

E. A. MUNN & O. L. PLUMTREE.

GRAIN CHUTE.

APPLICATION FILED FEB. 26, 1909.

945,975.

Patented Jan. 11, 1910.

3 SHEETS—SHEET 1.

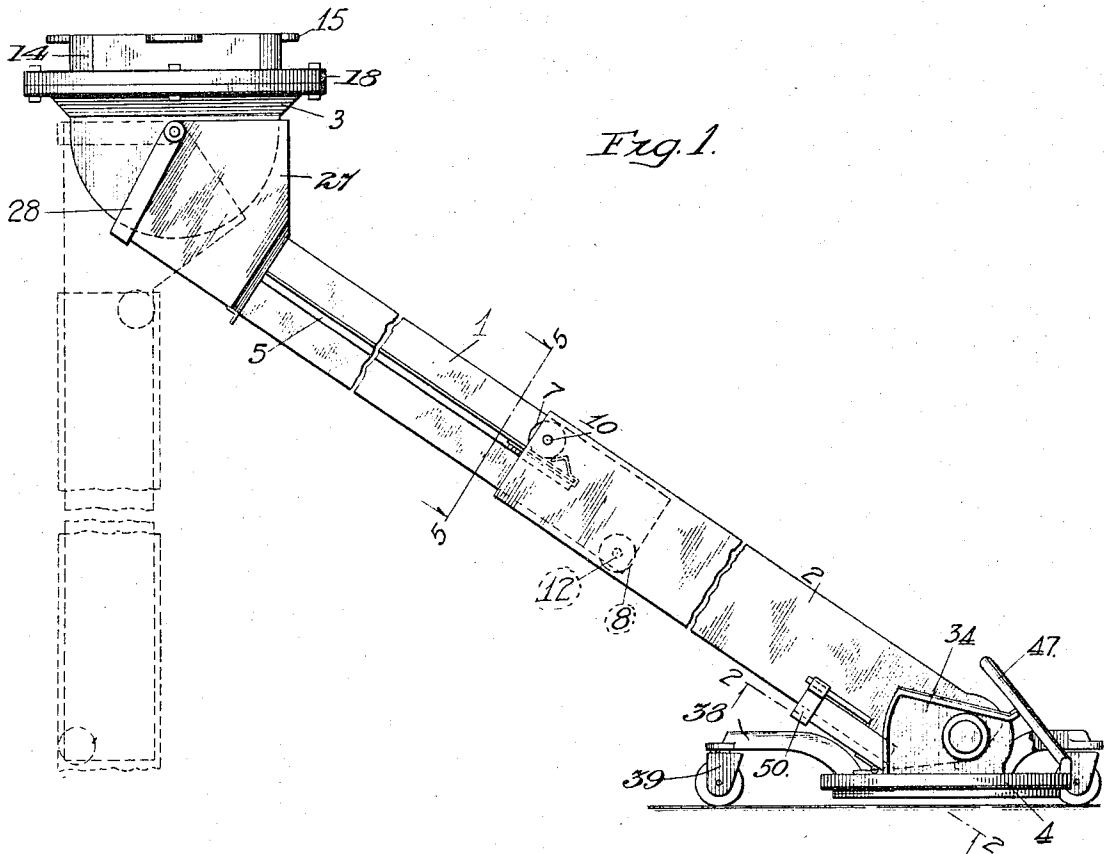


Fig. 1.

Fig. 2.

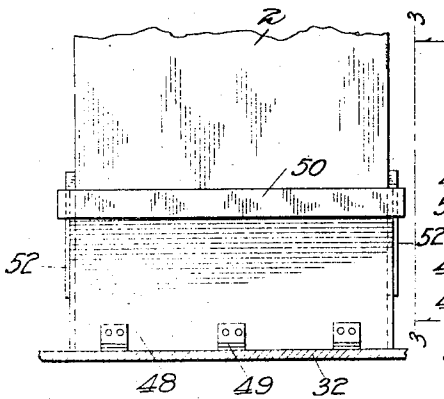


Fig. 3.

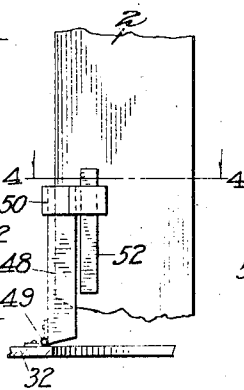
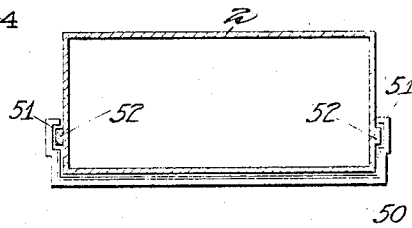


Fig. 4.



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3 SHEETS—SHEET 2.

Fig. 5.

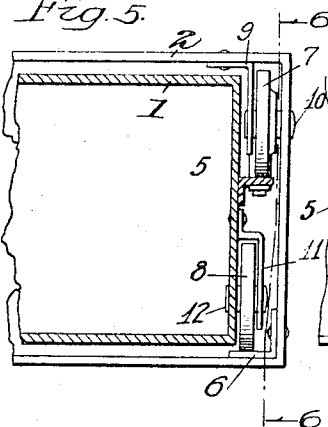


Fig. 6.

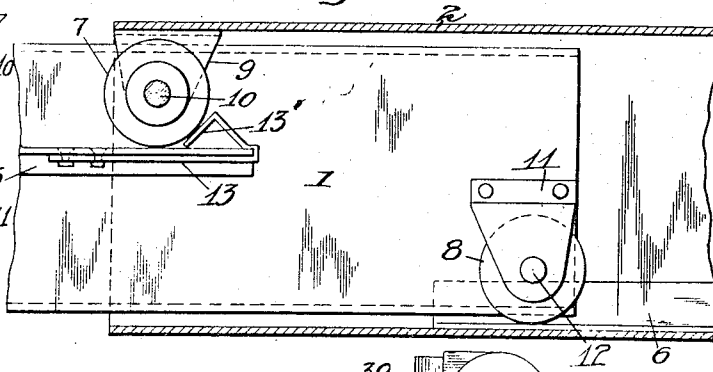


Fig. 7.

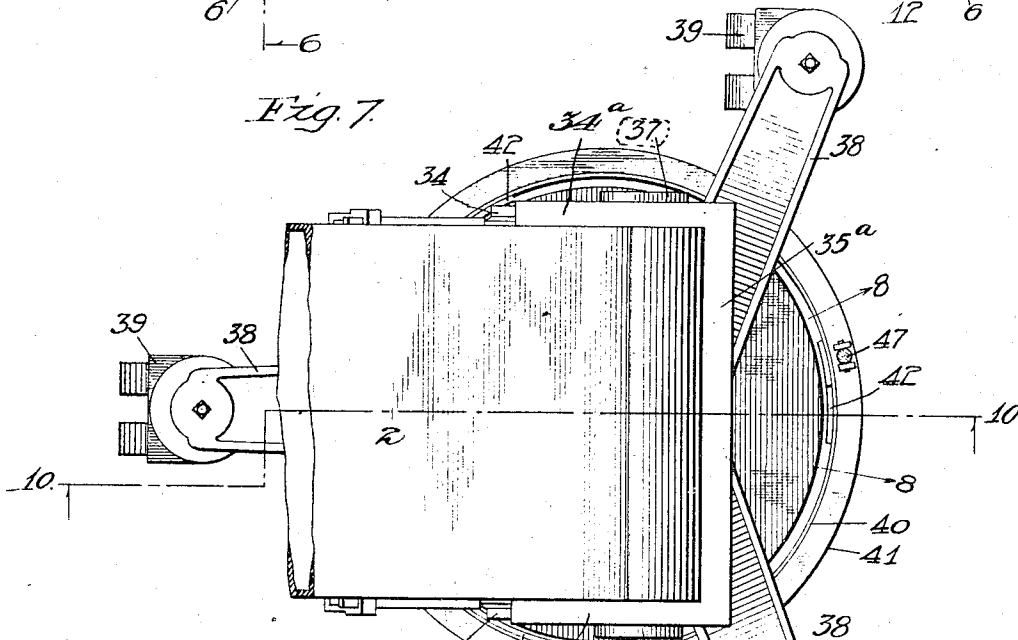


Fig. 8.

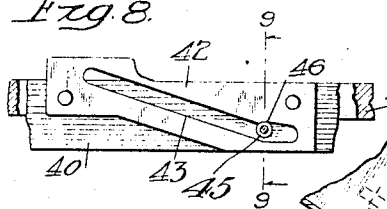


Fig. 9.

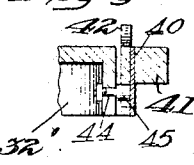
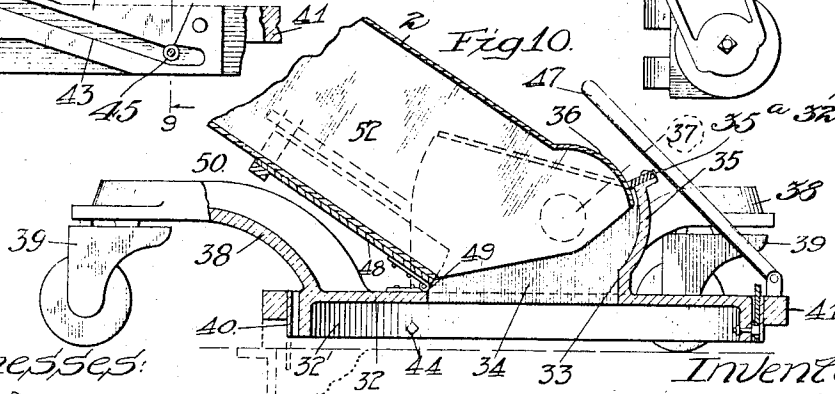


Fig. 10.



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3 SHEETS—SHEET 3.

Fig. 11.

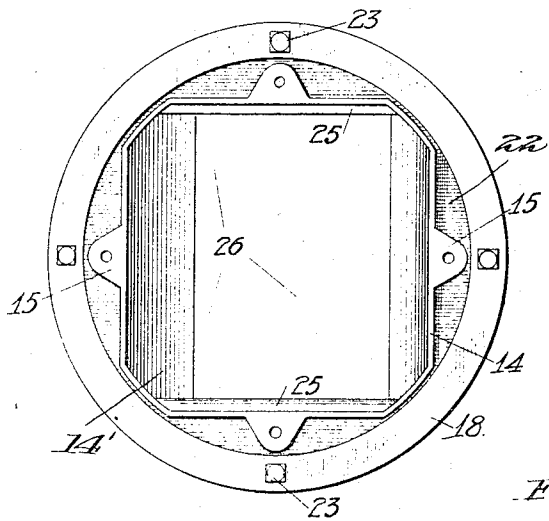


Fig. 12.

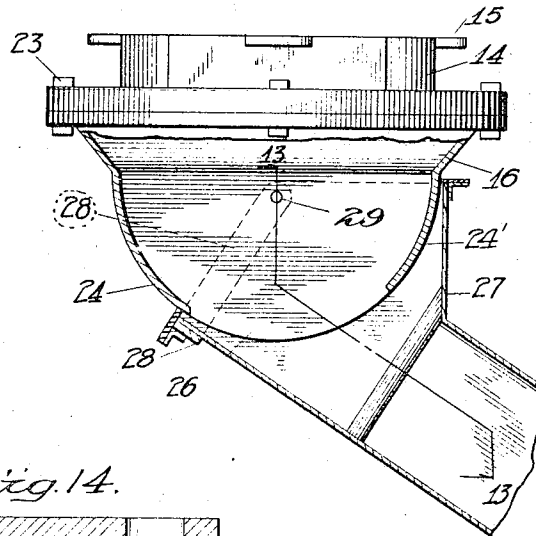


Fig. 13.

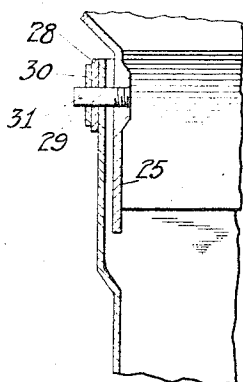


Fig. 14.

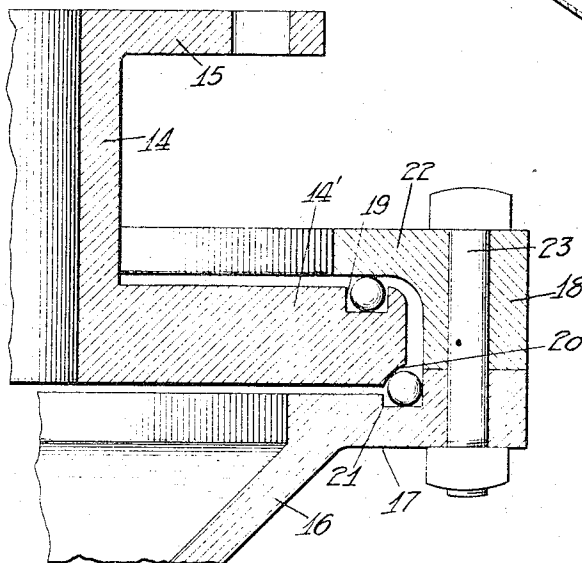


Fig. 15.

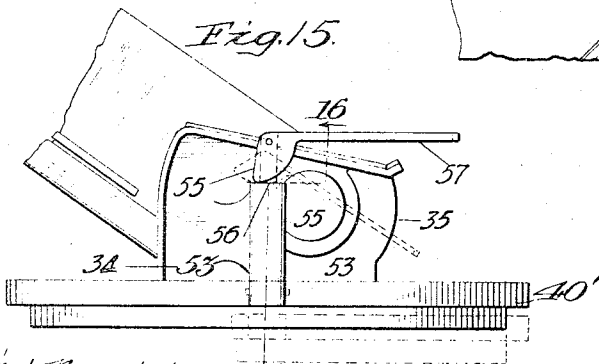
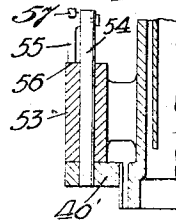


Fig. 16.



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UNITED STATES PATENT OFFICE.

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GRAIN-CHUTE.

945,975.

Specification of Letters Patent.

Patented Jan. 11, 1910.

Application filed February 26, 1909. Serial No. 480,165.

To all whom it may concern:

Be it known that we, EDWARD A. MUNN and OLIVER L. PLUMTREE, citizens of the United States, both residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grain-Chutes, of which the following is a specification.

This invention relates to improvements in grain chutes, and refers more particularly to improvements in that type of grain chutes which are used in elevators for transferring grain from one common bin or source of supply to any one of a considerable number of other bins or chutes located below and communicating with the floor over which the lower end of the chute is adapted to traverse, in short, the device is a grain-distributing chute.

Among the salient objects of the present invention are to provide improvements in the details of construction whereby the upper end of the chute is connected with the discharge of the bin above in such manner as to minimize the amount of vertical space necessary to such connection, and in this manner reduce the height of that story of the elevator in which the chute operates; to provide improved details of construction in the mechanism which supports and connects the upper end of the chute with a rotary discharge, which permits the chute to be adjusted in all lateral directions and at the same time provides for changing the angle of inclination of the chute through relatively wide limits; to provide improved details of construction of the mechanism constituting the discharge end of the chute whereby the latter is more economically constructed and more readily manipulated in adjusting it into position to communicate with a given bin or receiving chute; to provide an improved telescoping connection between the lower end of the chute and the carriage which supports the latter whereby changes in the angle of inclination of the chute may be made without opening or unsealing the joint; to provide a mechanism which may be very economically manufactured because of its peculiar details of construction, and which is both efficient and durable in operation, and in general to provide an improved apparatus of the character referred to.

To the above ends the invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims.

In the drawings—Figure 1 is a view in side elevation of a grain chute constituting a preferred embodiment of the invention; Fig. 2 is a detail showing in bottom plan the telescopic apron-like connection between the lower end of the chute and the carriage therefor; a portion of the base plate being shown in section; Fig. 3 is a detail of the parts shown in Fig. 2, taken at right angles to the latter figure; Fig. 4 is a cross section of the chute, taken on line 4—4 of Fig. 3 and looking in the direction of the arrows; Fig. 5 is a cross sectional view through a lateral one-half of the chute, taken on line 5—5 of Fig. 1; Fig. 6 is a longitudinal sectional view through the telescoping portions of the chute, taken approximately on line 6—6 of Fig. 5 and looking in the direction of the arrows; Fig. 7 is a plan view of the lower end of the chute and carriage therefor; Fig. 8 is a detail, taken approximately on indirect line 8—8 of Fig. 7 and looking in the direction of the arrows; Fig. 9 is a sectional detail taken on line 9—9 of Fig. 8; Fig. 10 is a vertical sectional view taken approximately on line 10—10 of Fig. 7; Fig. 11 is a top plan view of the receiving end of the chute, detached; Fig. 12 is a view partly in side elevation and partly in vertical section of the upper end of the chute and its swiveling connections; Fig. 13 is a fragmentary sectional view taken on line 13—13 of Fig. 12 and looking in the direction of the arrows; Fig. 14 is a radial sectional view through one side of the swiveling connections of the chute; Fig. 15 is a side elevation of a modified construction of the lower end of the chute; Fig. 16 is a sectional detail taken on line 16—16 of Fig. 15.

Referring to the drawings, 1 and 2, respectively, designate the upper and lower main sections of the grain chute, 3 designates as a whole the swiveling connections by which the upper end of the chute is connected to the bottom of the overhead bin or other source of grain supply, and 4 designates as a whole the carriage which supports the lower end of the chute.

The chute is rectangular in cross section throughout its main length, as best seen in

Figs. 5 and 6; the lower member 2 being arranged to telescope over and upon the upper member 1. To provide an efficient, cheaply constructed and durable antifriction connection between the two chute sections which will hold the members of the chute quite accurately in alinement with each other, we have provided a novel construction which is substantially as follows: upon the outside of the side walls of the section 1, preferably about midwidth of each wall, is riveted or otherwise permanently secured an angle-iron track member 5; the longer web of the angle being arranged to stand outwardly perpendicular to the side wall of the chute and forming a track. So also, within the lower angle, between the bottom and each side wall of the lower chute section 2, is secured an angular track member 6; the lower web of which constitutes the track proper. To cooperate with these track rails there is mounted upon each chute member an antifriction wheel or roller, as 7 and 8, respectively. The roller 7 is journaled upon the inside of the lower chute section, adjacent to the upper extremity of the latter, between a suitable bracket 9 and the inner face of the side wall of the chute and upon a journal stud 10 extending through these parts. In a somewhat similar manner the wheel or roller 8 is journaled upon the outside of the upper member 1 adjacent to the lower extremity of the latter, between a bracket 11 and the outer face of the side wall and upon a journal stud 12 inserted through these parts.

To prevent one chute member from being withdrawn from the other entirely, we provide a peculiar limiting stop for each of the rollers 7; said stop being designated 13 (see Fig. 6) and being formed of a piece of strap metal bolted to extend along the under side of the track member 5, turned upwardly around the lower extremity of the latter and above the track ledge bent into an upstanding stop proper 13', adapted to engage and arrest the downward movement of the roller 7. The length of the strap is sufficient to permit its attached end to extend beyond the end of the outer or lower section 2 when the members of the chute are fully extended, so that the attached end is freely exposed and the stop may be attached or detached conveniently.

The swiveling connection or turn-head at the upper end of the chute comprises as its main feature a short, stationary coupling member square in cross-section, with chamfered corners 14, provided at its upper end with outstanding lugs or ears 15 located centrally of the sides and having bolt apertures and adapted to be secured against the under side of the bin in register with the opening of the latter, and a lower coupling member comprising a hopper-like swiveling

member 16 which is rotatably connected with the member 14. To provide for assembling and connecting these parts, the member 16 is of two-part construction, comprising a main lower part 17 and a detachable upper solid or continuous ring 18. The member 14 has at its lower end a radial flange-like extension 14' in the upper edge, near the periphery of which is formed a ball-groove 19, and at the lower exterior angle a race-way 20. In the upper face of the lower member 17 in register with the race-way 20 is formed a ball-groove 21, and the ring 18 has a flange-like extension 22 at its upper inner perimeter which overlies and rests upon the balls in the race 19. Parts 17 and 18 are rigidly united by means of a plurality of bolts 23 inserted through the peripheral portions of the same. In assembling these parts the balls are placed in the respective grooves 19 and 21, the ring 18 then passed downwardly over the base lugs 15 of the member 14 and bolted to the lower part 17. Thereafter the swiveling connection as a whole is bolted to the bin.

It will be noted by reference to Fig. 11 that the internal diameter of the flange 22 of ring 18 is of a size sufficient to pass the fastening lugs 15. Among other advantages which the square stationary coupling section 14 possesses may be mentioned the fact that, by locating the lugs 15 centrally of the sides thereof, a maximum cross-sectional area for the flow of grain permitted by the internal diameter of the bearing flange 22 of the coupling ring 18 is obtained, such area being considerably greater than would be possible by a circular coupling member having radially projecting fastening lugs limited by the diameter of the bearing flange 22. The square construction also enables an overhead hopper spout or chute to be located either centrally or at any one of four different inclined positions relatively to the section 14. The employment of a continuous ring and bearing flange that will pass down over the section 14 and its fastening lugs has a three-fold advantage. It reduces the number of parts, it facilitates the assembling of the parts, and it produces a smooth continuous and unbroken bearing which prolongs the life of the balls.

The depending hopper-like extension of the member 17 is of semi-cylindric form and has two segmental cylindric side walls, designated 24, 24', and two flat and parallel end walls 25, as shown clearly in Fig. 11; the opening 26 leading to the chute being of a length equal to the full distance between the two parallel end walls and of a width somewhat less than the length, as also shown clearly in Fig. 11. The segmental side 24' next to the upper side of the receiving end of the chute is somewhat shorter than the

opposite side, so that the chute may be swung from an approximately vertical position to a position of comparatively slight downward inclination, without passing out of register with the opening 26. The upper extremity of the chute has a peculiar shaped enlargement or hopper 27 which fits over the outside of the member 17 of the swiveling connection. As best shown in Figs. 12 and 13, the extremity of the chute is reinforced by a strap-like bail 28, the end portions of which and the end walls of the hopper are pierced to fit upon journal studs 29 seated in the parallel end walls 25 of the member 17 in a plane coincident with the upper edges of the cylindric portion 24, 24', of said member. The usual washers and pins 30 and 31, respectively, serve to hold the parts united.

Describing now the construction of the carriage and connected parts at the lower end of the chute, the carriage 4 comprises a suitable base plate casting 32, provided with a central opening 33, at opposite sides thereof with parallel upstanding side walls 34 which embrace the corresponding side walls of the lower end of the chute, and a connected front wall 35. The terminal portion 36 of the upper wall of the chute is of segmental form in cross section, and the front wall 35 is curved to correspond thereto, as shown clearly in Fig. 10. Upon the outside of each side wall of the lower end of the chute is suitably riveted or otherwise secured a short trunnion, as 37, of relatively large diameter; these trunnions being engaged with suitable bearing apertures formed in the side walls 34 of the carriage casting. The base casting 32 is furthermore provided with radially extending caster arms 38, there being three in the present instance, arranged at divergent angles, and each having at its end a caster, as 39, so mounted as to swivel in the usual manner and support the carriage free from the floor.

After the carriage has been brought into register with an opening in the floor, it is desirable to make a substantially sealed joint between the carriage and the floor opening, and to this end a slip-ring 40 is mounted upon the cylindric periphery of the base plate 32, and means are provided for raising or lowering this slip-ring a limited distance. The slip-ring is provided with an outer stopping 41, which limits the extent to which the slip-ring can enter the opening in the floor when permitted to descend. At each of the three angularly separated points of the slip-ring 40 is rigidly secured a plate 42 (see Figs. 8 and 9), and through each plate is formed an inclined slot 43. In the cylindric flange 32' of the base casting are seated corresponding studs 44 which carry anti-friction rollers 45 arranged to travel in the corresponding slots 43. The lower end of each slot 43 is slightly notched at its upper side

and as indicated at 46, so that when the roller 45 is engaged with said notch all tendency of the slip-ring to rotate relatively to the carriage is prevented. A lever-like handle 47 is pivotally connected with the slip-ring at the front side thereof whereby the latter may be forced around one way or the other, and thus raised or lowered by reason of the cam action between the inclined slots and the anti-friction rollers.

Describing next the telescopic apron-like connection between the lower side of the chute and the carriage, 48 designates an apron of the full width of the lower side of the chute, and at its edges turned upwardly to embrace the sides of the chute to some extent. This apron is hinged at its lower end, as indicated at 49, to the base casting adjacent to the opening through the latter and arranged to rest and slide upon the bottom side of the chute. The upper end of this apron is reinforced by a bail-like strap 50, the ends of which project beyond the side edges of the apron and are internally grooved, as indicated at 51, and engage parallel ribs 52 secured upon the respective sides of the chute. In order to maintain a dustproof joint between the stationary parts of the carriage and the adjustable chute, rubber or analogous packing strips 34^a and 35^a are secured upon the upper edges of the walls 34, 34 and 35, respectively having their edges arranged to bear against the corresponding walls of the chute.

Describing the modification shown in Figs. 15 and 16, the changes reside only in the mechanism by which the slip-ring is raised and lowered. In this construction there are cast upon the opposite sides of the main carriage casting, bearing sleeves 53, through which are arranged to work studs 54 having their lower ends connected with the slip-ring 40'. To the upper end of each stud 54 is pivoted a cam 55, the cam edge of which rests against and coöperates with a cam surface 56 upon the upper end of the corresponding sleeve. These cams have handle extensions 57 whereby they may be operated in an obvious manner; said handles being preferably connected to form a bail so as to be moved together.

From the foregoing description it will be seen that the several objects of the invention hereinbefore stated are fully attained. The adoption of the spout members which are rectangular, or substantially rectangular, in cross section is accompanied with many distinctive advantages, notably, it has been determined that in the case of the rectangular chute which delivers the grain down an incline, the grain flows in a stream of even depth, or approximately so, over the entire area of the bottom of the chute, and there is comparatively little retardation by the friction of the grain with the side walls. In

contradistinction, in a circular chute, the stream is deepest at the center of the stream and the unequal pressure upon the flowing mass causes an unevenness of flow, which brings about a retardation of the stream as a whole, so that the rectangular chute will deliver a considerably larger percentage of grain, other conditions being equal. The extension of this rectangular principle to the swiveling connection or turn-head possesses the further advantage of shortening the vertical dimension of the turn-head and thus enabling the use of a longer chute for a given inclination and height of room, because it avoids the loss of both vertical and transverse space incidental to the coupling of rectangular with circular sections, and vice versa.

The adoption of the rectangular form of chute also enables the use of antifriction wheels of relatively large diameter, and narrow or axially short, since the wheels may be disposed between the parallel side walls, as described. Moreover, it is obvious that these antifriction wheels constitute the supports which take the bending moment upon the telescoping sections, and since they are arranged in the same vertical plane, and laterally remote from each other, the rigidity and strength of the telescoping connection are made the maximum. This rigidity is enhanced by the track rails, which in this construction do not materially increase the size or cost of the chute.

The extremely short swiveling connection of the present construction is of manifest importance, because in grain elevators the height of that story in which the grain-distributing chute is located is positively determined by the height necessary to accommodate the grain chute, and since the minimum degree of inclination is a practically fixed quantity, it follows that the shorter the swiveling connection the less height a story need be, other conditions being equal.

The several details which constitute features of improvement are of obvious value without specific mention.

We claim as our invention:

1. In a grain chute, the combination with two telescoping sections, of a track rail mounted upon the exterior of one of said sections and extending along the latter to a point within the permanently telescoped portions, an antifriction wheel mounted upon the overlapping member and cooperating with said track rail, and a stop mounted upon the end of said track rail and having a securing extension, provided with a fastening, extending to a point exposed from between the telescoping sections and accessible when said sections are withdrawn from each other to the extent permitted by said stop.

2. A turn-head for grain chutes, comprising

a short stationary coupling member adapted to be secured at its upper end directly to the bottom of the grain receptacle and provided on its lower end with a radial flange-like extension forming a circular bearing member, and a rotatable coupling member having a substantially semi-cylindrical body-portion with an open lower side, parallel flat end walls, and an outwardly flared upper side formed with a circular bearing member adapted to engage with, and support said rotary coupling member from, the circular bearing of said stationary coupling member, in combination with a chute section of rectangular cross-section formed with straight lower and side walls throughout its length and an outwardly bent upper wall section at its upper end, said grain chute section at its upper end being pivotally connected to said rotatable coupling member and having sealed engagement with the end and side walls thereof in all angular positions thereof.

3. A turn-head for grain chutes, comprising a short stationary coupling member adapted to be secured at its upper end to the bottom of the grain receptacle and provided on its lower end with a radial flange-like extension forming a circular bearing member, a rotatable coupling member having a circular upper peripheral portion fitting upon the flange-like extension of the upper member, provided with a substantially rectangular throat or passage terminating in a substantially semi-cylindrical body portion open at its lower side and having parallel flat end walls, the maximum diameter of the semi-cylindrical portion being not substantially greater than the width of the passage through said stationary coupling member, in combination with a chute-section of rectangular cross-section having a flared end portion closely fitting the exterior of the cylindrical portion of said rotatable coupling member and pivoted to the parallel end walls of the latter.

4. A turn-head for grain chutes, comprising a short stationary coupling member adapted to be secured at its upper end to the bottom of the grain receptacle and provided on its lower end with a radial flange-like extension forming a circular bearing member, a rotatable coupling member having a substantially semi-cylindrical body portion with an open lower side, parallel flat end walls, and an outwardly flared upper side formed with a circular bearing member adapted to engage with, and support said rotary coupling member from, the circular bearing of said stationary coupling member, in combination with a chute-section of rectangular cross-section having straight lower and side walls throughout its length and an outwardly bent upper top wall section and pivoted through its side walls to the end walls of said ro-

tatable coupling member, said lower wall and the outwardly bent sections of said upper wall having in all positions of the chute a substantially tangential bearing upon the cylindrical walls of said rotatable coupling member.

5. A turn-head for grain chutes, comprising in combination a short stationary coupling member square in cross-section having at its upper end radially projecting lugs on the side walls thereof whereby it is adapted to be secured to the bottom of the grain receptacle and provided on its lower end with a circular radial flange-like extension forming a circular bearing member, and a rotatable coupling member comprising a hopper-like body formed at its upper end with a peripheral flange extending beyond the periphery of said circular bearing member, and a continuous or solid ring bolted to said flange and provided on its upper side with an internal flange forming a rotatable bearing member and cooperating with said circular bearing member, the internal diameter of said flange being sufficient to permit said ring to be slipped bodily into operative position over the upper end of said stationary coupling member, and its lower side presenting a smooth continuous bearing surface.

6. In a grain chute, a tubular member adapted to be connected to the bottom of a grain receptacle, a hopper-like member journaled upon the lower end of said tubular member and having opposed segmental-cylindric side walls and other opposed parallel side walls, and a delivery spout pivotally connected with the hopper member upon a transverse axis substantially coincident with the center of the cylindric segments of the latter, and the end margins of which spout substantially conform to the walls of the hopper embraced thereby.

7. In a grain chute, a tubular member adapted to be connected to the bottom of a grain receptacle, a hopper-like member journaled upon the lower end of said tubular member and having opposed segmental-cylindric side walls and other opposed parallel side walls, a delivery spout pivotally connected with the hopper member upon a transverse axis substantially coincident with the center of the cylindric segments of the latter and the end margins of which spout substantially conform to the walls of the hopper embraced thereby, and a yielding packing strip secured to the end

margin of the spout and at its inner edge impinging the side walls of the hopper.

8. In a grain chute, the combination with the delivery end of the spout, of a base casting provided with a central aperture and laterally opposed upstanding trunnion supports at each side of said aperture, said spout having trunnioned connection with the trunnion supports of said base casting, a segmental-cylindric upper lip forming the terminal portion of said grain chute and arranged concentric with the axes of said trunnions, a segmental-cylindric upstanding wall upon the base casting arranged in overlapping relation with said segmental lip of the chute, and extensible connections between the lower side of the grain chute and the base casting.

9. In a grain chute, the combination with the delivery end of the grain spout, of a base casting provided with a delivery opening and parallel upstanding trunnion supporting walls at each side of said delivery opening, trunnion-like pivot connections between said side walls and the corresponding walls of the grain spout, an apron hinged to the base casting and arranged to rest flatwise against the lower side of the spout, guideways upon the side walls of the spout parallel with the bottom thereof, and lateral extensions upon said apron having sliding engagement with said guideways.

10. In a grain chute, the combination with the delivery end of the grain spout, of a base casting provided with a delivery opening and upstanding trunnion-supporting walls at each side of said delivery opening, pivot connections between said side walls and the corresponding walls of the grain spout, a segmental-cylindric upstanding wall upon the base casting arranged in overlapping relation with a corresponding segmental lip at the upper side of the grain chute, an extensible overlapping joint at that side of the grain chute opposed to those segmental overlapping portions, a plurality of caster supports upon the base casting, and an extensible slip ring mounted upon the periphery of the casting and adapted to be lowered into a receiving aperture in the floor.

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