G. W. NORDHOLM.

GRAIN ELEVATOR.

APPLICATION FILED MAR. 15, 1910.

1,053,431.

Patented Feb. 18, 1913.

3 SHEETS—SHEET 1.

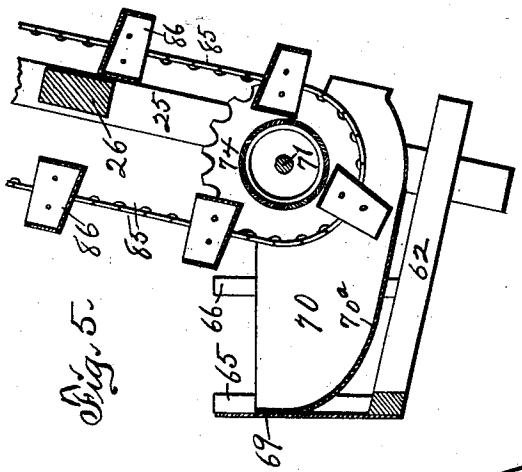

Fig. 5.

Fig. 1.

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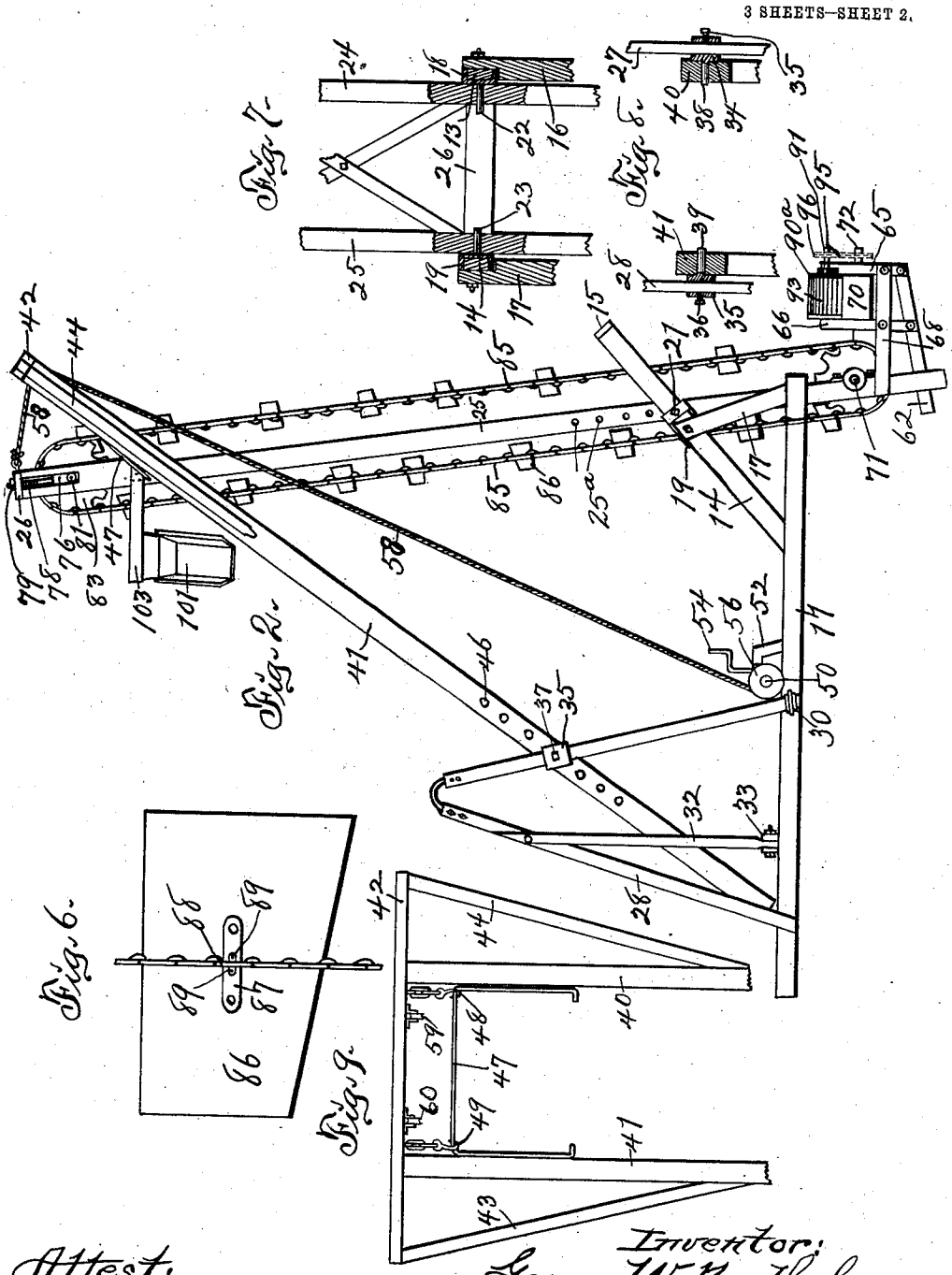

Fig. 7.

Fig. 8.

Fig. 2.

Fig. 6.

Fig. 9.

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3 SHEETS—SHEET 3.

Fig. 3.

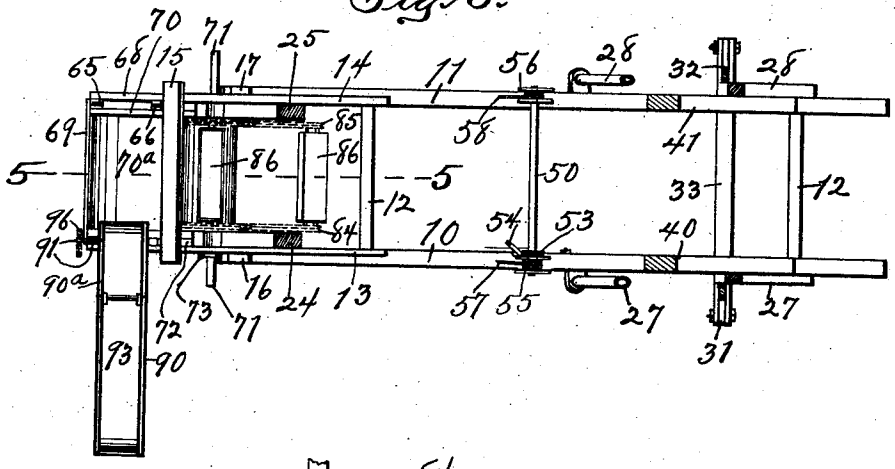
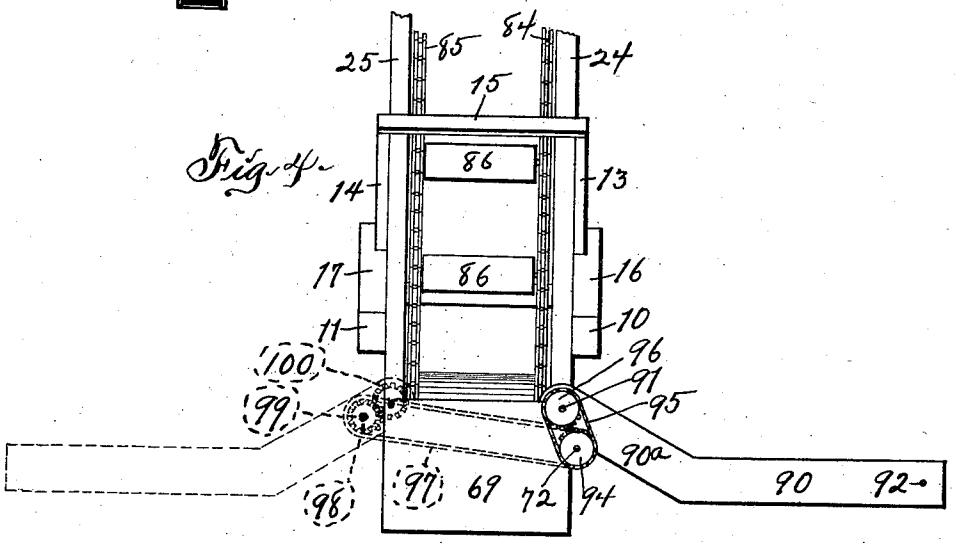


Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE W. NORDHOLM, OF PILOT MOUND, IOWA.

GRAIN-ELEVATOR.

1,053,431. Specification of Letters Patent. Patented Feb. 18, 1913.

Application filed March 15, 1910. Serial No. 549,558.

To all whom it may concern:

Be it known that I, GEORGE W. NORDHOLM, citizen of the United States, residing at Pilot Mound, in the county of Boone and State of Iowa, have invented a new and useful Grain-Elevator, of which the following is a specification.

The object of this invention is to provide an improved construction for elevating mechanism adapted to receive substances, such as grain and vegetables, from a wagon dump and elevate and deliver the same into a receptacle such as a crib, bin or railway car.

A further object of this invention is to provide improved means for folding an elevating mechanism into compact, inoperative condition.

A further object of this invention is to provide improved means for adjusting the height and inclination of an elevating mechanism to correspond with varying heights of desired points of delivery.

My invention consists in the construction, arrangement and combination of elements hereinafter set forth, pointed out in my claims and illustrated by the accompanying drawing, in which—

Figure 1 is a side elevation of the complete apparatus (except the dump and prime mover), showing the same in extended or elevated position as required for practical use, the dotted lines illustrating various parts of the apparatus in folded condition or position. Fig. 2 is a side elevation of the apparatus opposite to Fig. 1. Fig. 3 is a cross-section of the apparatus on the indicated line 3—3 of Fig. 1. Fig. 4 is a front elevation of the lower part of the apparatus. Fig. 5 is a vertical section of a portion of the apparatus on the indicated line 5—5 of Fig. 3. Fig. 6 is a detail end elevation of one of the elevating buckets, together with a portion of chain-belt and means for connecting the bucket and belt. Fig. 7 is a detail cross-section on the indicated line 7—7 of Fig. 1. Fig. 8 is a detail cross-section on the indicated line 8—8 of Fig. 1. Fig. 9 is a detail cross-section on the indicated line 9—9 of Fig. 1.

In the construction of the apparatus as shown a base frame is employed, which frame is constructed of parallel beams 10, 11 and suitable cross bars such as 12 rigidly connecting said beams. The beams 10, 11 preferably are constructed as skids and employed to support and convey the apparatus from place to place by the application of draft power to either end thereof as desired in any common and well known manner. Frame bars 13, 14 are fixed at their lower ends to forward portions of the beams 10, 11 and extend upwardly and forwardly therefrom. The frame bars 13, 14 are connected at their forward upper ends by a cross bar 15. Braces 16, 17 are fixed at their lower ends to the forward end portions of the beams 10, 11 and are fixed at their upper ends to central portions of the frame bars 13, 14. Bearers 18, 19 are slidingly mounted on and embrace the frame bars 13, 14 and are adapted for manual adjustment longitudinally of said frame bars between the cross bar 15 and braces 16, 17, whereby an elevator frame carried by said bearers may be adjusted on oblique lines relative to the base frame. The bearers 18, 19 are adapted to be secured to the frame bars 13, 14, at any desired points of adjustment by set screws 20, 21. Studs 22, 23 (Fig. 7) are formed on and extend inward from the inner faces of the bearers 18, 19 and are adapted to serve as pivots.

An elevator frame is provided and is composed primarily of side bars 24, 25 and suitable cross bars such as 26 spaced apart throughout the length of and connecting the side bars. The side bars 24, 25 may be latticed or otherwise braced in any desired manner to render the elevator frame rigid and of suitable strength to carry any load that may be applied thereto. The side bars 24, 25 of the elevator frame are formed with spaced apertures 24^a, 25^a near their lower ends adapted to receive and pivot on the studs 22, 23 of the bearers 18, 19, for longitudinal adjustment of said frame relative to said pivots. Thus is provision made for oscillatory and longitudinal adjustment of the elevator frame and any elements carried thereby, relative to the base frame, as illustrated in Fig. 1.

Standards 27, 28 are fixed to and rise from central and rear portions of the beams 10, 11. The standards 27, 28 are each formed of two legs, arranged in converging planes and connected at their upper ends, one of which legs is pivoted at its lower end to a beam while the other leg is engaged at its lower end in a socket 29 or 30 on a beam.

The standards 27, 28 also are provided with braces 31, 32, which braces are pivoted at their upper ends to rearmost legs of the standards and are secured at their lower ends to end portions of a cross bar 33 fixed to and extending transversely of and projecting beyond the beams 10, 11. The forward legs of the standards 27, 28 perferably are circular in cross-section, being made of tubing, and collars 34, 35 are slidingly mounted on said legs and are adapted to be secured thereto at any desired point of adjustment by set screws 36, 37. The collars 34, 35 are formed with studs 38, 39 (Fig. 8), which studs extend inwardly from the collars and serve as pivots.

A brace frame is provided and is constructed generally of side bars 40, 41 arranged parallel with each other and connected at their upper ends by a cross bar 42. The cross bar 42 extends beyond the side bars 40, 41 at each end and is further connected thereto by braces 43, 44. The brace frame is arranged and located between the standards 27, 28 and the pivots or studs 38, 39 of the collars 34, 35 extend through one or another of apertures 45, 46 in the side bars 40, 41. The side bars 40, 41 are provided with a plurality of the apertures 45, 46 in order that the brace frame may be adjusted longitudinally through the space between the standards 27, 28 and be pivotally supported at different points throughout its length by the studs 38, 39 and collars 34, 35.

A yoke 47 is pivoted at its ends to upper portions of the side bars 24, 25 of the elevator frame and the closed portion of said yoke is adapted to extend within the upper end portion of the brace frame and be connected thereto by hooks 48, 49 (Fig. 9), which hooks are flexibly connected to and depend from the cross bar 42. The yoke is of such length as to permit a spacing apart of the elevator frame from the cross bar 22 so that elevator buckets (hereinafter described) may pass freely between said frame and bar. The flexible connection of the hooks 48, 49 with the cross bar 42 of the brace frame may be of any desired length to accommodate adjustable spacing of the elevator frame relative to said bar.

A drum shaft 50 is arranged horizontally and journaled in brackets 51, 52 fixed to central portions of the beams 10, 11. The drum shaft 50 is provided with a worm gear 53 on one end portion and a crank shaft 54 is arranged vertically and journaled in the bracket 51 and carries a worm (not shown) of common form engaging said worm gear. The crank shaft 54 is adapted for manual rotation to operate the worm gear and revolve the shaft 50 in either direction. The drum shaft 50 is provided with drums 55, 56 on its ends and cables 57, 58 are fixed at their lower ends to and are adapted to be wound on said drums. The cables 57, 58 extend through sheaves 59, 60 (Fig. 9) suspended from the cross bar 42 and are fixed at their upper ends to the cross bar 26 at the head of the elevator frame.

An elevator boot is constructed and mounted on the lower end portion of the elevator frame. In constructing the boot I employ sills 61, 62 fixed to, extending transversely of and projecting at both ends from the lower end portions of the side bars 24, 25. The sills 61, 62 preferably are arranged between the side bars. Posts 63, 64 on one side and 65, 66 on the opposite side are fixed to and rise from forward ends and central portions of the sills 61, 62 respectively. A brace 67 extends across and is fixed to the posts 63, 64 and side bar 24 and a brace 68 extends across and is fixed to the posts 65, 66 and side bar 25. A front plate 69 (Figs. 4 and 5) is fixed to and connects the posts 63 and 65.

The boot proper, 70, preferably is constructed of sheet metal with side walls fixed to the inner faces of the posts 63, 64, 65, 66 and a bottom 70^a integral with the side walls. The bottom 70^a preferably is curved throughout its length, is open at the rear end and extends upward and forms a closure for the front end of the boot. The top of the boot 70 also is open.

A shaft 71 is journaled in bearings on the lower end portions of the side bars 24, 25 and extends across said side bars above the braces 67, 68. A countershaft 72 is arranged at right angles to the shaft 71 and is operatively connected thereto by intermeshing bevel gears 73. The countershaft 72 is journaled in bearings on the posts 63, 64 and may be driven by gearing from a prime mover (not shown). A pair of driving sprockets 74 are mounted on the shaft 71 between the side bars 24, 25. The upper end portions of the side bars 24, 25 are forked and bearing blocks 75, 76 are slidingly mounted in the forks thereof. Screws 77, 78 are mounted through end portions of the cross bar 26, extend longitudinally of the forks of the side bars 24, 25 and are fixed to the blocks 75, 76. Nuts 79, 80 are mounted on the upper ends of the screws and engage the upper surface of the cross bar 26. It is the function of the nuts 79, 80 and the screws 77, 78 to move the blocks 75, 76 outwardly in the forks of the side bars 24, 25.

A shaft 81 is journaled in bearings in the sliding blocks 75, 76 and a pair of sprocket wheels 82, 83 are mounted on said shaft. Elevator chains 84, 85 are mounted on the sprocket wheels 74, 82, 83 and elevator buckets 86 are carried by said chains. The buckets 86 (Fig. 6) preferably are made of sheet metal, rectangular in plan view and of greater depth at their rear sides than at

their front sides. Straps 87, alike in construction, are riveted to central portions of the ends of the buckets 86. Special links 88 are provided at intervals in the chains 84, 85 and said links are formed with transverse lugs or ears 89 projecting laterally therefrom. The ears 89 of the special links are riveted to the straps 87 so that said straps are arranged transversely of the special links. Thus a rigid connection is created between the special links and straps and buckets that tends to retain the buckets in proper positions. The chains 84, 85 may be tightened by movement of the blocks 75, 76 outwardly through the medium of the screws 77, 78 and nuts 79, 80 thereon as above described.

A feeding trough or spout 90 is provided and preferably is formed with a straight body portion and an end portion 90^a inclined relative to the body portion. The feeding trough 90 is adapted to be located beneath and transversely of a wagon dump (not shown) and to that end may be sunk in an excavation in the earth. The feeding spout or trough 90 is arranged at right angles to the base frame of the machine and has one end portion (the extremity of the inclined portion 90^a) projected over one side or the other of the boot 70. The spout or trough 90 is provided with a transverse shaft 91 in the extremity of the inclined portion 90^a and said shaft is removably and replaceably mounted in bearings (notches) in the upper end portions of the posts 63—64 or 65—66. A shaft 92 is mounted in the opposite end portion of the spout 90 and a lateral conveyer 93 is carried by said shafts and driven by one of them. It is the function of the lateral conveyer 93 to receive and convey substances such as grain or vegetables from the dump to the boot 70, from whence such substances may be conveyed and elevated by the buckets 86 on the chains 84, 85. In one position the shaft 91 is driven by sprocket gearing comprising a wheel 94 on the shaft 72 connected by a chain 95 to a wheel 96 on said shaft 91. Sometimes it is desirable to transpose the trough or spout 90 from one side to the other of the boot and in that event the shaft 91 is driven as follows: A chain 97 (dotted lines Fig. 4) extends from the wheel 94 across the front of the boot to a wheel 98 on a short shaft 99 journaled in the trough adjacent the shaft 91. The wheel 98 also is formed with a spur gear, which meshes with a pinion 100 on the end of the shaft 91 opposite to the wheel 96. A discharge spout 101 is suspended on brackets 102, 103 projecting rearwardly from the upper portions of the side bars 24, 25 of the elevator frame. The discharge spout 101 extends transversely of and beneath the upper portion of the elevator frame and is adapted to receive substances from the buckets 86 and convey the same by gravity laterally into a bin or receptacle provided therefor.

In practical use the apparatus is transported in folded condition, the spout or trough 90 and its connections being removed from the boot or turned through an arc to occupy a position across the boot. When desired for use the apparatus is located and a pit or excavation is formed to receive the boot and spout or trough 90. Then the brace frame is adjusted altitudinally by movement of the collars 34, 35 on the forward legs of the standards 27, 28. Then the brace frame is adjusted into inclined position by manual operation and is held manually temporarily or by placing a bar (not shown) across the forward portion of said frame and within the standards. Then the cables 57, 58 are wound on the drums 55, 56 by manipulation of the crank 54 to the end of oscillating the elevator frame on the pivots 22, 23. Before the elevator frame is raised, however, it should be adjusted longitudinally as to the pivots 22, 23 and also should be adjusted longitudinally of the frame bars 13, 14 through adjustment of the bearers 18, 19 on said frame bars. When the elevator frame has been adjusted to the desired inclination it is connected to the brace frame by engagement of the yoke 47 with the flexibly mounted hooks 48, 49. Then the spout or trough 90 is adjusted to one side or the other of the boot and connected by the driving devices to the shaft 72. Then the prime mover is connected to the shaft 72, the dump (not shown) is adjusted relative to the trough or spout 90. Thereafter the substances dumped upon the conveyer 93 in the spout or trough 90 are conveyed laterally to the boot 70, elevated from said boot by the buckets 86, discharged by the buckets into the lateral spout 101, and delivered by said spout to the desired bin, car or receptacle.

I claim as my invention—

1. In an apparatus of the class described, a base frame, frame bars mounted in oblique positions on said base frame, bearers mounted on and adjustable longitudinally of said frame bars and formed with pivots, and an elevator frame located between said frame bars and formed with spaced apertures adapted to receive and articulate on said pivots.

2. In an apparatus of the class described, a base frame, frame bars mounted in oblique positions on said base frame, bearers mounted on and adjustable longitudinally of said frame bars and formed with pivots, the paths of adjustment of the bearers being on planes oblique to the base frame, an elevator frame adapted to carry elevating devices, said elevator frame being located between said frame bars and formed with spaced

apertures adapted to receive and articulate on said pivots, whereby said elevator frame may be adjusted longitudinally and also be adjusted through adjustment of the bearers and also be oscillated relative to the base frame, and means for supporting said elevator frame from the base frame auxiliary to the frame bars and bearers.

3. In an apparatus of the class described, a base frame, an elevator frame mounted for oscillation on said base frame, said elevator frame also being arranged for adjustment longitudinally and also being arranged for adjustment of its axis of oscillation on planes oblique to the base frame, and means for supporting said elevator frame from the base frame auxiliary to the adjustable pivoting means comprising engaging said elevator frame at its top, a cross-bar on said base frame projecting at its ends therefrom, arched standards pivoted at one end each to said base frame and straddling the ends of the cross-bar, sockets on said base frame receiving the other ends of said standards, braces connecting said standards to end portions of said cross-bar, and pivot collars adjustably mounted on said standards and adjustably engaging said brace frame between its ends, said brace frame extending between the arched standards and between said pivot collars.

GEORGE W. NORDHOLM.

Witnesses:
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EARL M. SINCLAIR.