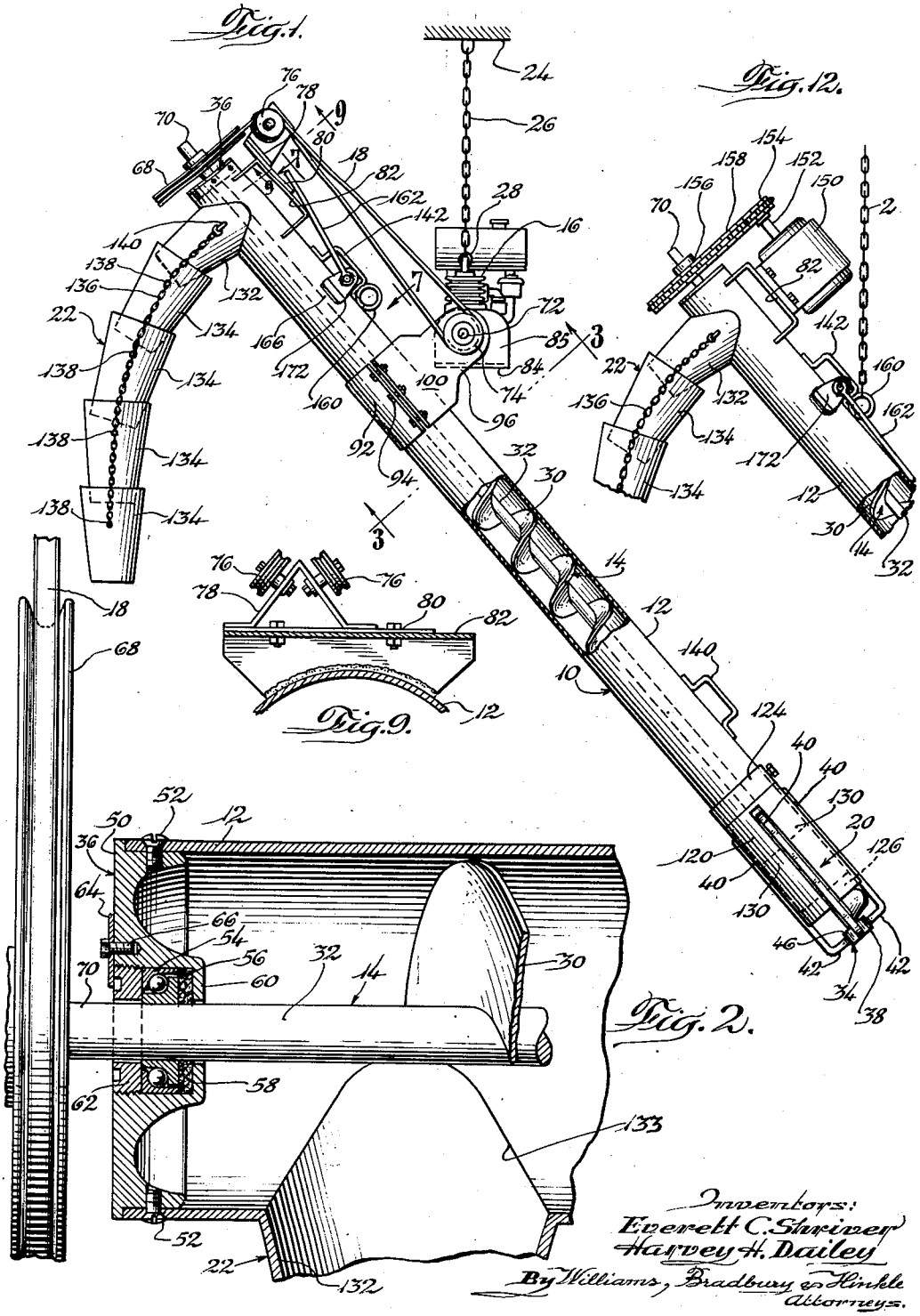
June 26, 1951 E. C. SHRIVER ET AL 2,558,006

GRAIN ELEVATOR

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GRAIN ELEVATOR

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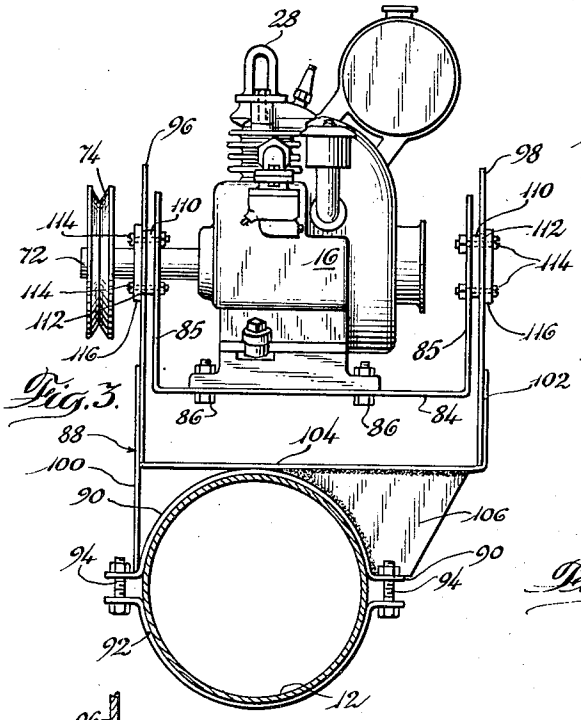


Fig. 3.

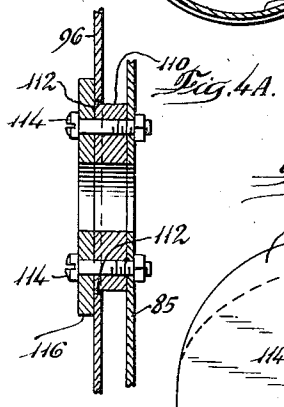
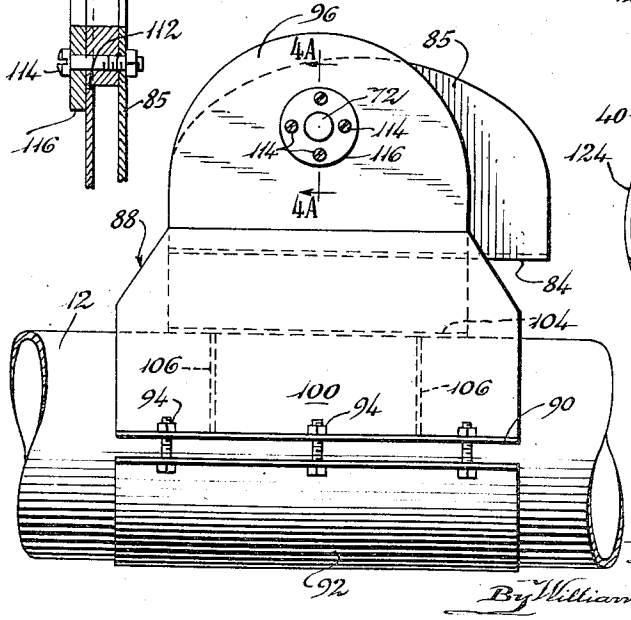


Fig. 4A.

Fig. 4.



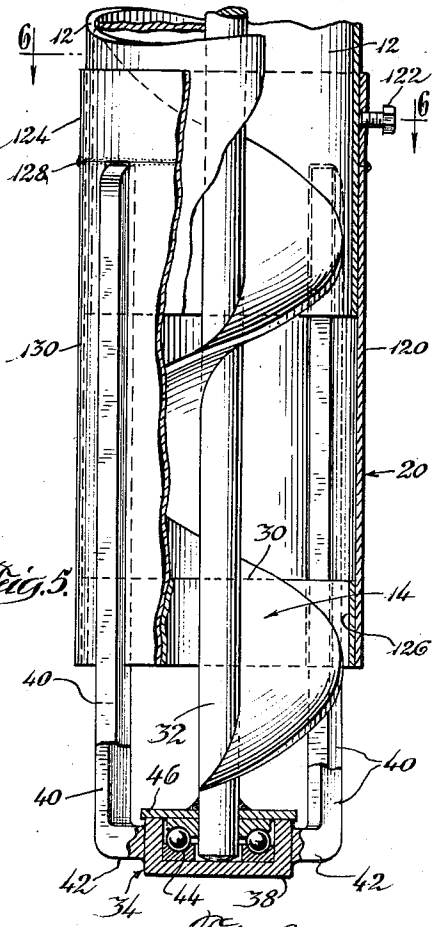
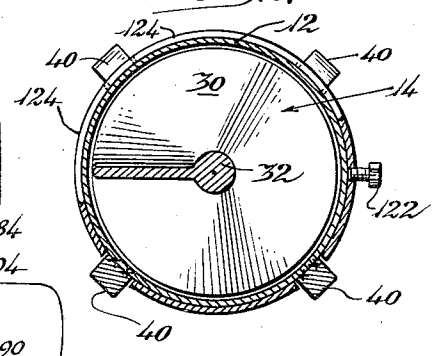


Fig. 5.

Fig. 6.



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GRAIN ELEVATOR

Filed Aug. 28, 1945 3 Sheets-Sheet 3

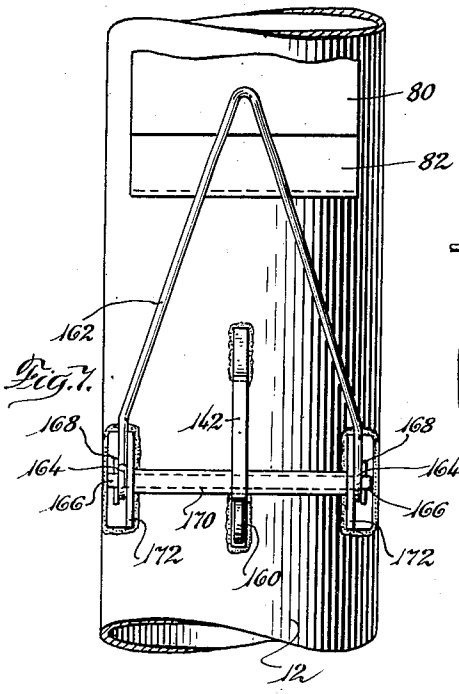


Fig. 7.

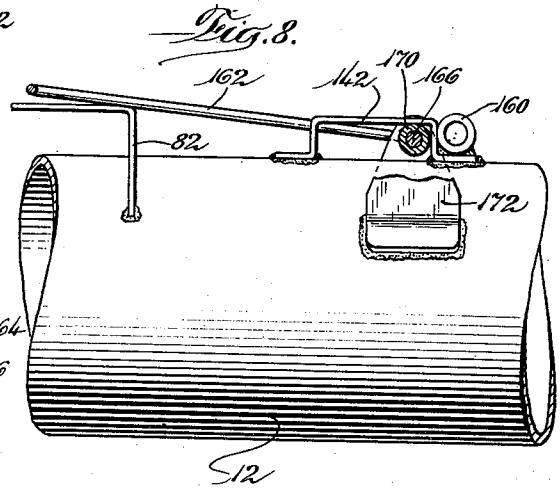


Fig. 8.

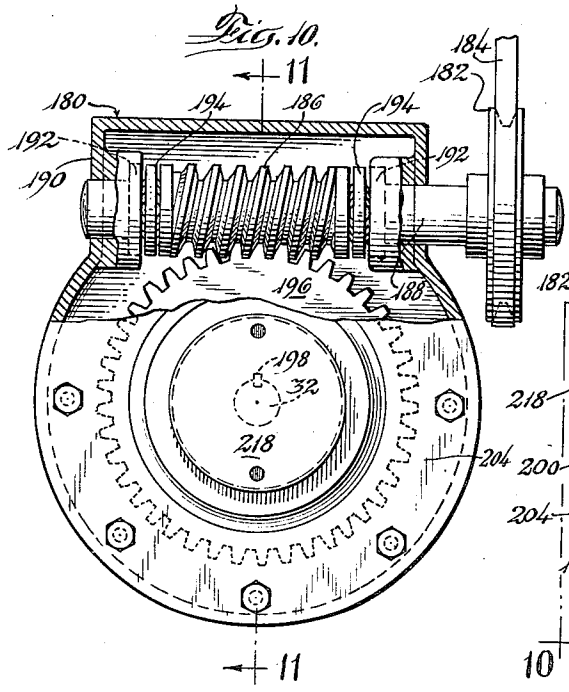


Fig. 10.

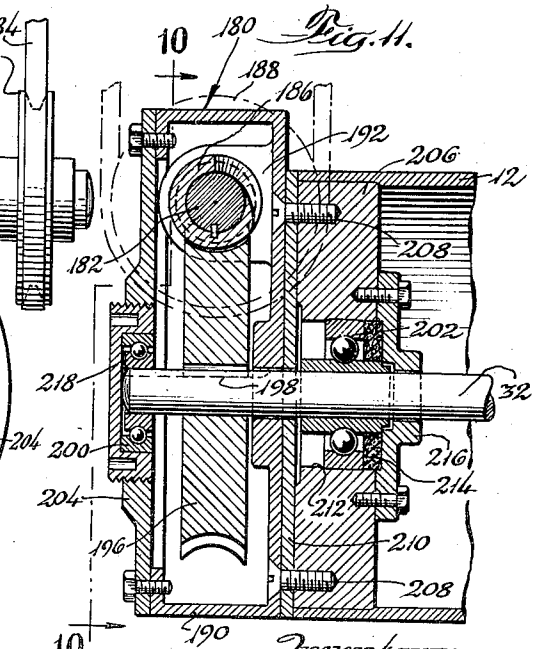


Fig. 11.

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GRAIN ELEVATOR

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Application August 28, 1945, Serial No. 613,118

8 Claims. (Cl. 198—213)

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The present invention relates to a grain elevator and has for its primary object the provision of a new and improved portable grain elevator.

Another of the primary objects is the provision of a new and improved portable grain elevator which is practical and economical in construction and easy to use and to handle.

Another and more specific object of the present invention is to provide a new and improved portable grain elevator including a casing, within which is housed an auger type conveyor especially adapted for conveying small grain, and means for rotating the auger, all so constructed and arranged that the elevator may be moved from place to place and that the lower or inlet end of the casing may be moved about either vertically or sidewise in the grain.

Another object of the present invention is to provide a portable grain elevator including a casing and an adjustable inlet at the lower end of the casing, whereby the size of the inlet may be readily adjusted to regulate the flow of grain.

Another object of the present invention is the provision of a new and improved portable grain elevator including power means for rotating the conveyor and novel means for mounting the power means.

A further object of the present invention is to provide a new and improved portable grain elevator having novel suspension means whereby the elevator may be suspended in such manner that it may be readily moved about in the grain.

A further object of the present invention is to provide a new and improved grain elevator including novel means for supporting and driving the grain conveyor.

A further object of the present invention is to provide a new and improved grain elevator wherein the inlet end of the elevator is substantially dustproof.

Other objects and advantages of the present invention will become apparent from the ensuing description thereof, in the course of which reference is had to the accompanying drawings, in which:

Fig. 1 is a side elevational view, partly broken away, of a grain elevator constructed in accordance with the present invention, the grain elevator being shown suspended in an inclined position corresponding to one of the many positions in which the apparatus might be placed in use;

Fig. 2 is an enlarged axial cross sectional view through the upper end of the conveyor and illustrating particularly the mounting of the upper end of the auger type conveyor utilized in the apparatus;

Fig. 3 is a transverse cross sectional view taken along the line 3—3 of Fig. 1 illustrating the conveyor driving motor in a different position;

Fig. 4 is a fragmentary side elevational view of

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the apparatus illustrated in Fig. 3, the driving motor being omitted for purpose of simplicity;

Fig. 4A is an enlarged fragmentary cross sectional view taken along the line 4A—4A of Fig. 4;

Fig. 5 is an enlarged axial cross sectional view through the lower end of the elevator illustrating the mounting of the lower end of the conveyor and the adjustable slide for regulating the size of the grain inlet;

Fig. 6 is a transverse cross sectional view taken along the broken line 6—6 of Fig. 5;

Fig. 7 is a fragmentary enlarged plan view taken along line 7—7 of Fig. 1 illustrating details of suspension means which may be utilized when the conveyor is driven by an electric motor;

Fig. 8 is a fragmentary side elevational view of the suspension means shown in Fig. 7;

Fig. 9 is a fragmentary cross sectional view taken along the line 9—9 of Fig. 1 and illustrating idler pulleys and their supporting structure;

Fig. 10 is an end elevational view, partly broken away, of a modified conveyor drive and taken along the line 10—10 of Fig. 11;

Fig. 11 is an axial cross sectional view of the drive illustrated in Fig. 10 taken along line 11—11 of Fig. 10;

Fig. 12 is a fragmentary side elevational view of a modified form of elevator utilizing an electric motor for driving the conveyor.

Referring now to the drawings and first particularly to Fig. 1, it may be noted that the grain elevator of the present invention is indicated as a whole by reference character 10. It includes, in the main, a substantially cylindrical casing 12 of convenient or desired length within which is rotatably mounted an auger type conveyor 14 suited especially for conveying small grain, a motor 16 movably secured relative to the casing and driving the conveyor through a belt 18, an adjustable inlet indicated as a whole by reference character 20, and an articulated or flexible outlet spout 22.

One of the main features of the elevator of the invention is its adaptability for various types of drives, especially either electric or gasoline. A gasoline engine drive is illustrated in Fig. 1, wherein the motor 16 is a gasoline engine, which may be of conventional construction.

The elevator may be suspended from a suitable support, shown diagrammatically at 24, by a chain or the like 26 secured to a supporting bracket 28 mounted in suitable position upon the motor. The arrangement, as will be described in detail hereinafter, is such that the elevator may be moved into different angular positions vertically and may be moved to and fro horizontally to facilitate the transfer of grain from a bin or car or the like to a desired place.

The casing 12 is preferably made of a relatively heavy grade of sheet metal. It is tubular in order

to receive the rotatable auger type conveyor 14 which includes a spiral blade 30 secured to a shaft 32. The shaft 32 is rotatably secured at its opposite ends to the casing 10 in lower and upper supports indicated by reference characters 34 and 36, respectively.

The lower support 34 includes, and now referring primarily to Figs. 1 and 5, a bearing cage 38 having a generally cup-like shape and secured to the lower end of the casing 12 by a plurality, preferably four rods 40 having inturned lower ends 42 suitably secured, as by welding, to the exterior of the cage. A thrust ball bearing 44 is secured to the lower end of the conveyor shaft 32 and to the cage. The lower bearing is made substantially dustproof by means of a washer 46 surrounding and welded to the shaft at a location where it substantially seals the cage 38.

The upper support 36 includes an annular head 50 secured to the upper end of the casing 12 by a plurality of screws 52. The conveyor shaft is rotatably supported in the head by a ball bearing 54 secured to the shaft and held within a bearing receiving recess 56 located centrally of the head. Leakage of grease toward the interior of the elevator along the shaft is prevented by seal defining packing 58 held between the bearing and the central portion 60 of the head.

The upper bearing 54 is secured to the head by a takeup screw 62 firmly held in place in the head in adjusted position by locking means including a washer 64 bearing against the screw and a bolt 66 securing the washer to the head.

The auger type conveyor 14 is thus supported freely and for true running in whatever angular position it may be placed in use. It is rotated, as already indicated, by the engine 16 and belt 18. The belt drives the conveyor shaft 32 through a pulley 68 secured to the end 70 of the shaft extending beyond the upper end of the casing. The belt is driven by the engine through the engine shaft 72 and a pulley 74 secured to the shaft.

The belt runs over a pair of idler pulleys 76 (only one of which is shown in Fig. 1) rotatably secured to an idler pulley bracket 78 detachably secured to the conveyor casing 12 so that it may be removed when the auger is rotated by an electric motor as indicated in Fig. 12 and as will be described in detail hereinafter. The idler pulley bracket 78 is fixedly secured to a base plate 80 detachably secured to a generally channel-shaped combined electric motor and bracket mounting plate 82 secured in suitable manner, as by welding, to the exterior of the casing near the upper end of the latter. The pulleys are located so that an "in line" drive is obtained.

The driving means for the conveyor is so constructed and arranged that the pulleys and belt remain in the same relative positions in the various positions of the casing and parts attached to it. This advantageous construction comprises means for suspending the casing movably with respect to the engine shaft so that the casing pivots about the shaft. As a result, the engine driven pulley 74 and the other pulleys and parts of the conveyor drive pivot about the engine shaft with the casing.

The engine 16 is fixedly supported in a generally U-shaped saddle 84, to which it is secured as by the mounting bolts 86, and which forms part of a simple yet effective mounting. The saddle is pivotally secured through its spaced apart upright portions 85 upon a mounting bracket indicated as a whole by reference character 88 and detachably secured to the casing. The mounting bracket includes a generally semi-circular upper portion 90 adapted detachably to be secured to the casing 12 by a similar semi-circular portion 92 also encircling the casing, the two semi-circular parts being secured by a plurality of bolts 94. The bracket includes also a pair of vertical side plates 96 and 98 having semi-circular upper ends. Side plate 96 is secured to a vertical side support 100 welded or otherwise suitably secured to the upper semi-circular part 90 of the mounting bracket. Side plate 98 is secured to the upwardly projecting portion 102 of a horizontal support 104 seated upon and secured to the top of the semi-circular part 90. The horizontal support 104 is also secured in place in a more rigid manner by a pair of vertical braces 106 welded to it and to part 90.

The engine supporting saddle 84 is pivotally supported relative to the side plates 96 and 98. The supporting means includes a pair of trunnions 110 extending through apertures 112 in the side plates and secured to the upright portions 85 of the saddle by a plurality of screws 114. The trunnions 110 fit relatively closely in the apertures 112 and they are prevented from being withdrawn through the apertures by larger diameter washers 116 attached to the trunnions by the screws 114. The motor shaft 72 extends freely through one of the trunnions 110.

The engine mounting is thus such that the saddle and engine swing forward and backward lengthwise of the elevator as the casing and conveyor are moved angularly, the engine being held in the same position vertically by the supporting chain. The entire assembly, including the motor, may also swing about a vertical axis so that both ends of the conveyor may be moved easily into desired positions.

In order to prevent undesired sidewise movement of the elevator casing, especially in the event too heavy an engine is used, the engine is secured to the casing at somewhat above the centerpoint so that the lower end of the casing is gravity biased downwardly.

In accordance with another feature of the present invention, the elevator is supplied with the adjustable grain inlet 20. The inlet includes a tubular composite outer sleeve 120 encircling the lower portion of the casing 12 and adapted to be secured in various adjusted positions lengthwise of the casing by a locking bolt 122. The sleeve 120 is preferably fabricated and includes a pair of collar-like portions 124 and 126. The former is in effect a part of the sleeve and is secured as by welding 123 to a plurality (four) of axially extending spaced apart side plates 130 slidably arranged between the rods 40. The lower ends of the side plates 130 are secured as by welding to the lower collar 126.

The spout, which forms another feature of the present invention, is of an articulated or flexible construction. It includes a first generally truncated tubular spout section 132 fixedly secured to the casing 12 and communicating with the interior of the casing through an opening 133 (see Fig. 2), in the casing. The auger, it should be noted, extends approximately to the middle of the aperture so that grain conveyed by it flows into the outlet spout section. The spout includes also a plurality of relatively movable spout sections 134 which are movably secured to each other by diametrically oppositely located chains 136 secured as by bolts 138 to the individual spout sections and by hooks 140 to the stationary spout section.

In order to enable the elevator as a whole to be transported from place to place and to enable it to be moved when in operation, the casing is provided with lower and upper handles 140 and 142 which are suitably secured as by welding to the exterior of the casing.

When the conveyor is to be rotated by an electric motor, as indicated in Fig. 12, the gasoline engine and the mounting means therefor, as well as the idler pulleys, and its supporting bracket may be removed. The electric motor, which is indicated by reference character 150, is then secured to the mounting 82 with the motor shaft 152 located lengthwise of the casing. In this modification the motor and auger shafts are interconnected by sprocket wheels 154 and 156 and a chain 158, although other types of drive may be utilized. The construction is thus such that the shift from one type of the motor to another may be made readily and without changing the mode of operation of the device.

When the conveyor is driven by an electric motor, the elevator is supported either through a ring 169 or a bail 162. The ring 160 is fixedly secured to the casing, for example, it may be welded to the casing and to one end of the upper handle 142. The bail 162 is preferably movably mounted relative to the casing. It is generally V-shaped and, referring now more particularly to Figs. 7 and 8, it may be seen to have generally circular lower ends 164 encircling a rod 166, which ends are prevented from being moved therefrom by the cotter pins 168. The rod passes through a tubular guide 170 mounted a short distance above the casing in the supporting plates 172, which are welded to the exterior of the casing.

A modified conveyor drive is illustrated in Figs. 10 and 11 to which reference is now had. In this embodiment of the invention, the drive includes gearing constructed as a structural unit with the upper bearing support and head, indicated as a whole by reference character 180. The drive includes a pulley 182 rotated by a belt 184 or the like driven by an electric motor mounted with its shaft disposed transversely of the casing or by a gas engine mounted as heretofore described.

The gear drive includes a worm 186 mounted for rotation with a shaft 188 projecting outside of the casing 190, to which projecting portion the pulley 182 is secured. The shaft 188 is rotatably supported relative to the casing by spaced apart supports 192 and ball thrust bearings 194. The worm 186 drives the conveyor shaft 32 through a worm wheel 196 secured to the shaft as by the key 198. The gears are sealed within the housing 190 which contains lubricant for lubricating the gears. The conveyor shaft is rotatably secured in the housing by spaced apart ball bearings 200 and 202 mounted, respectively, in a closure plate 204 and an annular casing closing plate 206. The gear housing 190 is secured to the plate 206 as by a plurality of cap screws 208. The screws also hold in place a spacer plate 210 located between the housing and the head plate 206. The bearing 202 is mounted within a central recess 212 in the plate 206. Leakage of lubricant along the shaft past the bearing is prevented by seal defining packing 214 and a bearing and packing holding plate 216.

The bearing 200 is secured in a cup-like take-up nut 218 adjustably mounted in a threaded central recess in the end plate 204.

From the foregoing detailed description of the conveyor of the present invention, it may be noted that the various embodiments thereof may be constructed readily and economically and that the resulting structure may be used advantageously for conveying grain from one location to another. The elevator may be operated by various types of motors including the gasoline engine 16 or the electric motor 150. Furthermore, the changeover from one type of drive to the other may be effected readily. The elevator can be transported from one location to another with ease and its position may be adjusted to convey the maximum quantity of grain in a minimum of time by moving the inlet in the grain to desired points.

When the gasoline engine is used, the elevator is secured to the engine and pivots about the engine shaft so that the elevator may be moved to various angular positions either about the engine shaft or about the suspending chain 26 without disturbing the relationship between the various parts.

The quantity of the grain transported by the elevator may be regulated at will by adjustment at the inlet 20, more particularly by axial movement of the slide 120 to vary the effective size of the inlet.

The grain conveyed by the elevator may be readily directed to desired points through the articulated or flexible spout. The delivery of the grain is therefore positionally independent of the inlet so that additional ease of operation is afforded.

The gasoline engine is so located lengthwise of the remainder of the apparatus that the weight of the lower portion exceeds that of the upper so that the elevator normally tends to occupy an inclined position somewhat as illustrated in Fig. 1. The ring 160 and bail 162 are located somewhat higher so that, when an electric motor is utilized, the balance remains about the same and the position of the elevator may be readily varied.

The dust and lubricant proof constructions also add to the practicability of the device.

While the present invention has been described in connection with the specific details of a limited number of embodiments of the invention, these details are not intended to be limitative of the invention, except insofar as set forth in the accompanying claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A grain elevator, including in combination, means including a casing and grain conveying means mounted within said casing for moving grain through said casing, power means including a rotatable shaft operatively connected to said grain conveying means for operating the latter, means secured to said power means for suspending it and said casing and grain conveying means, and means securing said casing to said power means for pivotal movement about the axis of said shaft.

2. A grain elevator, including in combination, means including a casing and grain conveying means mounted within said casing for moving grain through said casing, a motor located outside of the casing and including a shaft extending transversely of the casing and operatively connected to said grain conveying means for operating the latter, mounting means fixedly secured to the exterior of the casing, said mounting means having a pair of aligned apertures concentric to said shaft, a motor mounting saddle hav-

ing a pair of hollow trunnions rotatably mounted in said apertures and extending therethrough, said shaft passing through at least one of said trunnions, and means secured to said trunnions for holding said saddle on said mounting means.

3. A grain elevator, including in combination, means including a casing and grain conveying means rotatably mounted within said casing for moving grain through said casing, a motor including a shaft located outside of and extending transversely of the casing, mounting means fixedly secured to the exterior of the casing, said mounting means having a pair of aligned apertures concentric to said shaft, a motor mounting saddle having a pair of hollow trunnions rotatably mounted in said apertures and extending therethrough, said shaft passing through at least one of said trunnions, means secured to said trunnions for holding said saddle on said mounting means, a pulley mounted on said motor shaft beyond the motor mounting means, a pulley secured to said conveying means and rotatable coaxially of the casing, and means including a belt and idler pulleys detachably secured to the exterior of the casing for connecting the motor and conveying means pulleys.

4. A grain elevator, including in combination, a tubular closed casing, grain conveying means movably mounted within said casing, and said casing having an outlet at one end and an adjustable grain inlet at the other end, said inlet comprising angularly spaced apart rods fixedly secured to and extending lengthwise of the casing, and casing encircling means including portions located and movable lengthwise between the rods for varying the effective length of the casing and thereby controlling the effective size of the grain inlet.

5. A grain elevator, including in combination, a tubular casing having an outlet at one end, grain conveying means movably mounted within said casing, an adjustable grain inlet at the opposite end of said casing, said inlet comprising angularly spaced apart rods secured to and extending lengthwise of the casing and terminating in inwardly extending portions, and a dustproof conveying means supporting bearing assembly secured to said inwardly extending portions.

6. Mounting means for detachably securing power means having a shaft to the casing of a grain elevator, including in combination, a mounting adapted detachably to be secured to the exterior of the casing, said mounting having a pair of aligned apertures concentric to the shaft, a saddle having a pair of hollow trunnions rotatably mounted in said apertures and extending therethrough, the shaft passing through at least one of the trunnions, and means secured to the trunnions outside of said mounting for holding said saddle on the mounting.

7. An adjustable grain inlet for a grain elevator, including in combination, angularly spaced apart rods fixedly secured to and extending lengthwise of a main elevator casing, and casing encircling means including portions located between and movable lengthwise between the rods for varying the effective length of the casing and thereby controlling the effective size of the grain inlet.

8. A grain elevator, including in combination, a casing having a grain inlet and a grain outlet, grain conveying means extending axially of and inside said casing, means including bearing units supported at opposite ends of said casing for rotatably supporting said conveying means, and a take-up screw associated with the casing and the bearing unit at the outlet end of said casing for holding said bearing unit in position.

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