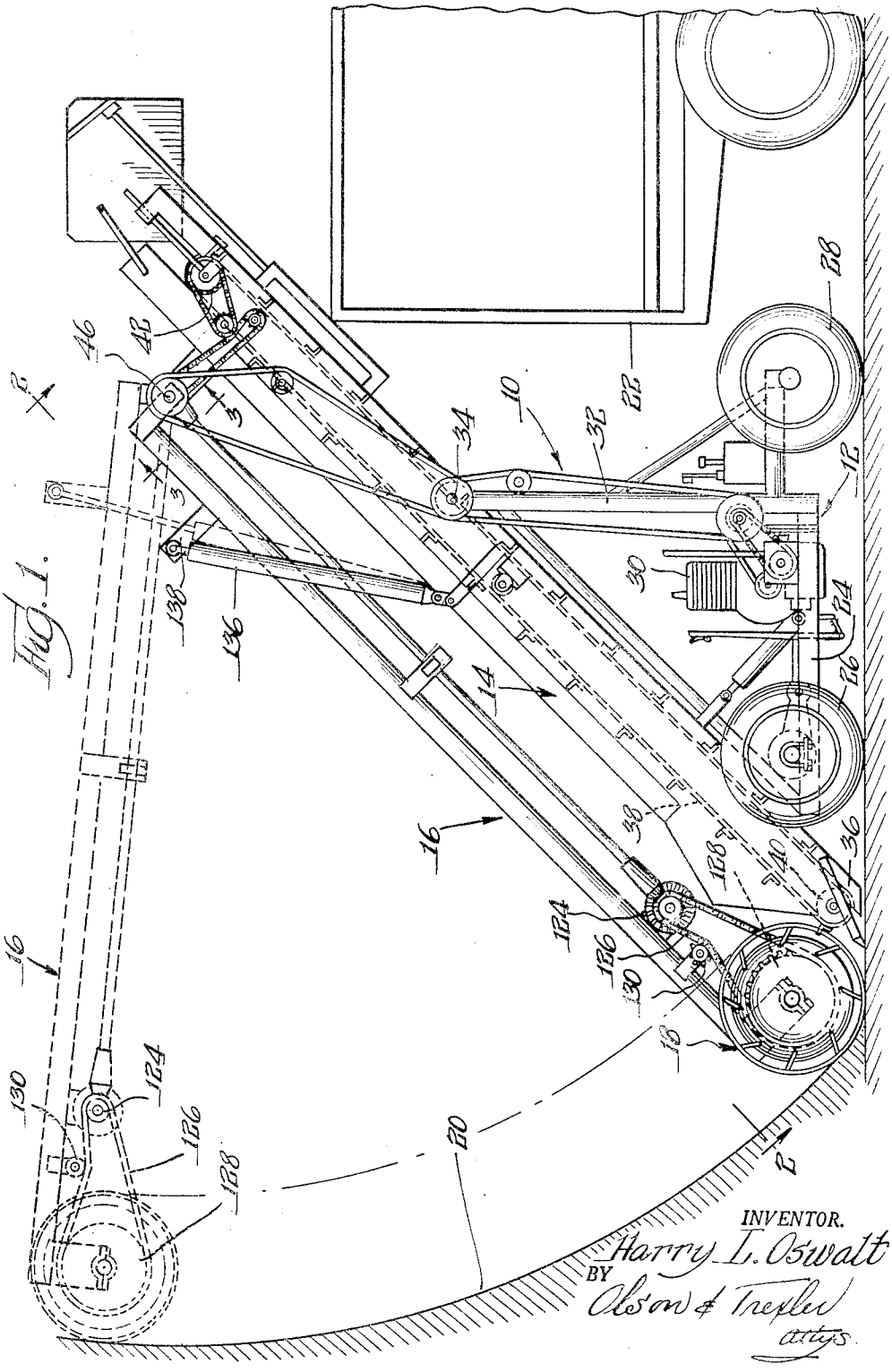
Jan. 29, 1957 H. L. OSWALT 2,779,452

ENSILAGE LOADER

Filed July 27, 1953 2 Sheets-Sheet 1



Jan. 29, 1957 H. L. OSWALT 2,779,452

ENSILAGE LOADER

Filed July 27, 1953 2 Sheets-Sheet 2

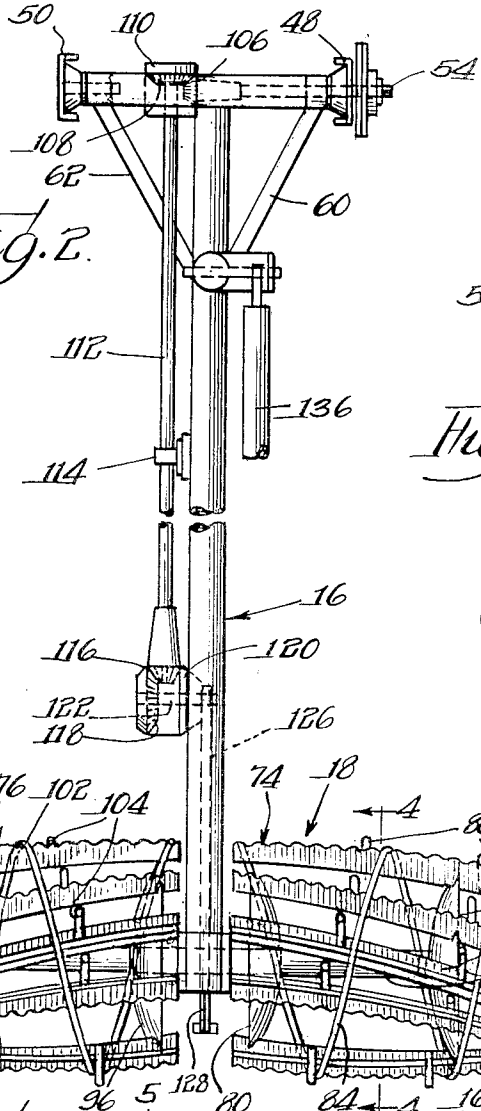


Fig. 2.

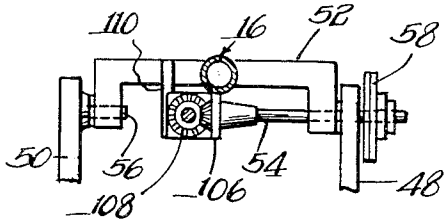


Fig. 3.

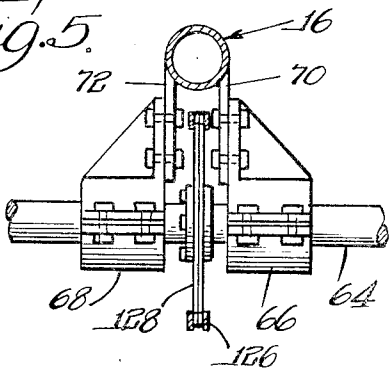


Fig. 5.

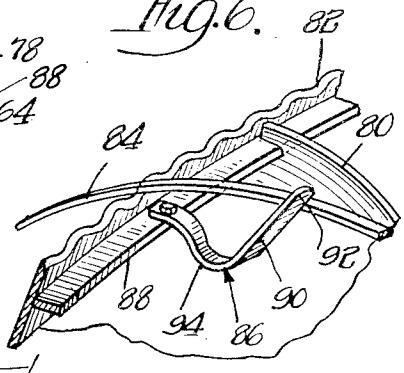


Fig. 6.

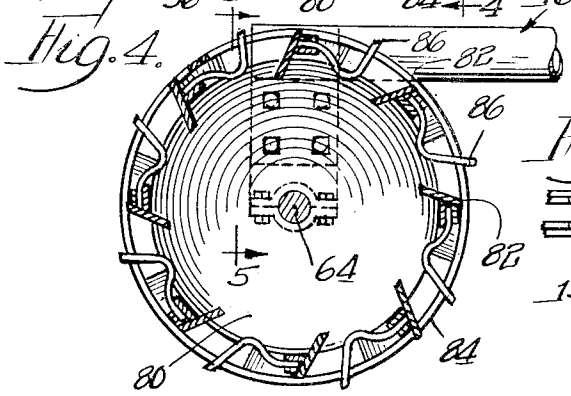


Fig. 4.

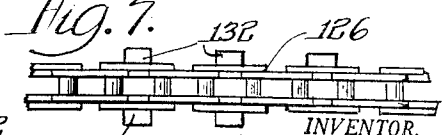


Fig. 7.

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United States Patent Office 2,779,452 Patented Jan. 29, 1957

2,779,452

ENSILAGE LOADER

Harry L. Oswalt, Garden City, Kans.

Application July 27, 1953, Serial No. 370,253

16 Claims. (Cl. 198—9)

The present invention relates to a novel mechanical loading apparatus, and more particularly to a novel apparatus for loading material, such as ensilage and the like.

In many instances, where large quantities of stock feed must be stored, crops such as corn, alfalfa, grass, sorghums, and the like are chopped green and deposited in trenches formed in the earth to ensile. The ensilage is stored in this manner for considerable periods of time and is periodically removed for stock feeding purposes. In the past, removal of portions of ensilage from the storage pile has been relatively difficult since after the ensilage has been stored, it becomes thoroughly matted and interlocked. It is, therefore, an object of the present invention to provide a novel ensilage loader capable of removing ensilage from a storage pile at a substantially increased rate without undue power requirements.

Another disadvantage of many of the prior art mechanical loading devices is that during removal of a portion of the ensilage, the surface of the remaining ensilage pile is loosened, whereby a considerable amount of ensilage is exposed to the air, causing it to spoil and become unfit for feeding purposes. It is, therefore, another object of the present invention to provide a novel ensilage loader capable of removing ensilage from the ensilage pile while at the same time leaving a relatively smooth and tightly packed surface on the ensilage pile, thereby preventing undue spoilage.

Still another object of the present invention is to provide a novel ensilage loader of the above described type which is capable of removing ensilage from a storage pile smoothly and at a relatively uniform rate, thereby facilitating rapid loading and preventing undesirable loosening of the ensilage remaining in the pile.

Another object of the present invention is to provide a novel ensilage loader of the above described type which is of rugged and simple construction and may be economically manufactured.

A more specific object of the present invention is to provide a novel ensilage loader having a pair of axially spaced reel means for removing ensilage from a storage pile and novel means for loosening the ensilage between the reels to facilitate removal of such ensilage.

Other objects and advantages will become apparent from the following description and the accompanying drawings, wherein:

Fig. 1 is a side elevational view illustrating an ensilage loader embodying the novel principles of this invention;

Fig. 2 is a fragmentary plan view taken along line 2—2 in Fig. 1;

Fig. 3 is a fragmentary cross sectional view taken along line 3—3 in Fig. 1;

Fig. 4 is a fragmentary cross sectional view taken along line 4—4 in Fig. 2;

Fig. 5 is a fragmentary cross sectional view taken along line 5—5 in Fig. 4;

Fig. 6 is an enlarged fragmentary perspective view illustrating novel features of this invention; and

Fig. 7 is a fragmentary plan view illustrating a novel element of this invention.

Referring now more specifically to the drawings, wherein like parts are designated by the same numerals throughout the various figures, an ensilage loader 10 embodying the principles of this invention is illustrated in Fig. 1. The loader 10 includes a mobile base 12, an elevator 14 mounted on the base, and a boom 16 carrying reel means 18 for removing ensilage from a storage pile 20, whereupon the elevator 14 directs the ensilage to a suitable transporting vehicle, such as a truck 22.

The mobile base 12 and the elevator 14 are fully shown and described in my co-pending application, Serial No. 343,569, filed March 20, 1953, and, therefore, will be only briefly described herein.

The mobile base includes a frame 24 supported on pairs of wheels 26 and 28. A suitable gasoline engine 30 is mounted on the frame and is operatively connected with one of the pairs of wheels by suitable drive means, whereby the ensilage loader may be driven to any desired location. The conveyor 14 is preferably pivotally mounted between upstanding frame members 32 for movement about an axis 34, whereby the conveyor may be raised from the ensilage loading position shown in Fig. 1 to an elevated position whenever it is desired to drive the loader from one location to another.

The conveyor 14 includes a pair of spaced parallel frame members 36 and an endless belt 38 mounted between a pair of roll members 40 and 42, which roll members are in turn rotatably mounted between the frame members 36. The conveyor belt 38 is driven by the engine 30 through suitable drive means generally designated by the numeral 44 and including cooperating drive pulleys and belts.

The boom 16 which is preferably of elongated tubular steel construction is mounted for pivotal movement about an axis 46 (see Fig. 1) by the means shown best in Figs. 2 and 3. The boom is supported between a pair of upstanding channel members 48 and 50 which in turn are welded or otherwise secured to the frame members 36 of the elevator member. As shown in Fig. 3, a generally inverted U-shaped bar 52 is pivotally mounted between the channel members 48 and 50 by means of pivot pins or shafts 54 and 56. Preferably, the shaft 54 also functions as a drive shaft and has an outwardly extending portion to which a pulley or sprocket wheel 58 is secured which may be driven by a suitable belt or chain operatively connected with the above described drive means 44. The boom 16 is bolted, welded, or otherwise secured to the bar 52 and, if desired, may be reinforced by a pair of braces 60 and 62 shown in Fig. 2.

In accordance with a primary feature of this invention, a novel reel means 18 is mounted on the outer or free end of the boom 16. The reel means 18 includes an axle 64 which is journaled in a pair of bearing members 66 and 68 secured to opposite sides of the boom 16 by depending plate members 70 and 72. In the illustrated embodiment, the bearings have been bolted to the plate members 70 and 72, but it is understood that any suitable securing means may be provided.

As illustrated best in Fig. 2, the reel means 18 includes a pair of reels 74 and 76 which are mounted on opposite ends of the common axle 64. The reel 74 includes a pair of axially spaced dish-shaped end disks 78 and 80 welded or otherwise rigidly secured to the axle 64. A plurality of blades 82 are spaced around the peripheries of the disks for loosening and removing ensilage from the storage pile in the manner described fully hereinbelow.

As fully pointed out in my above mentioned co-pending application, any attempt to dig into a storage pile of ensilage as with a fork or other equivalent means requires excess amounts of power and unduly loosens the remain-

ing portion of the storage pile. However, it has been found that by first compressing the surface of the storage pile and then relieving the pressure, a portion of the ensilage springs away from the storage pile so that it may be easily removed therefrom and directed to the elevator mechanism. Therefore, as illustrated best in Fig. 4, the reel blades 82 are inclined rearwardly with respect to the direction of rotation indicated by the arrow so that the reel blades compress the surface of the ensilage pile rather than dig into it. Thus, as the reel is rotated, each blade compresses a portion of the ensilage pile, and as the blade passes, the ensilage springs outwardly and is swept from the pile by the following blade. Preferably, the blades 82 are helically disposed and positioned so that one of the blades is at least partially in contact with the ensilage pile at all times. This promotes smooth operation of the reel and helps to prevent the blades from unduly digging into the pile upon initial contact therewith. In addition, in accordance with a feature of the present invention, a continuous band 84 is helically wrapped around the peripheral edges of the blades 82 in the manner illustrated best in Fig. 2. This band is in continuous contact with the ensilage pile during the loading operation, and, therefore, prevents the reel blades from unduly digging into the pile, whereby smooth operation and uniform ensilage removal is greatly facilitated. The band 84 is preferably secured to each of the blades 82 as by welding so that in addition to its previously mentioned function, the band serves to strengthen and rigidify the reel.

In accordance with another important feature of the present invention, resilient or yieldable means is provided on the reel so as to extend radially beyond the blades 82 for yieldably pressing against the ensilage pile to increase substantially the rate of removal of ensilage from the pile. In the illustrated embodiment, this yieldable means includes a plurality of spring fingers 86 secured to each of the reel blades 82. As shown best in Fig. 6, each of the spring fingers 86 is secured at its inner end to a rib 88, which rib in turn is welded or otherwise secured to the back of blade 82 for strengthening the blade. The spring finger 86 has a free end portion 90 which extends radially beyond the blade 82 for engagement with the ensilage pile. It should be noted that the free end portion 90 is inclined rearwardly with respect to the direction of rotation of the reel so that the spring finger presses against the ensilage pile rather than digs into it. Preferably, the free terminal end 92 of the spring finger 86 is sharpened so that it is self-cleaning, thereby preventing fouling of the reel. Preferably, an intermediate portion 94 of each spring finger is looped inwardly as illustrated to increase the flexibility of the finger. In order to provide the action of the spring fingers across substantially the entire width of the reel 74, a pair of fingers is preferably mounted at axially spaced points on each blade 82 with the spring fingers on one blade axially offset from the spring fingers on the other blades in the manner illustrated best in Fig. 2.

The reel 76 is substantially identical to the above described reel 74 and, therefore, need not be described in detail. Thus, the reel 76 includes inner and outer dished end plates 96 and 98, a plurality of blades 100, a continuous band 102 surrounding the blades, and a plurality of spring fingers 104 identical to the above described fingers 86. It should be noted that the forward or leading ends of the helically disposed blades 82 and 100 are located at the outer ends of their respective reels, whereby the blades 82 and 100 serve to direct ensilage removed from a storage pile toward the center of the reel means and toward the center of the conveyor 14 to facilitate removal of the ensilage by the conveyor.

The reel means 18 is rotated by the means illustrated best in Figs. 2, 3, and 5. This means includes a bevelled gear 106 mounted on the above described shaft 54 and disposed for meshing engagement with a bevelled gear 108 secured to a bracket 110 on the boom mounting U-shaped bar 52. As illustrated, drive shaft 112 is driven by the bevelled gear 108 and has its outer end rotatably supported by a suitable bearing 114 secured to the boom. Another bevelled gear 116 is secured to the outer end of the drive shaft 112 for driving engagement with a bevelled gear 118 rotatably mounted in a gear box 120 on the boom 16. The gear 118 is secured to a shaft 122 extending out of the gear box and having a sprocket wheel 124 fixed thereon, as illustrated best in Fig. 1. The sprocket wheel 124 drives an endless chain 126 which encircles a large sprocket wheel 128 fixed on the reel axle 64. Preferably, an idler sprocket wheel 130 is adjustably mounted on the boom 16 for engagement with the chain to maintain the chain under the desired tension. With this structure, it is seen that the gasoline engine 30 not only drives the mobile base and the conveyor, but also drives the reel means 18.

As shown best in Fig. 2, the reels 74 and 76 are spaced axially from each other a sufficient distance to provide clearance for the boom 16. It is believed to be apparent that as the reels 74 and 76 remove ensilage from the storage pile, the ensilage between the reels will not be completely removed, whereby a ridge of ensilage is formed. In order to remove this ridge of ensilage between the reels, means is provided for agitating the ensilage in a manner so that it will be removed from the storage pile and directed to the conveyor. In accordance with the present invention, the drive chain 126 encircling the large sprocket wheel 128 is utilized to agitate the ensilage between the reels. Preferably, the drive chain is provided with protuberances or outwardly extending cleats 132 and 134, as shown best in Fig. 7, which cleats dig into the ridge of ensilage between the reels to agitate the same. A portion of the loosened ensilage is removed from the storage pile by the cleats on the drive chain, and other portions of the loosened ensilage will be swept from the storage pile by the ends of the reels.

The operation of the above described ensilage loader is as follows. The ensilage loader is, of course, first positioned at the base of a storage pile in the manner illustrated in Fig. 1. The boom 16 is then swung to the elevated position shown in dotted lines in Fig. 1 by suitable means including a hydraulic cylinder 136 which has a slidable piston pivotally connected to the boom 16 by means of a bracket 138. Any suitable control means, not shown, is provided for actuating the hydraulic cylinder. After the boom 16 is raised, the loader is advanced toward the ensilage pile until the reels overlie the upper edge of the pile. The drive means 44 is then operatively connected with the engine 30 through a suitable clutch to drive the reels and the elevator mechanism. The boom 16 is then lowered onto the ensilage pile, whereupon the blades and the spring fingers of the reels first compress and then release the ensilage so that succeeding blades sweep the loosened ensilage from the pile and direct it toward the bottom of the pile for removal by the elevator. As set forth hereinabove, the continuous bands encircling the reel blades prevent the blades from digging into the ensilage pile and cause the reel to float on the ensilage, whereby irregular or jumping action of the reel is prevented, and smooth operation and ensilage removal is promoted. The spring fingers which normally extend radially beyond the peripheries of the blades compress and loosen quantities of ensilage substantially in addition to the quantities which can be successfully compressed and loosened by the blades alone. In the event the yieldable spring fingers 90 meet undue resistance as they pass through the ensilage pile, they yield rearwardly, thereby preventing tearing of the ensilage pile and undue stress on the apparatus. It has been found that the yielding feature of the spring fingers is of the utmost importance since if an attempt is made to substitute rigid fingers for the spring fingers, the surface of the ensilage pile is torn

and unduly loosened, thereby permitting spoilage, and the apparatus may become overloaded or jammed. As the reels sweep the ensilage smoothly and cleanly from the pile, the boom and the reels lower through the pile under their own weight until they reach their lowermost position shown in solid lines in Fig. 1. The boom is then raised, and the loader is advanced so that the above described operation may be repeated.

From the above description, it is seen that the present invention has provided a novel ensilage loading apparatus which is of simple and rugged construction and by which ensilage may be smoothly and cleanly removed from a storage pile at substantially increased rates. More specifically, it is seen that the provision of a continuous band encircling the reel promotes smooth and even operation, and the yieldable elements or spring fingers operate to increase substantially the rate of ensilage removal without danger of unduly tearing the ensilage pile or overloading the apparatus. Furthermore, it is seen that the present invention has provided novel means associated with the reel drive chain for insuring removal of ensilage between the axially spaced reels. While the apparatus described hereinabove has been described with particular reference to its utility for removing ensilage from storage piles, it will be obvious that the loader of this invention may be used to load various materials other than ensilage.

While the preferred embodiment of the present invention has been illustrated and described herein, it is obvious that many details may be changed without departing from the spirit and scope of the appended claims.

I claim:

1. In an apparatus for loading material, such as ensilage and the like, rotatably mounted means, a plurality of blades spaced around said means for loosening material from a storage pile thereof, and directing the loosened material from said storage pile, and a plurality of yieldable means projecting generally radially beyond said blades for loosening additional quantities of material from said storage pile for removal from the storage pile.

2. An apparatus, as defined in claim 1, wherein said blades are helically disposed for directing loosened material axially of the rotatable means and toward a desired point of discharge.

3. An apparatus, as defined in claim 1, wherein said means is adapted to be rotated in a predetermined direction, and said blades and said yieldable means are inclined rearwardly with respect to said predetermined direction for preventing the blades and said yieldable means from unduly digging into the storage pile.

4. In an apparatus for loading material, such as ensilage and the like, rotatably mounted means for removing said material from a storage pile thereof, said means including a plurality of peripherally disposed and annularly spaced blades for loosening material from said storage pile and directing the loosened material from said storage pile, and a continuous band helically wrapped around said blades for continuous engagement with said storage pile, thereby restraining said blades from unduly digging into said storage pile.

5. An apparatus, as defined in claim 4, which includes a plurality of yieldable means projecting generally radially beyond said blades for loosening additional quantities of said material for removal from said storage pile.

6. An apparatus, as defined in claim 5, wherein said rotatable means is adapted to be rotated in a predetermined direction, and said blades and said yieldable means are inclined rearwardly with respect to said predetermined direction of rotation to prevent said blades and said yieldable means from unduly digging into said storage pile.

7. In an apparatus for loading material, such as ensilage and the like, rotatably mounted means for removing said material from a storage pile thereof, said means including a plurality of annularly spaced blades for loosening material from said storage pile and directing the loosened material from said storage pile, and a spring finger mounted on at least some of said blades and projecting radially beyond said blades for loosening additional quantities of material from said storage pile for removal from the storage pile.

8. An apparatus, as defined in claim 7, wherein the spring fingers on said blades are axially offset from each other so that upon rotation of said rotatable means the spring fingers act upon the storage pile for a substantial portion of the axial length of said rotatable means.

9. An apparatus, as defined in claim 7, which includes a plurality of axially spaced spring fingers mounted on each of said blades.

10. An apparatus, as defined in claim 7, which includes said blades and said spring fingers being inclined rearwardly with respect to a predetermined direction of rotation of said rotatable means, and a continuous band-like element helically encircling said blades, whereby to promote smooth operation of said rotatable means and even removal of said material from the storage pile.

11. In an apparatus for loading material, such as ensilage and the like, a pair of axially spaced rotatable means for loosening and removing said material from a storage pile thereof, means including a drive chain extending between said rotatable means for driving the same, and lateral projections on said chain disposed between said rotatable means for loosening material between said rotatable means from said storage pile for removal from said storage pile.

12. In an apparatus for loading material such as ensilage and the like, rotatably mounted means for removing said material from a storage pile thereof, said means including a plurality of yieldable members for loosening said material from a storage pile arranged in helical rows on the periphery of said rotatably mounted means, said members projecting outside the periphery of said rotatably mounted means and having their outer portions trailing their inner portions relative to the direction of rotation of said rotatably mounted means, and means for directing the loosened material from said storage pile.

13. In an apparatus for loading material such as ensilage and the like, rotatably mounted means for removing said material from a storage pile thereof, said means including a plurality of yieldable members for loosening said material from a storage pile arranged in helical rows on the periphery of said rotatably mounted means, said members being staggered axially of said rotatably mounted means as between said helical rows and projecting outside the periphery of said rotatably mounted means and having their outer portions trailing their inner portions relative to the direction of rotation of said rotatably mounted means, and means for directing the loosened material from said storage pile.

14. Apparatus according to claim 13 in which said yieldable members comprise sheet material tongues oriented for movement in a broadside manner.

15. Apparatus according to claim 14 in which said yieldable members comprise middle portions looped inwardly with respect to said rotatably mounted means.

16. Apparatus according to claim 14 in which said yieldable members are sharpened at their outer ends.

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