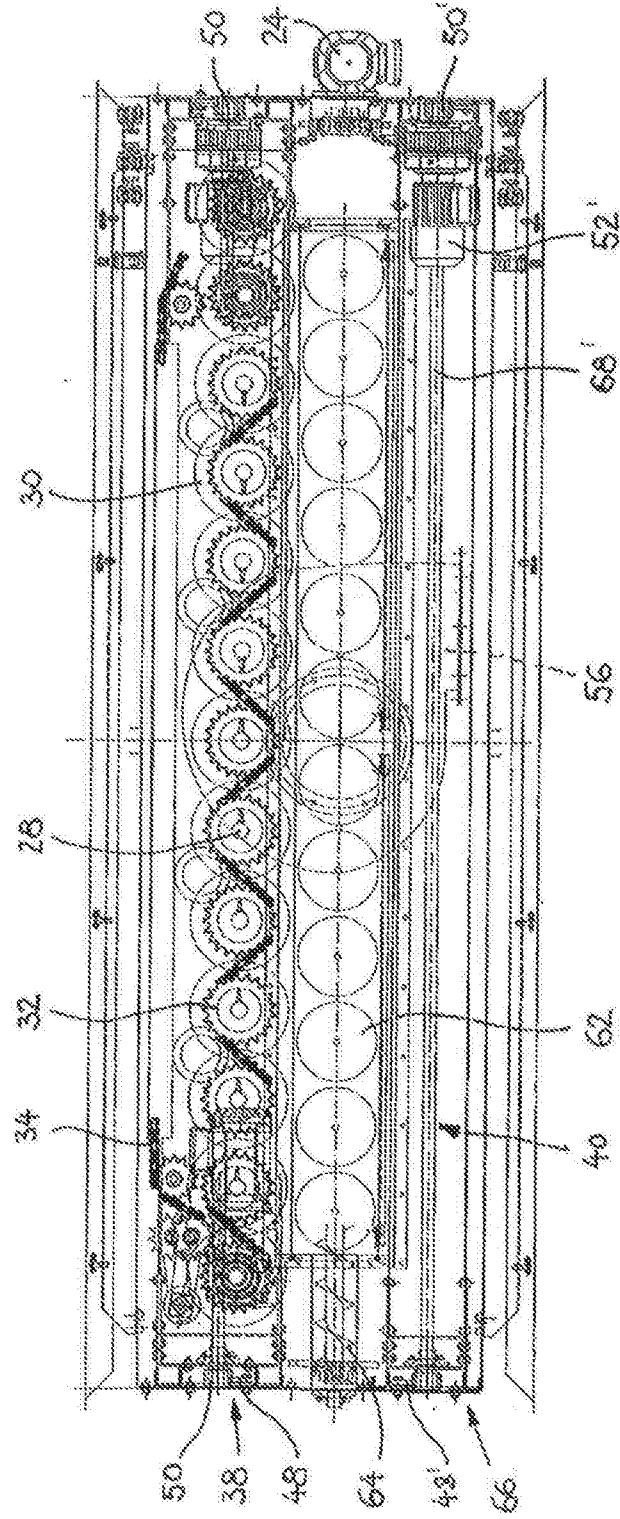


Fig. 6

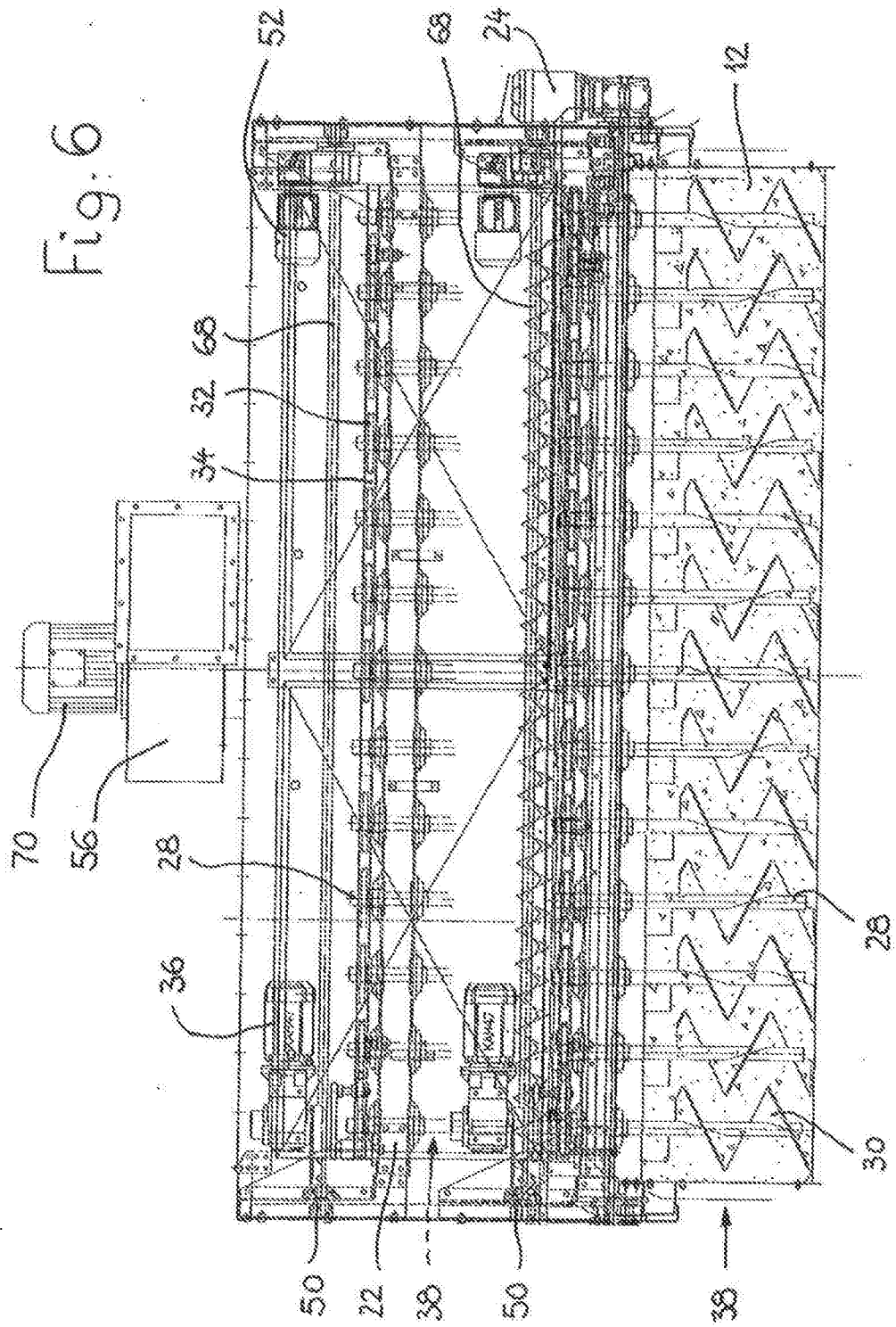


Fig. 7

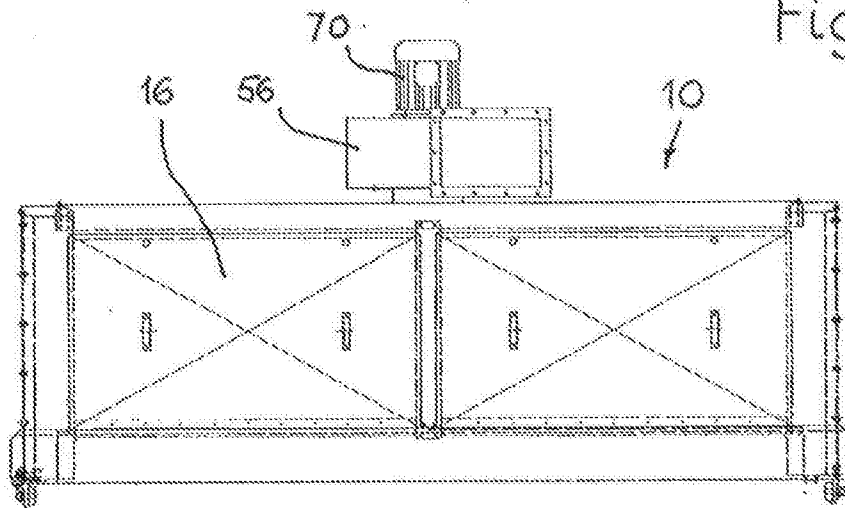


Fig. 8

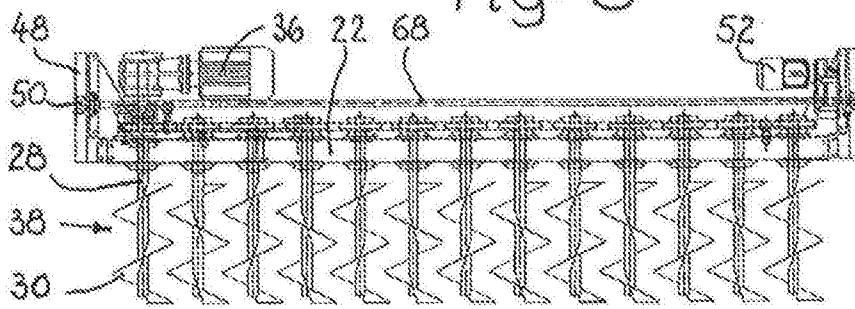


Fig. 9

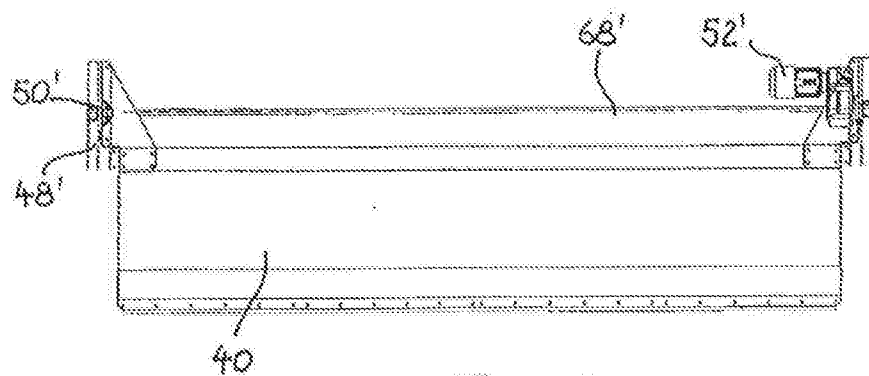
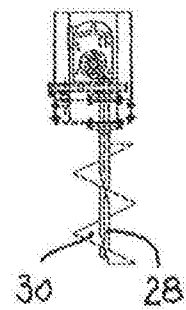
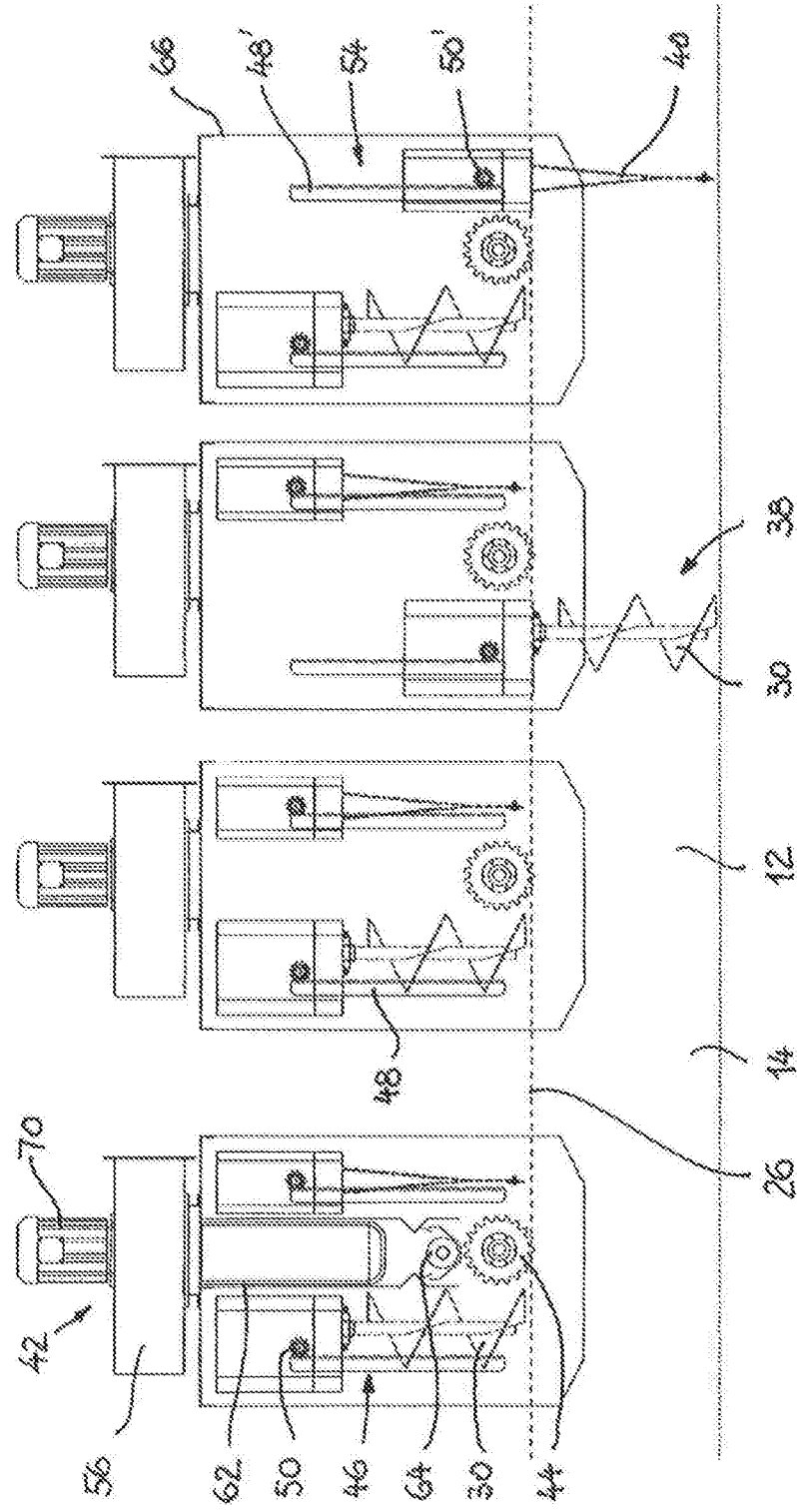


Fig. 10

Fig. 11



Fig. 12 Fig. 13 Fig. 14 Fig. 15



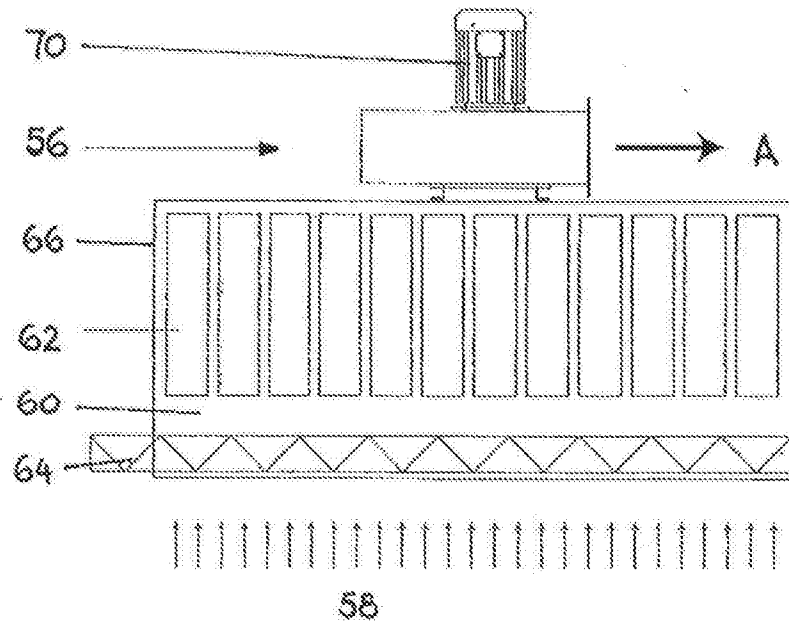


Fig. 16