H. E. COBB.

ENSILAGE PACKER.

APPLICATION FILED AUG. 18, 1919.

1,353,724.

Patented Sept. 21, 1920.

3 SHEETS—SHEET 1.

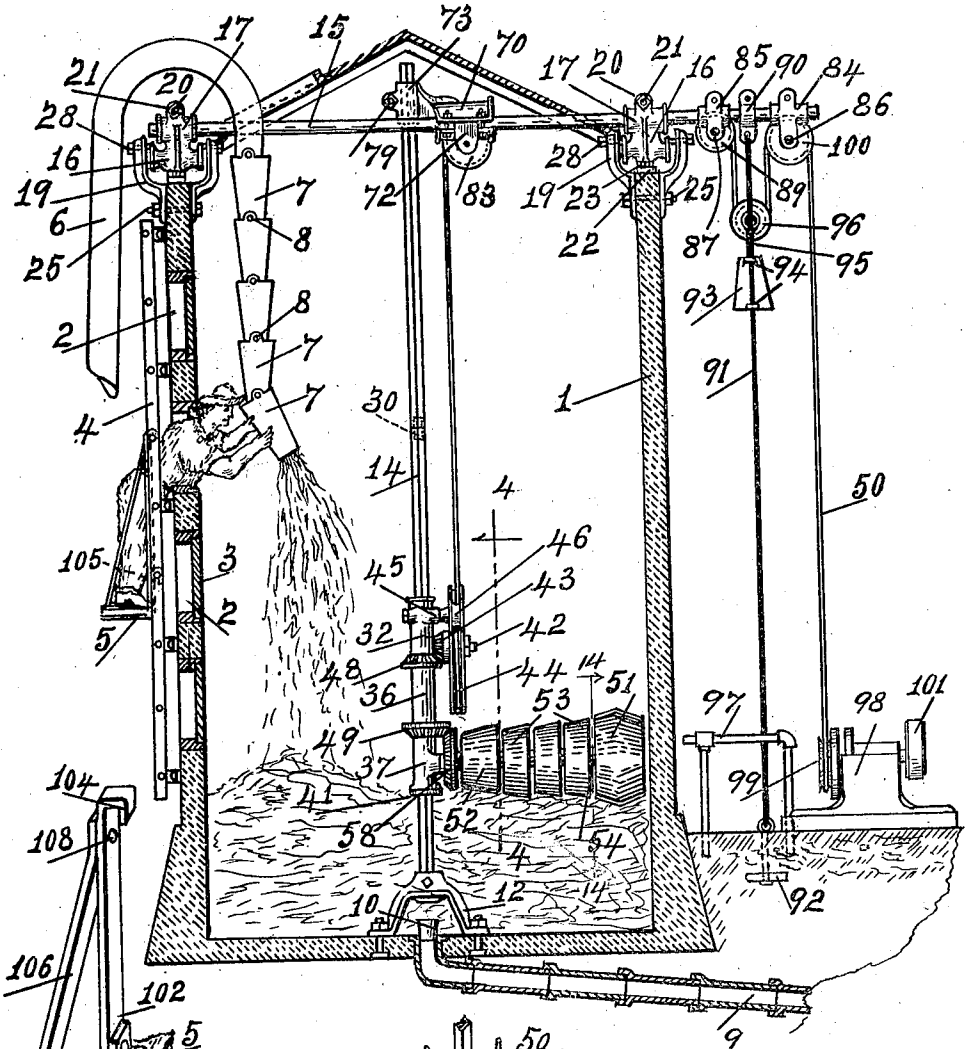


FIG. 1.

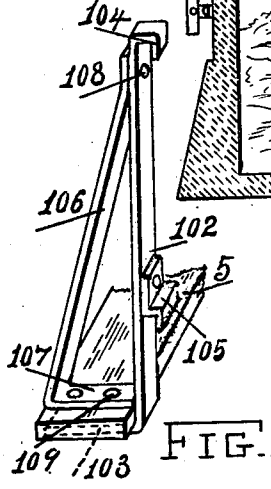


FIG. 13.

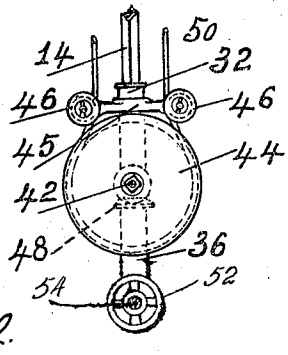


Fig. 4.

Witnesses.
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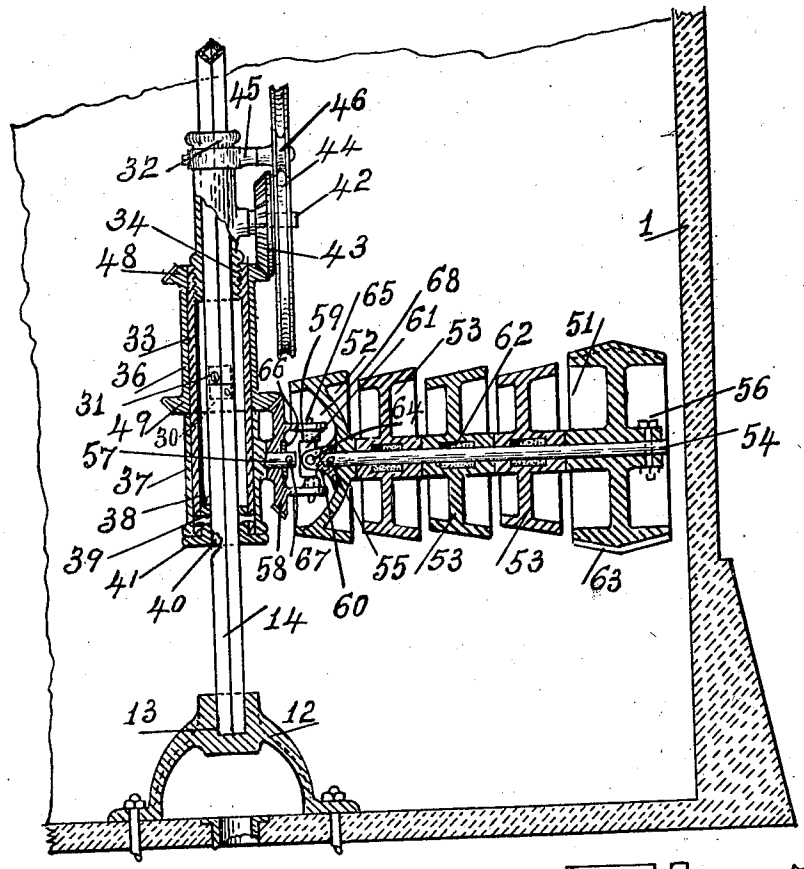


FIG. 2.

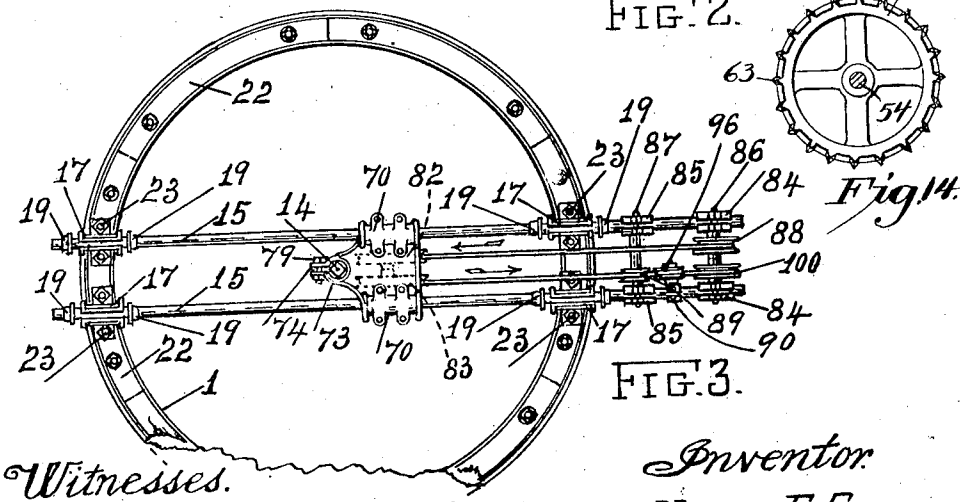


FIG. 3.

Fig. 14.

Witnesses.

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3 SHEETS—SHEET 3.

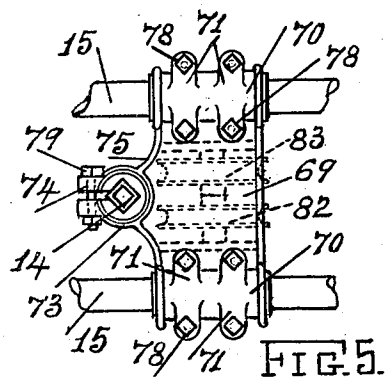


FIG. 5.

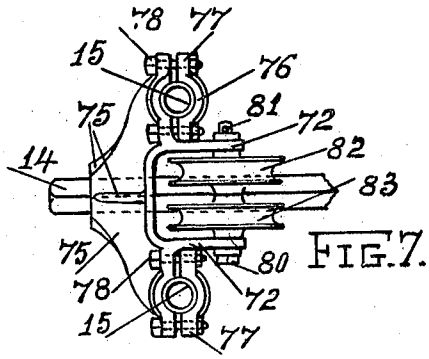


FIG. 7.

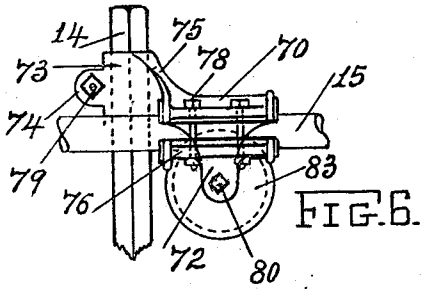


FIG. 6.

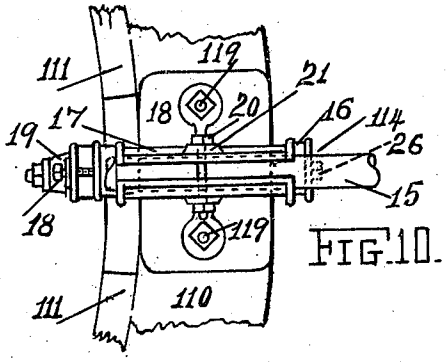


FIG. 10.

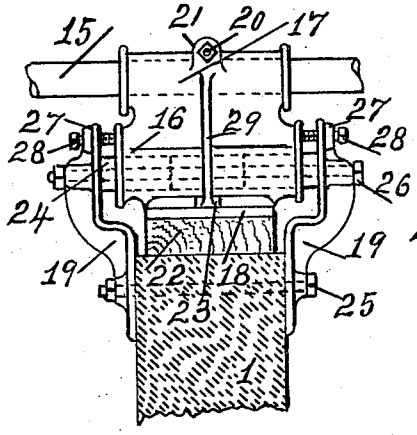


FIG. 8.

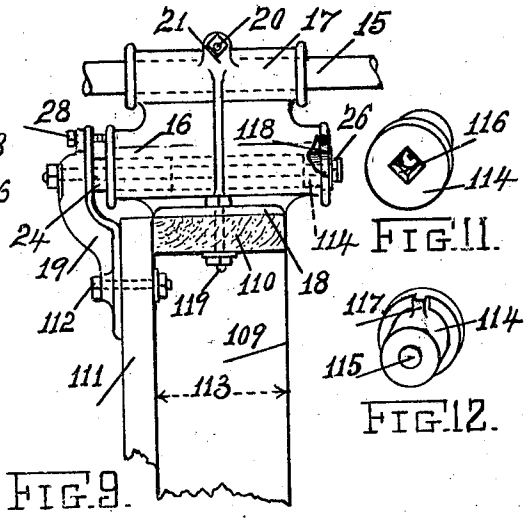


FIG. 9.

FIG. 11.

FIG. 12.

Witnesses.
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UNITED STATES PATENT OFFICE.

HARRY E. COBB, OF SPRINGFIELD, ILLINOIS.

ENSILAGE-PACKER.

1,353,724. Specification of Letters Patent. Patented Sept. 21, 1920.

Application filed August 18, 1919. Serial No. 318,427.

To all whom it may concern:

Be it known that I, HARRY E. COBB, a citizen of the United States, residing at Springfield, in the county of Sangamon and State of Illinois, have invented a new and useful Ensilage-Packer, of which the following is a specification.

The invention relates to ensilage packers such as are used to pack down the ensilage in silos while they are being filled. A general purpose of the invention is to provide packing mechanism which may be easily and quickly installed in silos of different constructions; which may be operated without the attendance of any person in the silo, which shall be simple in construction and not likely to get out of order, and which shall be effective and economical in operation.

More specific purposes of the invention are: to provide in conjunction with a stationary vertical staff central in the silo and rollers traveling in the silo; a carriage adapted to slide on the staff and carrying the train of gears which operate the rollers; to provide a master roller controlling the action of the other rollers; to provide a universal coupling flexibly connecting the rollers with the carriage, thereby permitting the rollers to run on the uneven bed of ensilage without undue strain on the carriage and the central staff; to provide standardized rollers suitable for use in any standard silo; to provide improved means for adjustably connecting the frame structure with silo walls of different material, or of different thicknesses, or with walls that are not plumb and adjusting the pedestals on the walls; to provide on adjustable saddle of improved construction adapted to hold the staff firmly in true vertical position and equipped with sheaves co-acting with sheaves carried by the carriage; to provide an endless-belt drive for actuating the rollers; to provide an improved tension device for the endless belt drive; to provide improved means for introducing the cut or shredded fodder into and distributing it evenly in the silo without the necessity for the operator to enter the silo; and to provide improved minor structural details.

The invention is illustrated in the annexed drawings, to which reference is hereby made, and will now be described and claimed.

Figure 1 is a vertical sectional view through a silo, showing in elevation packing mechanism embodying my invention; Fig. 2 is an enlarged partial vertical section taken on the axis of the central staff and showing details of the carriage, the gears, the universal coupling and the rollers. Fig. 3 is a top plan of the frame structure and appurtenances in place on the wall of the silo; only so much of the silo wall is shown as is necessary to show the position of the frame structure relative to the wall; Fig. 4 is a vertical section taken on the line 4, 4, of Fig. 1; Fig. 5 is an enlarged top plan; Fig. 6 is an enlarged side elevation and Fig. 7 is an enlarged end elevation of the saddle and connected parts; Fig. 8 is an enlarged side elevation of one adjustable pedestal, the same as is shown in Fig. 1; Fig. 9 is an enlarged side elevation and Fig. 10 is an enlarged top plan of an adjustable pedestal of modified construction such as is used in connection with a wooden silo; Fig. 11 is an outside perspective view and Fig. 12 is an inside perspective view of a plug used in connection with the bracket shown in Fig. 9; Fig. 13 is an enlarged perspective view of part of the scaffold and Fig. 14 is an enlarged vertical transverse section, taken on the line 14, 14 of Fig. 1.

The same reference numerals designate the same parts in all the views.

The silo 1 may be of any approved construction. I have shown and will describe a circular silo having cement walls, but it is obvious that many sided silos instead of circular silos may be used and that the material may be either cement, concrete, tile or wood, as may be most convenient.

The silo has openings 2, provided with doors 3, which fit tightly in the openings and prevent leakage.

On the outer wall of the silo is a stationary ladder 4 in line with the series of openings 2. A scaffold 5, to be described later, hooks on to the rungs of the ladder and supports the operator in convenient positions for the work.

The silage is introduced into the silo

through a feed pipe 6, and connected with the pipe is a series of spouts 7, which are connected with each other by pivots 8. The operator stands on the scaffold with his head and shoulders projecting into the silo, and with his hands directs the spouts so as to deposit the silage in any desired position in the silo. As the filling of the silo progresses, the operator will move the scaffold upward, so that he can extend his head, shoulders and arms through the different windows to operate the spouts as may be required.

The silo is provided with a drain 9, which will be opened when it is desired to clean the silo, but will be closed by a plug 10 preparatory to filling the silo. A chair 12 is stationary on the center of the bottom of the silo and straddles the plug 10 in order that the plug may be conveniently inserted or removed. The chair has in its upper end a polygonal socket 13 in which the lower end of the polygonal staff 14 rests. The staff 14 is preferably a sectional tube of square cross section, the sections being connected together by any suitable means, preferably by square plugs 30 riveted in one section and fitting inside the complemental section and fastened therein by suitable removable fasteners 31. A sectional staff is used in order that the length of the staff may be varied according to the depth of the silo.

The frame structure comprises horizontal parallel pipe members 15, supported on pedestals which will now be described.

There are two pairs of pedestals diametrically opposite each other on top of the plate 22, which is stationary on top of the silo wall. The pedestals are connected with the plate 22 by bolts 23. The pedestals are all alike, so a description of one will suffice for all.

Each pedestal comprises in one structure a barrel 16 accommodating the members 24 of the brackets 19; a split tubular member 17 accommodating one of the pipes 15; a base plate 18; and a pair of brackets 19 (Fig. 8). The pipe members 15 extend through the members 17 and are clamped therein by bolts 20 extending transversely through ears 21 on the members 17. Each bracket 19 has an integral tubular member 24 which telescopes in the barrel 16. The brackets 19 are preferably connected with the silo wall by bolts 25 extending through the brackets and through the wall. A bolt 26 extends through both brackets 19 and through the members 24 and firmly unites them with the barrel 16. At the upper end of each bracket is an extension 27 accommodating a set-screw 28. The inner ends of the set-screws 28 bear against the respective ends of the barrel 16. When the parts are assembled and adjusted, the screws 28 will be tightened to hold them in their adjusted position.

The members 24 extend a considerable distance into the barrel 16 and admit of adjusting the brackets to walls of different thicknesses. The pedestal is strengthened by suitable braces 29.

The carriage and rollers.

The rollers which do the packing travel around and around on top of the ensilage and as the filling of the silo progresses the rollers gradually rise and cause the carriage to slide upward along the staff 14. The carriage comprises a tubular upper member 32 of polygonal cross section conformed to the staff 14 and non-rotative relative to the staff but adapted to slide thereon; a tube 33, permanently connected with the member 32, preferably by a screw 34; an intermediate tubular member 36 rotative around the tube 33; and a lower member 37, also rotative around the tube 33. A plug 38 is secured in the lower end of the tube 33 by counter-sunk rivets 39 or other suitable means. The plug has a central polygonal hole 40 conformed to the staff 14 in order that the plug may slide on but cannot rotate on the staff; the plug also has an integral ledge 41 which prevents lengthwise movement of the member 37 on the tube 33.

A stud 42 on the member 32 supports a bevel gear 43 and a sheave 44 which rotate in unison on the stud.

A bracket 45 (Figs. 1, 2 and 4) stationary on the member 32 supports rotative sheaves 46 which cause the belt 50 to hug the sheave 24 and prevent slipping of the belt.

The compacter which rolls on and compacts the ensilage, comprises an outer or master roller 51, an inner or coupling roller 52 and intermediate rollers 53. The master roller is somewhat larger and heavier than the other rollers and has on its circumference inclined cleats 63 which keep it from slipping on the ensilage and increase its effectiveness in propelling the other rollers. The roller 51 is connected with the shaft 54 by a bolt 56. The intermediate rollers 53 are loose on the shaft 54 and are all alike; each roller has an inwardly tapered rim tending to press the ensilage toward the center of the silo, and a grease box 62 containing grease to lubricate the shaft. The inside roller 52 is loose on the shaft 54 and has an inwardly tapered tread the same as the rollers 53. The web of the roller 52 is dished as shown to form a concave chamber 68 housing the coupling devices 59, 60 and 61. A coupler head 60 is secured on the shaft 54 by the bolt 55. The coupler head spans the block 61 and is connected therewith by a pivot 64. A pivot 65 connects the block 61 with the outwardly extended arms 59 integral with the bevel gear 58. The gear 58, actuated by the gear 49, rotates on the stud 57 which is preferably integral with the member 37 which is rotative around the sleeve 33. A washer 66 and a pin 67

prevent sliding of the gear 58 on the stud 57. The parts 60, 61, 64, 65 and 59 together constitute a universal-joint connection of the shaft 54 with the gear 58, permitting the shaft to rotate and to rise and fall to permit the rollers to adapt themselves to inequalities in the surface of the ensilage, thereby avoiding undue strain on the shaft, the gears and the central staff. The master roller 51 actuated by the shaft 54 travels in a circle in the silo and propels the inner roller 52 and the intermediate rollers 53 in smaller circles. The rollers 52 and 53 being loose on the shaft are capable of rotation at different speeds; hence each roller will adapt itself to the circle in which it travels and therefore will roll on and compact the ensilage but will not drag it, thus assuring practically even packing of the ensilage throughout the silo. Here it is to be noted that the inside diameters of standard silos are usually multiples of two feet, that is to say, 8 ft., 10 ft., 12 ft., 14 ft., etc. The master roller 51 and the inner roller 52 are common to all ensilage packers which embody my invention regardless of the diameter of the silo in which they are installed, but the shafts 54 will be of different lengths suitable for use in silos of different sizes. In practice the width of tread of the intermediate rollers 53 is preferably one foot. The rollers 53 are interchangeable to admit of adding or removing a roller or rollers, as the case may be, to adapt the compacter to the silo in which it is to be installed.

The saddle.

The saddle, shown in detail in Figs. 5, 6 and 7 is preferably of cast iron and comprises: a flat top plate 69; arched side members 70, having inner surfaces conformed to the outer surfaces of the pipes 15; a split hub 73 accommodating the upper part of the staff 14; downwardly extended hangers 72, clamping members 76; a shaft 80, transverse to the hangers; and sheaves 82 and 83 rotative on the shaft. A bolt 79 extending through ears 74 on the hub 73 serves to clamp the hub on staff 14. Bolts 78 extending through ears 71 on the members 70 and through ears 77 on the clamping plates 76 connect the saddle with the pipes 15. Upon loosening the nuts on the bolts 78 the saddle may be moved lengthwise of the pipes 15 to bring the staff 14 to true vertical position, and when the saddle is properly placed the nuts may be tightened to keep it in place. A pin 81 transverse to the bolt 80 prevents lengthwise movement of the bolt.

The frame extension and connected parts.

The frame members 15 (Figs. 1 and 3) project outwardly a considerable distance beyond the circumference of the silo. Brackets 84 and 85 and a strap 90 are clamped on the frame members. A stationary bolt 86 is transverse to the brackets 84 and a stationary bolt 87 is transverse to the brackets 85. Two sheaves 88 and 100 are rotative on the bolt 86. One sheave 89 is rotative on the bolt 87. The sheave 88 is in line with the sheave 82, and the sheaves 89 and 100 are in line with the sheave 83.

A yoke 95 is permanently attached to a weight 93. A sheave 96 is rotative in the yoke 95. The weight has perforated arms 94. A guide wire 91 extends through the perforations of the arms 94. The upper end of the guide wire is permanently attached to the strap 90 and its lower end is permanently attached to the anchor 92. The guide wire prevents swaying of the weight and guides its vertical movement.

A guard rail 97 incloses a limited area immediately under the weight 93, to prevent persons from unwittingly entering the area where they might be struck by the moving weight.

The mechanism may be operated by any suitable prime mover (not shown) such for example as a steam engine, a gasolene engine, an electric motor, or the like. I have shown conventionally in Fig. 1 a gear set 98 adapted to be driven by a belt running on the pulley 101. The gear set may be of any approved construction, connected and timed to rotate the sheave 99 at a speed suitable for effective and satisfactory operation of the compacting mechanism.

I have shown and described an endless round belt or cable 50 running on a series of sheaves which forward and direct the belt or cable, but it is obvious that a flat belt, or a link belt, or a sprocket chain may be used with suitable pulleys, or flanged wheels, or toothed wheels, to forward and direct the belt, cable or chain, as the case may be, without departure from my invention; and the term "belt" herein used is to be understood as including cables, chains, round belts, flat belts, link belts and other flexible power-transmission devices; and the term "sheave" herein used is to be understood as including sheaves, pulleys, flanged wheels, toothed wheels or other similar devices for forwarding or directing the flexible power-transmission devices.

The scaffold.

The scaffold for supporting the operator in convenient positions relative to the intake openings 2, is clearly shown in Figs. 1 and 13, and consists of a plank 5 and a pair of hangers permanently attached to the plank, one hanger being adjacent to each end of the plank. The hangers are spaced apart from each other according to the width of the ladder 4 with which they are used. Each hanger comprises an upright member 102

having a foot 103, an integral hook 104 and an attached hook 105; and a brace-member 106 having a foot 107. A rivet 108 connects the upper part of the brace with the upright member 102, and bolts 109 extend through the foot member 107, the plank 5 and the foot member 103 to securely connect them with the plank. The hooks 104 support the scaffold on the rungs of the ladder 4 and the hooks 105 engage on the rungs of the ladder to keep the scaffold from swinging outwardly.

(THE RUN OF THE BELT.)

Operation.

The belt 50 running on and actuated by the sheave 99, runs upwardly to and over the sheave 88, thence in a straight line to and over the sheave 82, thence downwardly to and around the sheave 44, thence upwardly to and over the sheave 83, thence in a straight line to and over the sheave 89, thence downward to and around the sheave 96, thence upward to and around the sheave 100, and thence downward to the sheave 99. The rotating sheave 44 actuates the gears 43, 48, 49 and 58 to effect rotation of the shaft 54 to cause the compacter to travel in a circle around the staff 14 to compact the ensilage while it is being distributed in the silo by the spouts 7.

A pedestal of modified construction, illustrated in Figs. 9, 10, 11 and 12, is adapted for use in connection with wooden silos and will now be described.

A circular wooden silo as ordinarily constructed comprises stationary vertical studding 109 placed in a circle suitable distances apart from each other and united at their tops by a plate 110. A circular series of vertical staves 111 are permanently attached to the studding and the plate.

The frame-member 15, the barrel 16, the holding-member 17, the base 18, the bracket 19, the tubular bracket-member 24, the bolt 26, the adjusting screw 28 and the clamping devices 20 and 21 are the same as have already been described. To attach the pedestal to a wooden silo two brackets 19 cannot be used advantageously, by reason of the space 113 between the outer edge of the studding 109 and the inner face of the stave 111. I therefore use at one end of the barrel 16, a plug 114 having a central hole 115, to accommodate the bolt 26, a polygonal socket 116 which holds the head of the bolt to keep it from turning, and a lug 117 which engages in a notch 118 at one end of the barrel to keep the plug from turning in the barrel. Bolts 119 extend through the base 18 and through plate 110 and connect the pedestal with the plate. The bolt 112 secures the bracket on the stave 111. The bolt 26 extends through the plug 114, through the barrel 16, through the member 24 and through the upper part of the bracket 19 and holds the parts firmly together.

Minor details of construction may obviously be varied and still keep within the scope of my invention.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The compacter for ensilage packers, consisting of a rotative shaft; a master roller fixed on said shaft; an inner roller loose on said shaft; and interchangeable rollers loose on said shaft, between the master roller and the inner roller.

2. The compacter for ensilage packers, consisting of a drive gear; means for actuating the drive gear; a shaft having universal-joint connection with the drive gear; a master roller fixed on the shaft; and other rollers loose on the shaft and rotative independently of the master roller.

3. In an ensilage packer, the combination of a stationary staff, an inner sleeve slidable in the direction of the length of the staff; an outer sleeve rotative on said inner sleeve; a stud on said outer sleeve; a gear rotative on said stud; a shaft having universal-joint connection with said gear; a master roller fixed on said shaft; and other rollers loose on said shaft and rotative independently of the master roller.

4. In an ensilage packer, the combination of a stationary staff; a carriage slidable in the direction of the length of the staff; a driving gear, intermediate gears and a driven gear carried by said carriage; means for actuating the driving gear; a shaft having universal-joint connection with the driven gear; a master roller fixed on said shaft; and other rollers loose on said shaft.

5. In an ensilage packer, the combination of a rotative driven gear; means for rotating the driven gear; a block pivotally connected with said driven gear; a coupling head pivotally connected with said block; a shaft rotative with said coupling head; and a roller rotative on said shaft and dished to form a chamber containing said block and said coupling head.

6. In an ensilage packer the combination of parallel horizontal frame members; a saddle adjustable on the frame-members in the direction of their length; a staff-holding device on the saddle; rotative sheaves supported on the frame members; rotative sheaves supported by the saddle; a staff held by said staff-holding device; a carriage adapted to slide on the staff; a sheave on the carriage co-acting with the sheaves on the saddle; a train of gears driven by the sheave on the carriage; a shaft actuated by said train of gears; a master roller fixed on the shaft; compacting rollers loose on the shaft; an endless belt running on said sheaves; and a counterweight on one run of

the belt effective to keep the belt taut during the sliding movements of the carriage.

7. In an ensilage packer, the combination of a stationary chair having a polygonal socket; a stationary frame structure above said chair; a saddle on said frame-structure; a staff-holding device on the saddle in line with the socket of said chair; a polygonal staff held against rotation in the socket of the chair and in the staff-holding device of the saddle; a carriage slidable on the staff; a train of gears carried by the carriage; a master roller actuated by said train of gears and compacting rollers traveling in a circle around said carriage.

8. In an ensilage packer, the combination of a sliding carriage; a sheave and a train of gears carried by said carriage; compacting mechnism actuated by said gears; an endless belt driving said sheaves; means for forwarding and directing said belt; and belt controlling means automatically adapting the belt to different positions of the carriage.

9. In an ensilage packer, the combination of frame members; sheaves supported by the frame members; a saddle adjustable on the frame members; means for securing the saddle on the frame members; sheaves on the saddle parallel to each other; and in line with the sheaves on the frame members; a staff held by the saddle; a carriage slidable on the staff; a sheave carried by the carriage; compacters connected with the carriage and traveling around the staff; a belt running on the sheaves on the frame members and running downwardly over one sheave on the saddle, around the sheave on the carriage and upwardly over the other sheave on the saddle; and a counterweight co-acting with the belt, the sheaves on the frame-members, the sheaves on the saddle and the sheave on the carriage.

10. In an ensilage packer, the combination of a vertical staff; compacters traveling in a circle around the staff; an endless belt actuating the compacters; and a counterweight supported by said belt.

In witness whereof I have hereunto signed my name at Springfield, Illinois, this 12th day of August, A. D. 1919.

HARRY E. COBB.

Witnesses:
ROY G. TROXELL,
W. T. TROXELL.