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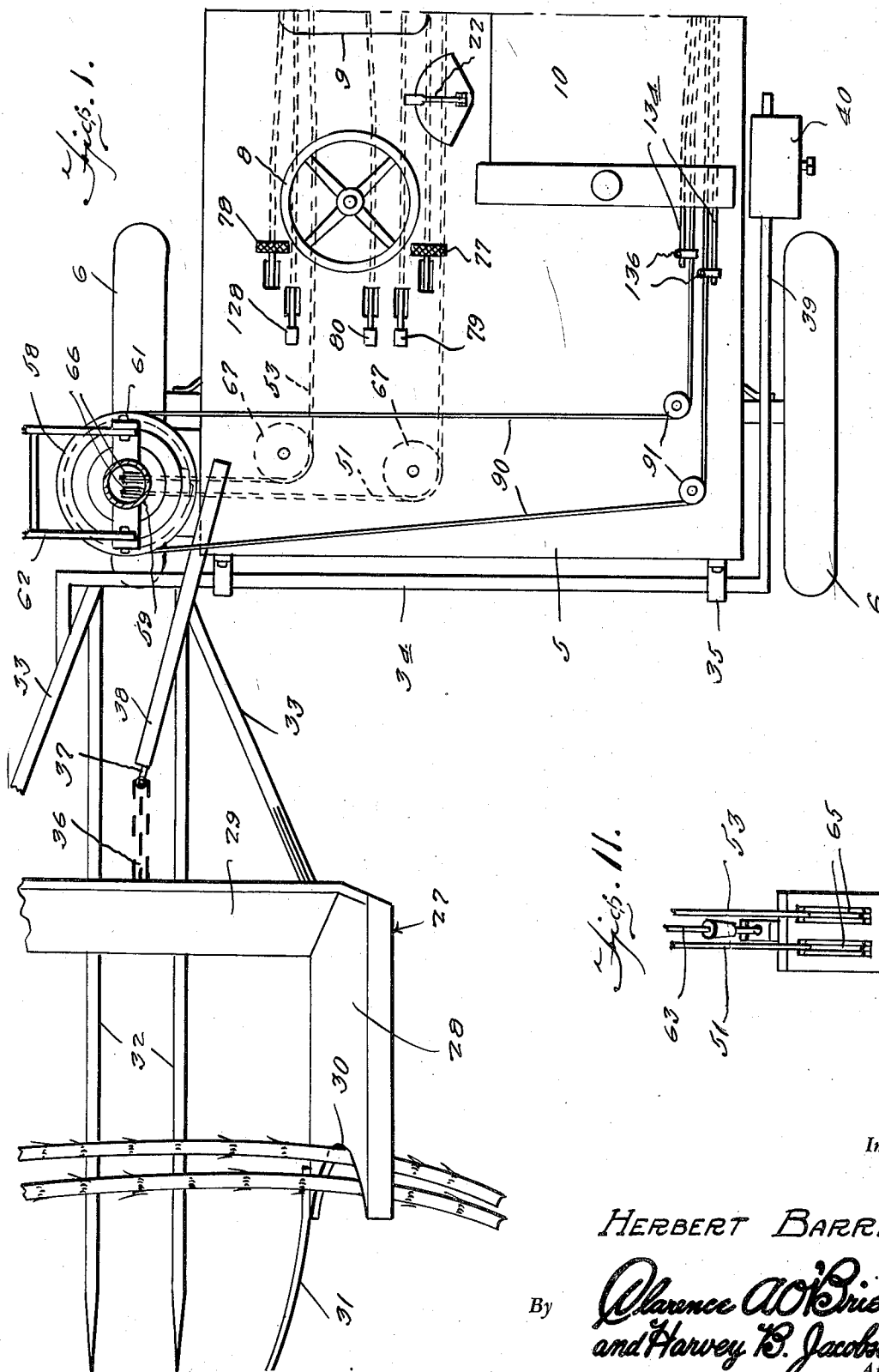
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2,375,205

PILING AND LOADING MACHINE

Filed April 25, 1944

9 Sheets-Sheet 1



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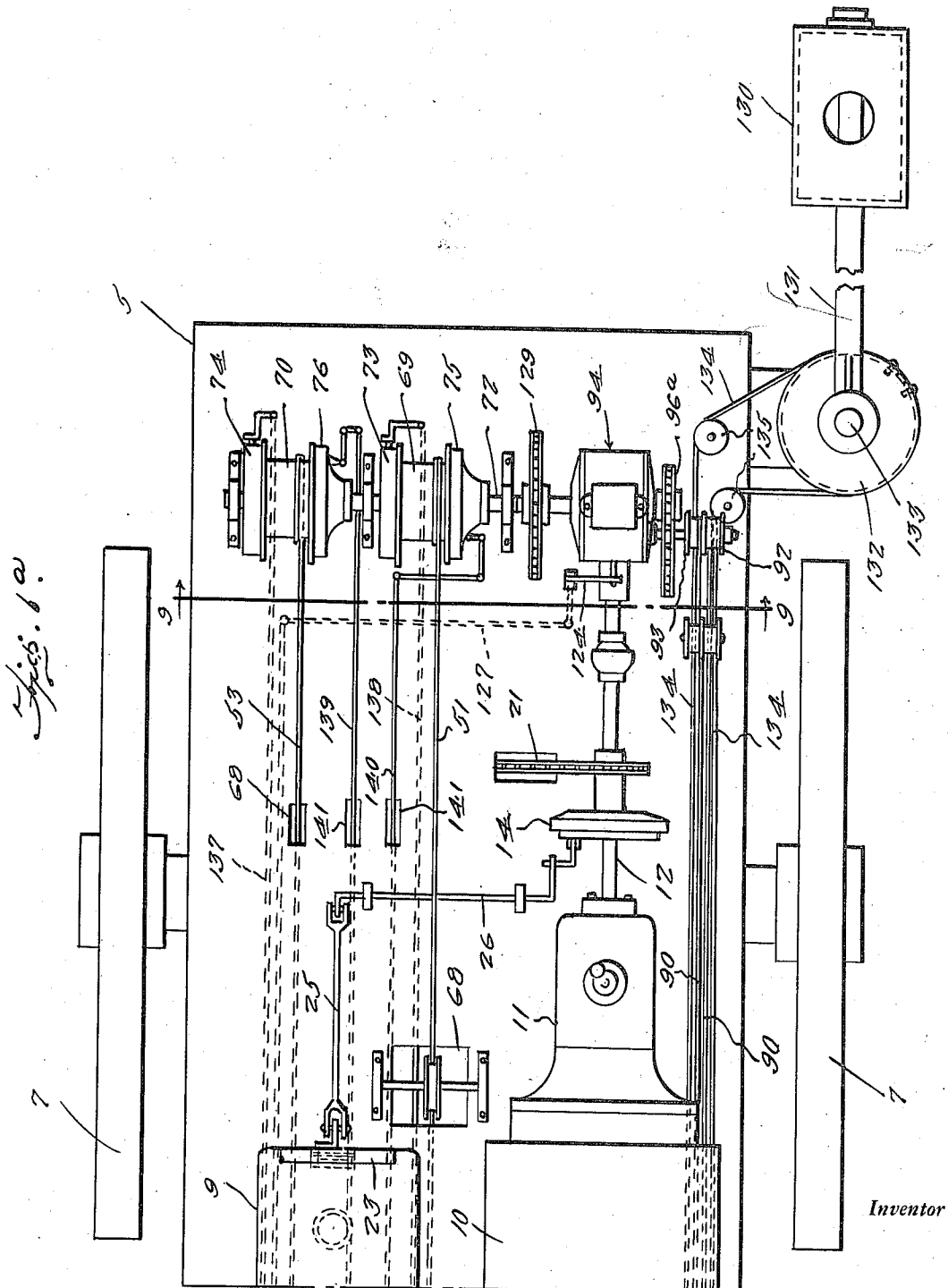
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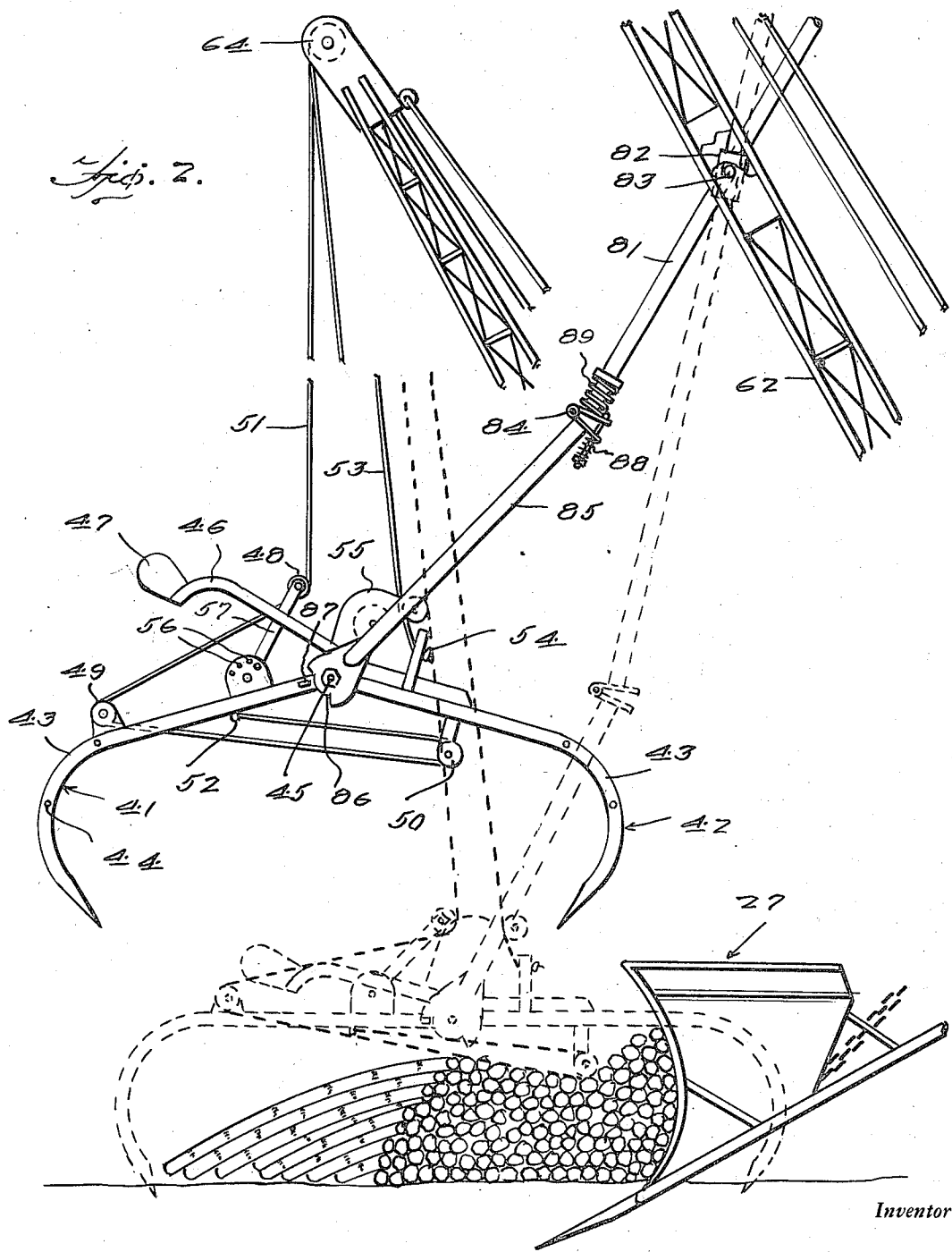
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9 Sheets-Sheet 3



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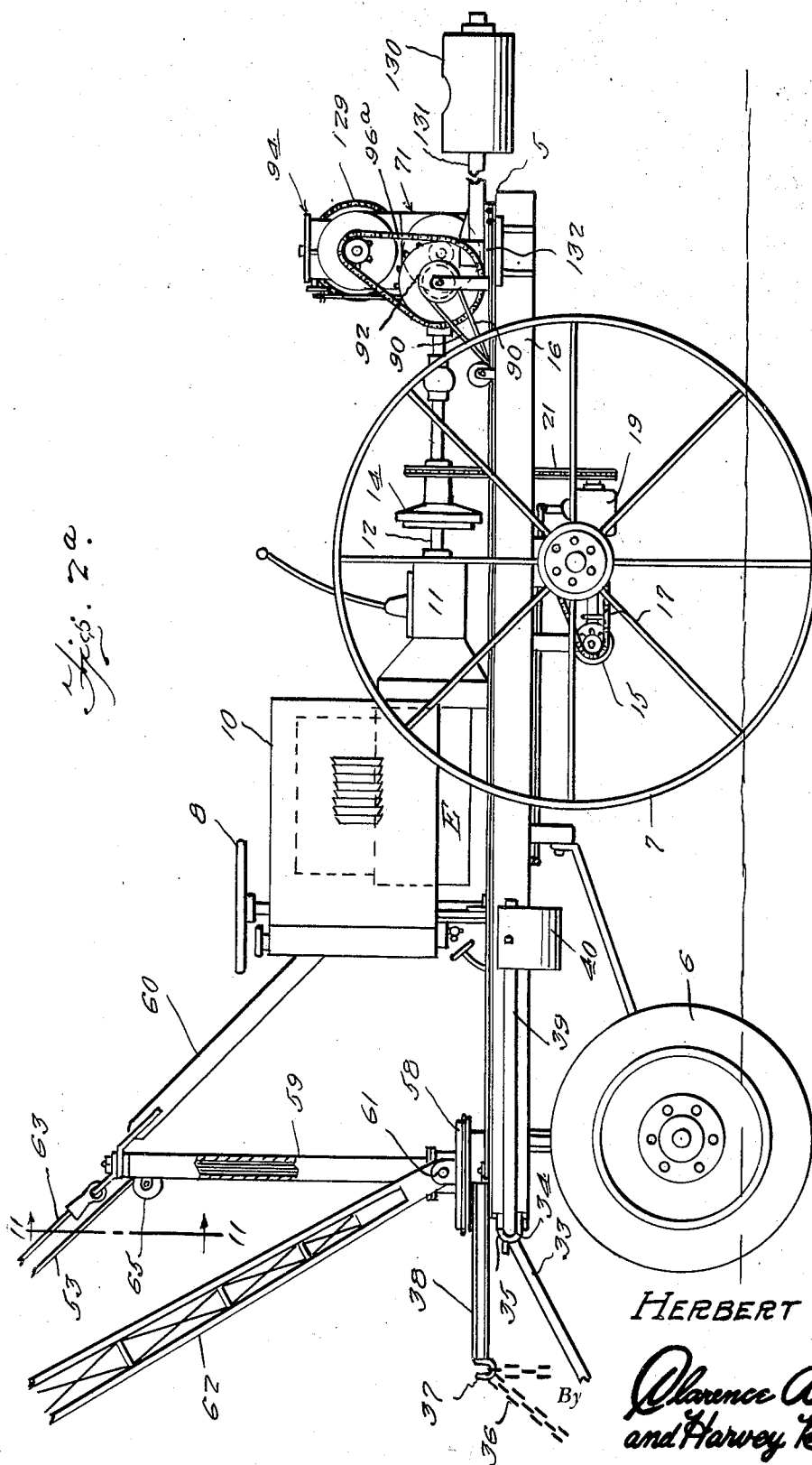
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9 Sheets-Sheet 4



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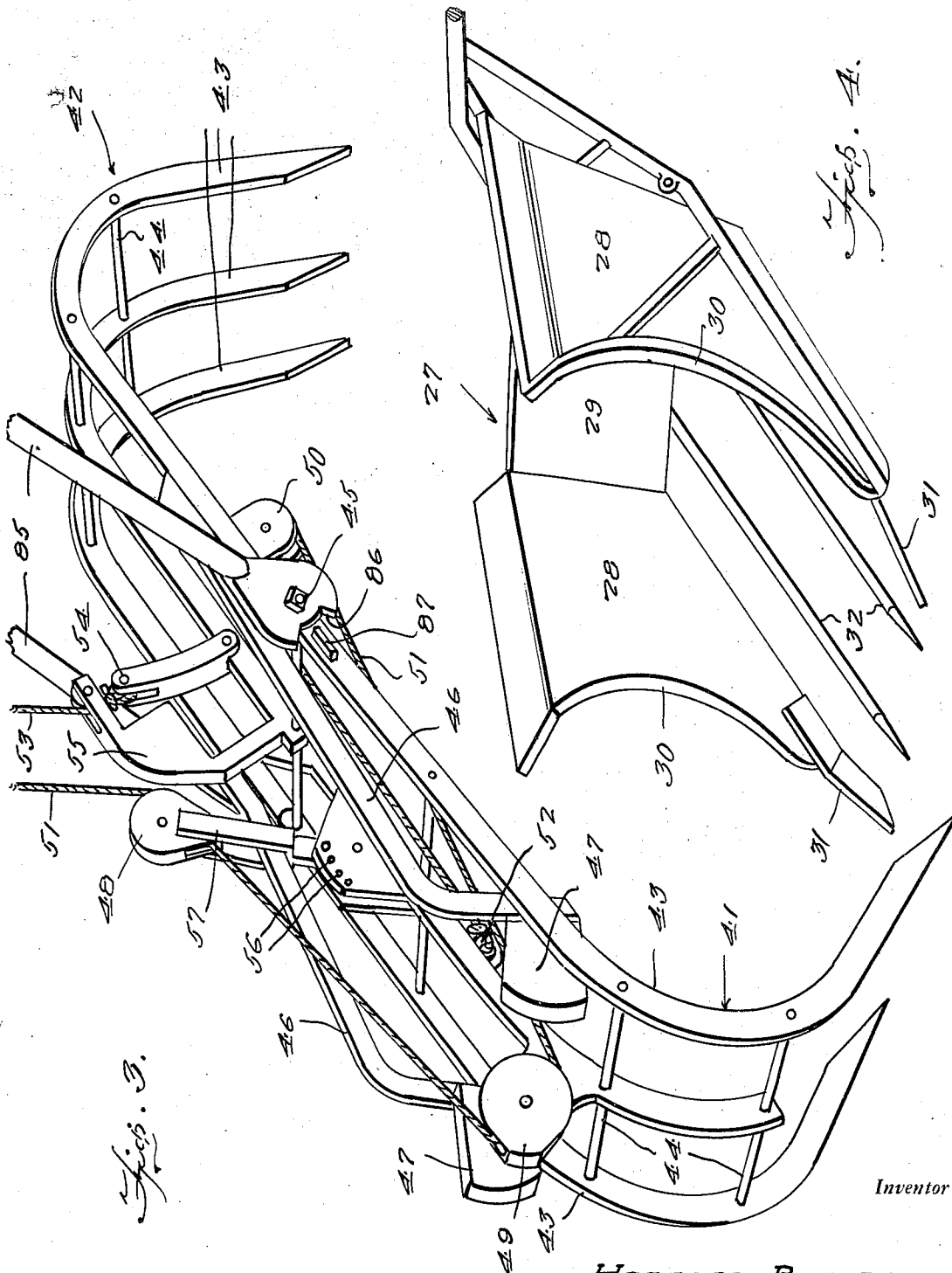
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PILING AND LOADING MACHINE

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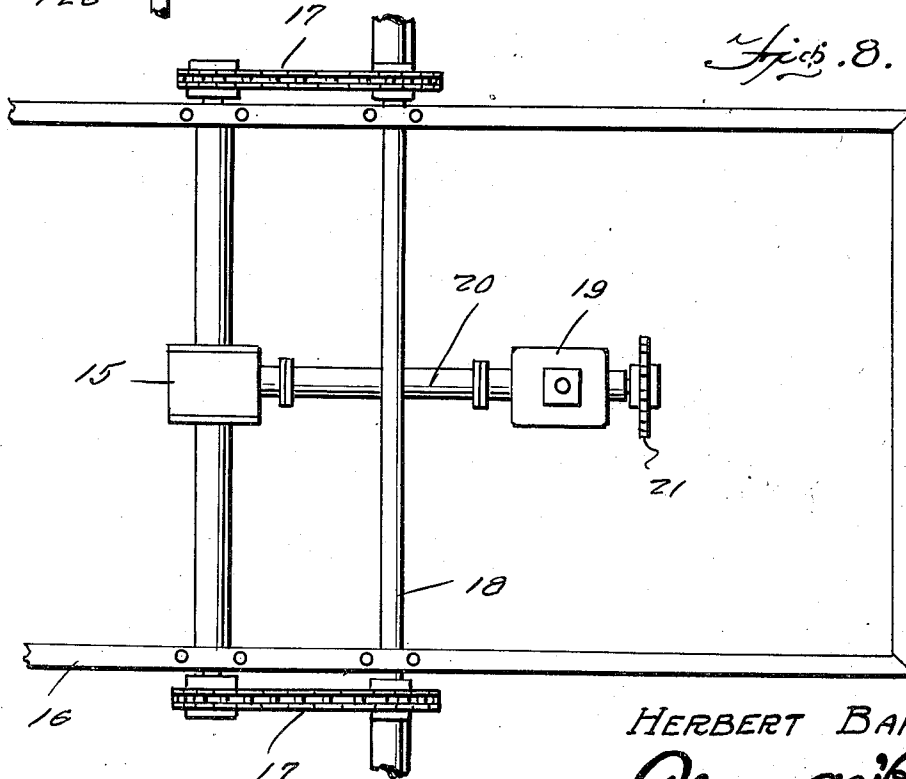
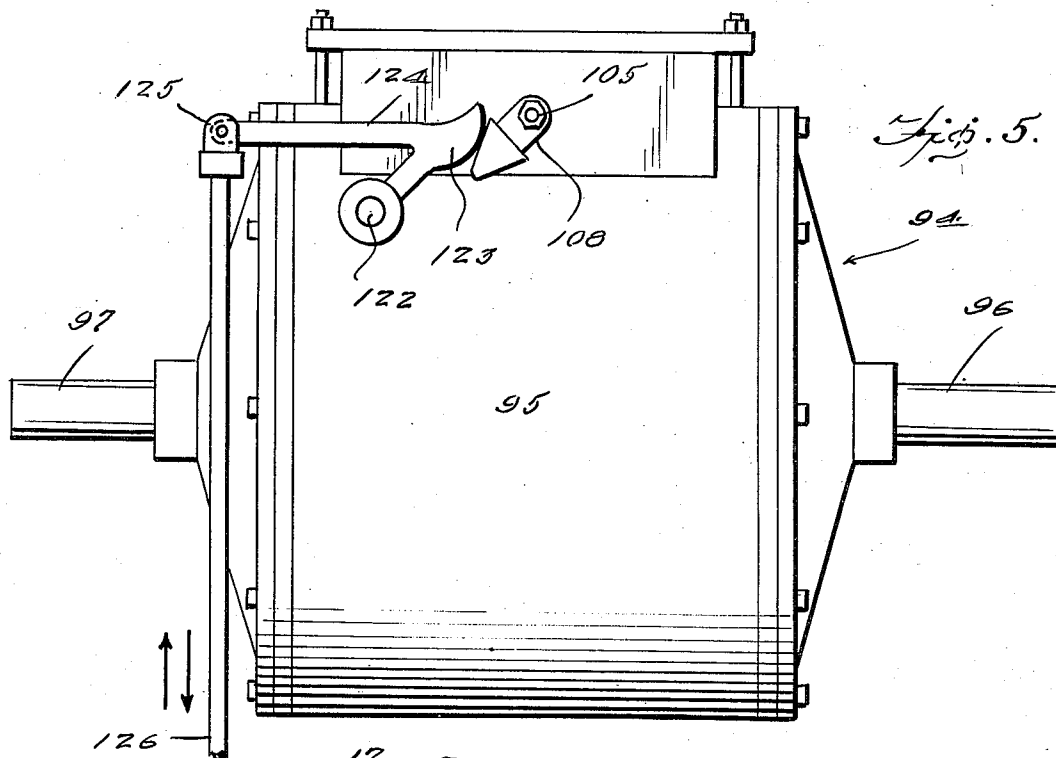
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PILING AND LOADING MACHINE

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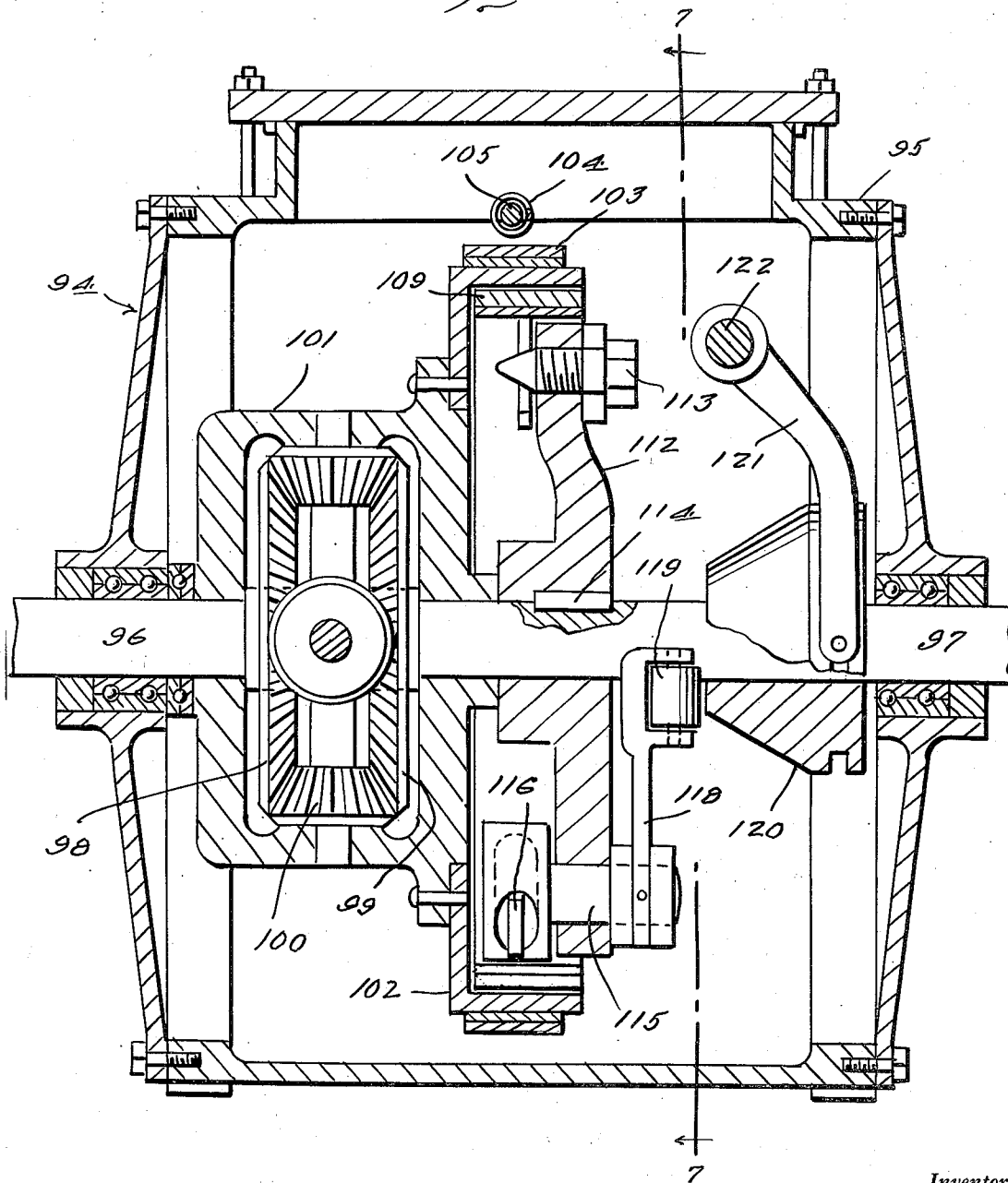
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PILING AND LOADING MACHINE

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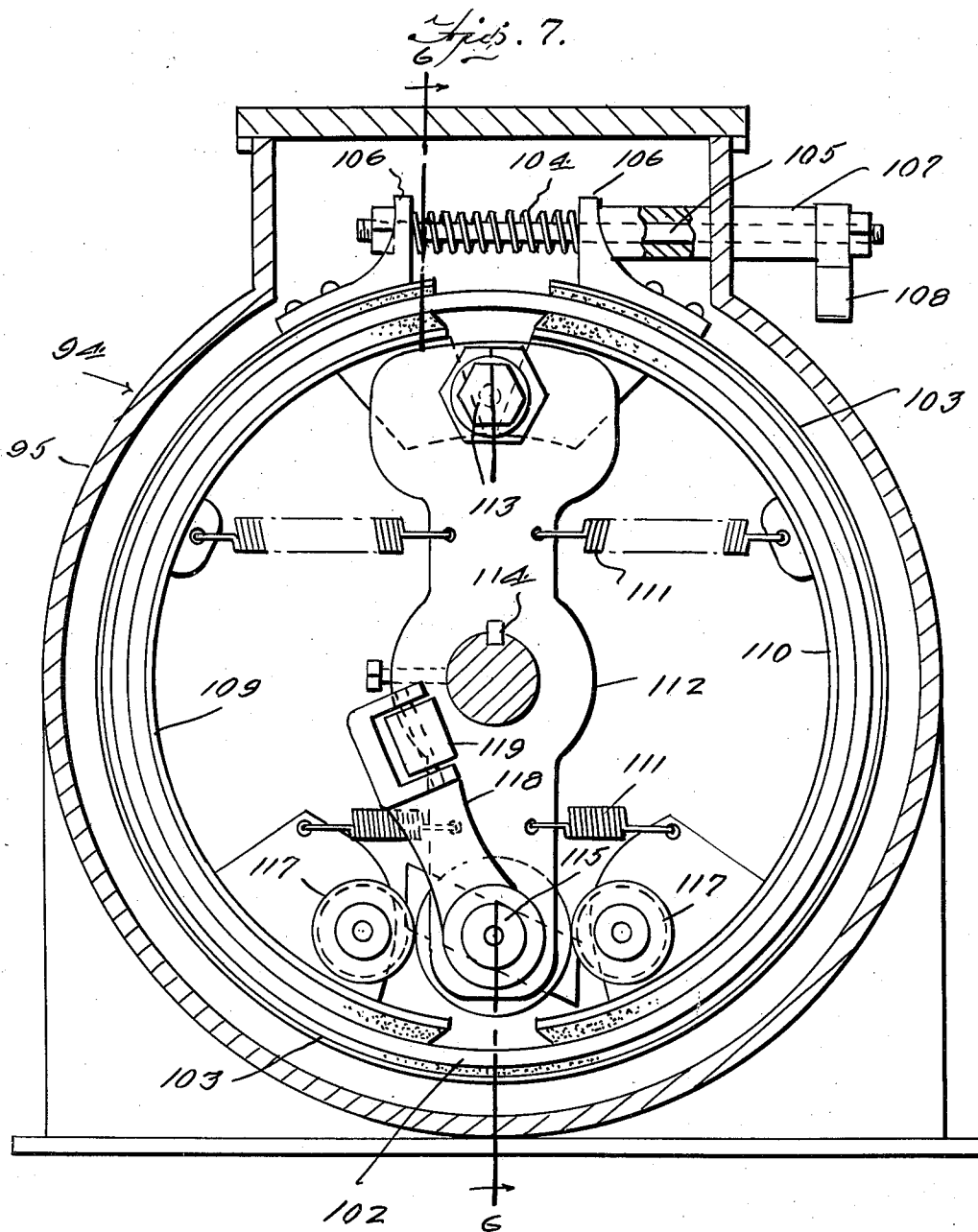
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PILING AND LOADING MACHINE

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9 Sheets-Sheet 8



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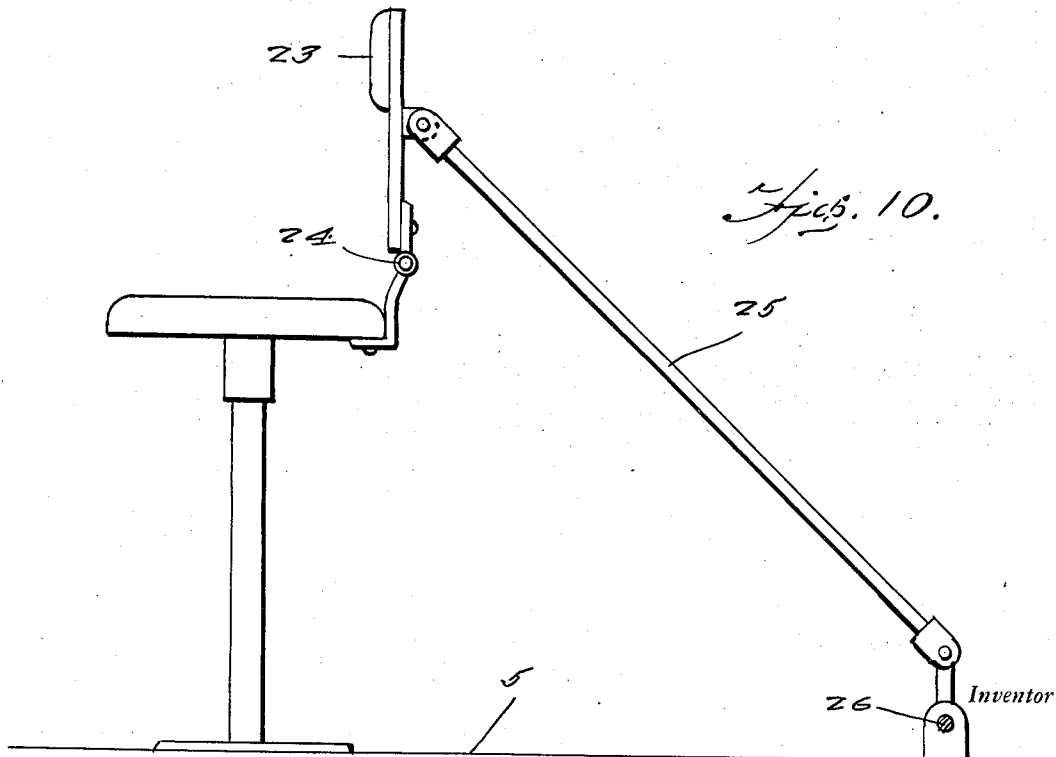
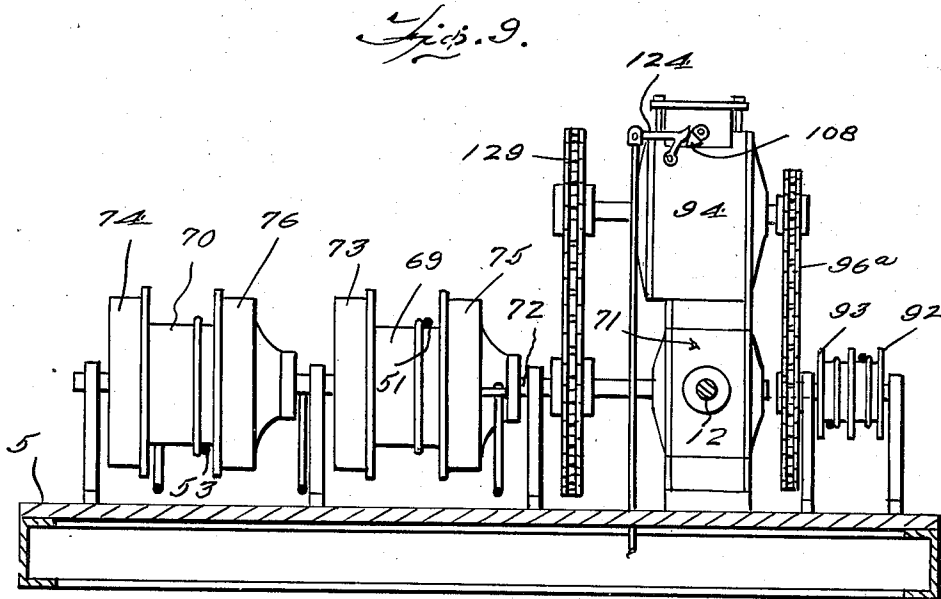
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PILING AND LOADING MACHINE

Filed April 25, 1944

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UNITED STATES PATENT OFFICE

2,375,205

PILING AND LOADING MACHINE

Herbert Barras, Baldwin, La.

Application April 25, 1944, Serial No. 532,622

13 Claims. (Cl. 212—42.5)

This invention relates to a piling and loading machine which, although capable of other uses, is especially designed to pile and load cut sugar cane.

The primary object of the present invention is to provide an improved portable, power-driven machine adapted to be driven onto the cane field and up the rows of cut cane for pushing the latter into piles and loading the piles of cane into a truck, located alongside the machine and by means of which the cane is transferred or transported to the sugar mill or other desired place.

A general object of the present invention is to provide a machine of the above kind by means of which the cut cane may be piled and loaded effectively and expeditiously and by the employment of a minimum amount of manual labor.

A specific object of the present invention is to provide, in a machine of the above kind, an improved piling device whereby the cut sugar cane is automatically pushed into piles as the machine moves forwardly.

Another object of the present invention is to provide an improved mechanism for loading the piled cane into a truck located alongside the machine, said mechanism including a swinging boom, a novel form of grapple for picking up the piled cane, hoisting mechanism including hoisting cables passing over guides at the upper end of the boom and operatively connected to the grapple for closing and elevating and lowering and opening the grapple, and a guide bar slidably guided in the boom and connected to the grapple for preventing undue swaying or turning of the grapple during the loading operation so that the grapple will be surely positioned at all times for properly picking up the piled cane and properly depositing it in the receiving truck.

The present invention also contemplates the provision of novel means for controlling the operation of power-driven winding drums forming part of the hoisting mechanism, and novel means for causing swinging of the boom from grappling position to loading position and vice versa.

Another object of the present invention is to provide a machine of the above kind in which the grapple is disposed in front of the machine when in grappling position and laterally of the machine when in loading position, in combination with counterbalancing means automatically positioned to overcome any tendency of the machine to tilt laterally when the grapple is swung to its lateral loading position.

The present invention contemplates many other important features and details of construc-

tion that will become apparent from the following description when considered in connection with the accompanying drawings, and the invention consists in the novel form, combination and arrangement of parts hereinafter more fully described, shown in the drawings and claimed.

In the drawings, wherein like reference characters indicate corresponding parts throughout the several views:

Figure 1 is a fragmentary view, mainly in top plan, and partly broken away and in section, showing a forward portion of a piling and loading machine constructed in accordance with the present invention.

Figure 1a is a top plan view of a rear portion of the machine; this view, together with Figure 1, showing nearly the complete machine mainly in top plan.

Figure 2 is a side elevational view, partly broken away and with the upper end of the boom displaced from its true position, and showing the piling scoop, the grapple and adjacent parts.

Figure 2a is a side elevational view of the major rear portion of the machine shown in Figures 1 and 1a; this view, together with Figure 2, showing substantially the complete machine in side elevation.

Figure 3 is an enlarged perspective view of the grapple.

Figure 4 is an enlarged perspective view of the piling scoop.

Figure 5 is a front elevational view of the special driving unit for reversing the direction of rotation of the winding drums forming part of the mechanism for swinging the boom and the automatic counterbalancing weight movable in unison therewith.

Figure 6 is a substantially central vertical section through the unit of Figure 5 and drawn on an enlarged scale, the plane of section being substantially on line 6—6 of Figure 7.

Figure 7 is a vertical section taken substantially on line 7—7 of Figure 6.

Figure 8 is a fragmentary plan view illustrating details of the driving connection between the motor of the machine and the rear driving and supporting wheels thereof.

Figure 9 is a transverse section taken substantially upon the line 9—9 of Figure 1a.

Figure 10 is a side elevational view of the operator's seat of the machine and part of the means for operatively connecting the back rest of said seat with the main clutch which transmits power from the motor of the machine to the various mechanisms thereof.

Figure 11 is a fragmentary vertical section taken substantially on line 11--11 of Figure 2a.

Referring in detail to the drawings, the present machine includes a motor vehicle having a bed or platform 5 mounted upon a suitable running gear including front steering and supporting wheels 6 and rear supporting and driving wheels 7. A steering wheel 8 forming part of a suitable or conventional steering mechanism is provided for turning the wheels 6 to steer the vehicle. This steering wheel 8 is located near the front and adjacent one side of the vehicle, and a seat 9 for the operator of the machine is provided on the platform 5 directly behind the steering wheel 8. Mounted on the platform 5 along the other side thereof is a suitable motor or engine E housed within a casing or hood 10. Through the medium of an ordinary automobile transmission 11, this engine drives a rearwardly extending shaft 12. A normally disengaged clutch 14 is provided on shaft 12. Mounted beneath the platform 5 is an ordinary differential gearing 15 whose shaft sections project at opposite sides of the vehicle frame 16 and have their projecting outer ends operatively connected by chain gears 17 with the rear wheels 7 that are mounted on a transverse axle 18 (see Fig. 8). Disposed rearwardly of the differential gearing 15 is an ordinary automobile transmission gearing 19 operatively connected to the differential gearing 15 by a propeller shaft enclosed in a torque tube 20. The driving shaft of transmission 19 is operatively connected by a chain gearing 21 to a part of clutch 14 that is normally free of shaft 12. A suitable or conventional remote control means is provided for operating the transmission 19 including a gear selecting and shifting lever 22 provided adjacent the operator's seat 9, as indicated in Figure 1. The transmission 19 controls the forward or rearward movement of the machine as well as the speed of forward movement or travel thereof. Transmission 11 is simply set in a desired speed according to the speed of operation normally required for the various mechanisms to be later described. It has been pointed out that the clutch 14 is of the normally disengaged type having a second part keyed on shaft 12 and adapted to be actuated for engaging with the first-mentioned part so as to transmit the drive from shaft 12 to transmission 19. For actuating the clutch 14 to engage it, said clutch is operatively connected to the back rest 23 of the operator's seat 9 so that when the operator leans back, engagement of clutch 14 is effected. For this purpose, the back rest 23 is hinged at 24 to the rear of the seat bottom and for forward and rearward swinging movement, and said back rest is operatively connected by a link 25 with one end of a rock shaft 26 whose other end is operatively connected to the operating lever of the clutch 14. As is the case with a normally disengaged clutch, spring means is provided for disengaging it, and this means acts to normally position the back rest 23 in a forwardly swung position. Therefore, by simply pressing rearwardly on the back rest 23, the operator may effect engagement of clutch 14 so as to transmit drive from shaft 12 to transmission 19 to effect travel of the machine.

Disposed at the front of the vehicle near one side of the latter is a cane loading scoop 27. This scoop is open at the top, bottom and front, and consists of spaced side members 28 connected by a transverse or rear member 29. The front edges of the side members 28 are provided with concave recesses 30, and projecting forwardly from the

side members 28 at their lower edges and at the bottoms of the recesses 30 are inclined teeth 31 arranged to pass under and elevate the cane as the scoop moves forwardly, causing the cane to pile up in front of the recesses 30. Additional teeth 32 arranged in suitable spaced relation and projecting forwardly from the lower edge of the rear wall 29 of the scoop may be provided. The scoop is fixed to the forward ends of arms 33 which converge rearwardly and are rigid with the adjacent end of a rock shaft 34 disposed transversely of the forward end of the platform 5 and journaled in bearings 35. A chain 36 is attached to the back of the scoop and adjustably engageable with a hook 37 carried by the forward end of a bar 38 fixed to and projecting forwardly from the platform 5. Chain 36 thus supports the scoop at the desired elevation and in an inclined position, as shown in Figure 2, so that the forward ends of the teeth 31 and 32 are normally disposed slightly above the surface of the ground. The rock shaft 34 permits the scoop to yield upwardly to compensate for irregularities in the ground surface, and in order to freely permit ready upward yielding of the scoop, the latter is preferably counterbalanced by providing the end of the rock shaft 34 opposite that to which the scoop is attached, with a rearwardly projecting arm 39 on which is adjustable a weight 40. It will thus be evident that when the machine is driven forwardly, up the row of cut cane, said cane will be pushed into piles in front of the recesses 30 of the scoop and with the rear portion of the pile elevated on the projecting teeth 31 and the forward end portions of the teeth 32. Thus, it is not necessary to pile the cane manually ahead of the machine.

The present invention further includes an improved grapple by means of which the cut cane piled in front of the scoop 27 may be compacted and picked up for being loaded into a truck located alongside the machine. As shown more clearly in Figures 1, 2 and 3, this grapple includes a pair of hook-shaped jaws 41 and 42 composed of a plurality of jaw members 43 rigidly connected at 44 in spaced parallel relation and pivoted at corresponding ends upon a transverse shaft 45. An arm 46 projects from each side member of jaw 42 at the pivoted end of the latter, and this arm has a weight 47 on its free end so as to counterbalance the jaw 42. Guide pulleys 48 and 49 are mounted on the jaw 41 respectively near the pivoted end of the latter and near the outer hooked end of the same. Another guide pulley 50 depends from the intermediate portion of the jaw 42, and a cable 51 passes downwardly under pulley 48 around pulley 49 then inwardly around pulley 50 and then back to the point 52 where it is attached to the intermediate portion of the jaw 41. The arrangement is such that when slack is provided in the cable 51, the jaw 42 may swing away from the jaw 41 to open position. On the other hand, when a pull is exerted on cable 51, it causes the jaw 42 to swing toward the jaw 41 so as to close the grapple. Another cable 53 is attached at 54 to the jaw 42 nearer its pivoted end, and this cable passes inwardly and upwardly through a guide 55 mounted on the pivoted end portion of jaw 42. The arrangement is such that when slack is provided in cable 53, the jaw 42 is permitted to be closed as just described. Also, when a pull is exerted on cable 53 and slack is provided in cable 51, the jaw 42 is caused to open. Means is provided, as generally indicated at 56, for adjusting the mount

67 of pulley 48 so that the latter may assume a position the most effective distance above the jaw 41 and from its pivoted end, thereby insuring effective operation of cable 51 for closing the jaw 42 in cooperation with the simultaneous provision of slack in cable 53.

Mounted on the side of platform 5 adjacent which the operator's seat 9 is located and at the front end of said platform, is a horizontal pulley 58 that is rotatable about a vertical axis and has a central rigid post 59 rising therefrom. A brace 60 extends from the upper end of post 59 rearwardly to the platform 5 for bracing the post 59. Pivoted at its lower end upon the pulley 58, as at 61, is a boom 62. The boom 62 is sustained in the desired inclined position by means of a guy wire 63 connecting the upper end of the boom with the top of the post 59. The cables 51 and 53 extend upwardly from the grapple and over pulleys at 64 in the upper end of the boom, after which said cables pass downwardly and rearwardly over pulleys at 65 on the upper end of post 59. From the pulleys 65, the cables 51 and 53 pass downwardly through the post 59 and around pulleys at 66 mounted at the bottom of the horizontal supporting pulley 58 for the boom 62. From the pulleys 66, the cables 51 and 53 pass laterally and around further pulleys 67 journaled on the under side of platform 5. The cables then pass rearwardly from pulleys 67 to a point near the rear end of the platform where they pass under suitable guides and then upwardly through slots 68 provided in said platform 5, as shown in Figure 1a. After passing through its slot 68, the cable 51 is wound about and attached to a winding drum 69 of a hoisting mechanism so that when said drum 69 is rotated in one direction, cable 51 will be wound thereon. After passing through its slot 68, the other cable 53 is wound about and attached to another winding drum of the hoisting mechanism indicated at 70, so that when said drum 70 is rotated in the opposite direction, said cable 53 will be wound thereon. The arrangement is such that when cable 51 is wound on drum 69, cable 53 is simultaneously unwound from drum 70 and vice versa. Thus, by allowing slack in cable 51 and simultaneously allowing slack in cable 53, although sustaining the weight of the grapple by said cable 53, the grapple may be lowered in the open position of Figure 2. The jaw 42 of the grapple is of such width as to just pass between the side members 28 of the scoop 27 with its hooked free end disposed rearwardly of the pile of cane in front of said scoop 27. Slack is then allowed in cable 53 while cable 51 is wound upon drum 69. This causes the jaw 42 to close or swing toward the jaw 41, thereby compacting the pile of cane and gripping it in compacted condition. Continued winding of cable 51 will cause elevation of the grapple in closed position, and when the closed load carrying grapple has been elevated sufficiently, it is swung to one side of the machine with the boom 62 by rotating the pulley 58 in a clockwise direction, as viewed in Figure 1. When the grapple has reached a position directly over the truck to be loaded, cable 51 is unwound from drum 69 while cable 53 is allowed to simultaneously unwind from drum 70, the weight of the grapple and its load being sustained by the cable 51. The grapple thus lowers while still gripping the load, and after the grapple has lowered sufficiently slack is provided in cable 51 and cable 53 is wound on drum 70 so as to open the grapple

by swinging jaw 42 away from jaw 41. In this way, the load is released and deposited in the truck.

The shaft 12 extends rearwardly into a gear casing 71 where its rear end is operatively connected by bevel gearing with the adjacent end of a transverse shaft 72 journaled upon the rear end of the platform 5. Drums 69 and 70 are rotatably mounted on shaft 72 and are respectively provided with brakes 73 and 74 for restraining rotation thereof. Also, a clutch 75 is provided for clutching drum 69 to shaft 72, while a similar clutch 76 is provided for clutching drum 70 to shaft 72. A brake pedal 77 is provided in front of the driver's seat 9 and operatively connected to brake 73 for actuating the latter. Another brake pedal 78 is provided in front of the seat 9 and operatively connected to the brake 74 for actuating the latter. A lever 79 is provided for actuating the clutch 75, and another lever 80 is provided for actuating the clutch 76, said levers 79 and 80 being located adjacent the steering wheel 8 and being operatively connected to said clutches, respectively. It is to be noted that the clutches 75 and 76 are of the normally disengaged type and are adapted to be engaged by operation of levers 79 and 80. By this arrangement, either or both of the drums 69 and 70 may be driven in one direction for winding the cables thereon or either or both of said drums may be released from shaft 72 and allowed to turn in the opposite direction for permitting the cables 51 and 53 to unwind therefrom. By selective operation of the brakes and clutches, the cables 51 and 53 may be controlled to close and elevate the grapple or lower and open it at will.

In order to steady and prevent swaying of the grapple relative to the boom 62 and to maintain the grapple against turning from its proper relation to the boom, said grapple carries a slide rod 81 that extends upwardly and slidably projects through a guide sleeve 82 pivoted on a horizontal axis 83 in the boom 62 near the upper end portion of the latter. The lower end of the slide rod 81 is hinged at 84 centrally to the intermediate portion of a U-shaped bail 85 whose ends are pivoted on the shaft 45 of the grapple at the outer sides of the jaws 41 and 42. The pivoted ends of the bail 85 are wide and provided in their end edges with arcuate notches 86 that provide spaced shoulders between which project lugs 87 carried by opposite sides of the jaw 41 near the pivoted end of the latter. The shoulders of the notches 86 and the lugs 87 permit a comparatively short or limited swinging movement of the jaw 41 relative to the bail 85 so that closing of the grapple is mainly effected by swinging movement of jaw 42 toward jaw 41. Separation of the leaves of hinge 84 is yieldingly resisted by spring means at 88 so that an increase in the angularity of bail 85 to slide rod 81 is yieldingly resisted. In this way shock from impact of the grapple with the ground is effectively absorbed. Another shock absorbing spring 89 is provided on the slide rod 81 near its lower end, said spring 89 being arranged to contact the sleeve 82 and absorb shocks incident to elevation of the grapple, at which time the rod 81 slides upwardly through the sleeve 82. It will be seen that the rod 81 and bail 85 provide the mentioned means for steadying the grapple relative to the boom and to prevent undue swaying of said grapple, particularly sidewise swaying. The proper relation of the grapple to the boom 62 is such that when the grapple is in position to lower for en-

gaging a pile of cut cane in front of the scoop 27, said grapple is disposed with its greatest dimension longitudinally of the machine, or with the jaw 42 at the rear and the jaw 41 at the front. The grapple must not turn from this position, because when the boom 62 turns about the axis of the pulley 58 for a distance of 90°, the upper end of said boom should be disposed above the body of a truck arranged alongside the side of the machine at which the boom is mounted, and the grapple should be positioned to extend transversely of the truck body. With the grapple thus disposed, it is simply necessary to lower and open it for depositing the pile of cane in a proper position within and longitudinally of the truck body. The manner in which the grapple is operated and operatively associated with the boom 62 brings this about, and it is only necessary to have one man in the truck to supervise the deposit of the cane in the latter. As only one man is needed to operate the piling and loading machine, it will be evident that a minimum amount of manual labor is needed to insure successful use of the machine.

A cable 90 passes around the pulley 58 that supports the boom 62, and said cable extends across the front portion of the platform 5 and around guide pulleys 91, then rearwardly to small winding drums 92 and 93 mounted on the platform at the outer side of the gear casing 71. One end of cable 90 is wound on drum 92 in one direction and secured thereto while the other end of cable 90 is wound on drum 93 in the other direction and secured to the latter. Thus, when the drums 92 and 93 are rotated in one direction, an end portion of cable 90 is wound on drum 92 and the other end portion thereof is unwound from drum 93, thereby acting to turn the pulley 58 in a direction to swing the boom 62 to the forwardly directed position of Figures 2 and 2a. On the other hand, rotation of drums 92 and 93 in the opposite direction will cause cable 90 to be wound on drum 93 and unwound from drum 92, thereby turning pulley 58 in a direction to swing the boom 62 to a position wherein said boom extends upwardly and outwardly beyond the adjacent side of the machine. When in the first-mentioned position, the boom is located so that the grapple is suspended over the pile of cane in front of the scoop 27 and disposed longitudinally of the machine with the jaw 42 rearmost, as generally shown in Figure 2. When the grapple is lowered, the jaw 42 will pass downwardly between the sides 28 of the scoop 21 so as to engage behind the pile of cane while the jaw 41 is disposed in front of the pile of cane. It will therefore be evident that upon closing the grapple, the pile of cane will be effectively grasped and compacted therein for being elevated and deposited in a truck located alongside the machine adjacent the side at which the boom is located. It will also be apparent that when the boom is swung to the laterally extending position, the grapple will be disposed transversely of the truck body so that the cane will be deposited in the truck body longitudinally of the latter when the grapple is lowered and opened. This facilitates orderly deposit of the cane in the truck without any separate operation or work. At this time, it may be pointed out that the grapple is illustrated in Figure 2 somewhat forwardly of the position it actually assumes with respect to the scoop 27. Due to limitation of space in the drawings, it was necessary to displace these parts

from their true relationship in order to show the structure within the limited space provided for the drawing. The arrangement and desired operation will be understood, however, in view of the dotted line position of the grapple in Figure 2. The yieldable hinge connection at 84, 88 constitutes a sort of yieldable knee action hinge akin to the knee action of a fowl, and it permits forward yielding of the grapple and its bail 85 relative to the slide rod 81 when the grapple is dropped into the dotted line grappling position of Figure 2, thereby absorbing shock incident to striking of the grapple upon the ground.

A reversible driving mechanism is provided for the winding drums 92 and 93, and this driving mechanism or device, which is generally indicated at 94, is mounted upon the gear casing 71 and is shown in detail in Figures 5 to 7, inclusive. As shown, it consists of a suitable casing 95 having aligned shaft sections 96 and 97 journaled in and extending through opposite sides thereof, the adjacent inner ends of shafts 96 and 97 being operatively connected by means of a planetary gearing. This gearing includes large bevel gears 98 and 99 secured on the inner ends of the shafts 96 and 97, respectively, and bevel pinions 100 arranged between and simultaneously meshing with the gears 98 and 99 and rotatably supported by a spider 101 in which the shafts 96 and 97 are rotatable. Thus far described, the construction is similar to that of a differential gearing, the difference being that instead of the spider 101 carrying a ring gear, it has a brake drum 102 fixed thereto. Associated with the brake drum 102 is an external contracting brake band 103 normally expanded and released by a spring 104. This spring 104 is provided on a portion of a rod 105 between ears 106 fixed on adjacent ends of the band 103. Also journaled in and extending through the casing 95 and journaled on the rod 105 is a sleeve 107 having a cam-shaped inner end bearing upon the outer face of one of the ears or lugs 106. The outer end of sleeve 107 carries a lever arm 108 adapted to be actuated for turning sleeve 107 so as to force the ears 106 together against the action of the spring 104 to contract or apply the brake band 103 with respect to its drum 102. As soon as the arm 108 is released, the spring 104 will automatically act to expand and release the brake band 103.

Also associated with the brake drum 102 is an internal expanding brake including brake shoes 109 and 110 normally contracted and released by means of helical tension springs 111. Corresponding ends of the shoes 109 and 110 are pivoted to one end of a cross member 112, as at 113, said cross member 112 being keyed at 114 to the shaft 97. Pivoted in the other end of cross member 112 is a shaft 115 having a double cam 116 fixed on one end thereof and movable between abutments or rollers 117 mounted on the other corresponding ends of the brake shoes 109 and 110. The arrangement is such that when shaft 115 is rotated in one direction, cam 116 acts upon the rollers 117 to expand the brake shoes 109 and 110 so that they are applied with respect to the drum 102. When the shaft 115 is freed, the springs 111 act to turn the cam 116 and shaft 115 in the opposite direction and to contract the shoes 109 and 110 out of engagement with the drum 102. A lever arm 118 is fixed to the other end of shaft 115 and is provided at its free end with a roller 119 arranged in the path of a cone-shaped cam 120 slidable on the shaft

97. Cam cone 120 is provided with an operating yoke or fork 121 fixed on a rock shaft 122 journaled in and extending through the front wall of casing 95 slightly below and just in front of the arm 108. Fixed on the projecting end of shaft 122 is a cam lever 123 arranged to bear upon the adjacent side of the free end portion of lever 108, said cam lever 123 being provided with a laterally projecting arm 124 pivoted at 125 to the upper end of a link 126. Link 126 is operatively connected as indicated by dotted lines in Figure 1a at 127 to a hand lever 128 located adjacent the steering wheel 8, as shown in Figure 1. The arrangement is such that when the lever 128 is operated to shift link 126 downwardly, cam lever 123 is swung away from lever 108 so as to allow the external brake band 103 to remain released and to simultaneously rock shaft 122 in a direction to move cam cone 120 inwardly for actuating arm 118 in the direction in which cam 116 acts to expand the internal brake shoes 109 and 110. This causes the internal brake shoes to be applied for restraining the drum 102 against rotation independently of cross member 112. In other words, when this is done, power will be transmitted from shaft 97 directly to shaft 96 at the same speed and in the same direction, spider 101 and drum 102 being caused to rotate with the cross member 112, and the gears 98 and 99 being caused to turn together with the pinions 100 because the latter do not at this time rotate about their respective axes. On the other hand, when the link 126 is actuated so as to be moved upwardly, the cam cone 120 is moved outwardly to allow the internal brake shoes to be released, and the cam lever 123 simultaneously actuates lever 108 in a direction to contract the brake band 103. This applies the external brake band 103 with respect to the drum 102, thereby restraining the spider 101 against rotation and permitting the cross member 112 to freely turn with shaft 97 relative to the brake drum 102. Under these circumstances, gear 99 is rotated with shaft 97 in one direction, thereby turning pinions 100 and causing rotation of gear 98 in a reverse direction. As the drums 92 and 93 are geared at 96a to the projecting end of shaft 96, it will be apparent that, in this way and by this means, said winding drums 92 and 93 may be reversely driven at will for effecting the swinging of boom 62 into the desired direction. As shown in Figure 9, a chain drive 129 is provided between shaft 72 and shaft 97, and it will of course be understood that lever 128 is normally positioned so that brake band 103 is released and brake shoes 109 and 110 are released so that no motion is transmitted to shaft 96 which carries drums 92 and 93, even though the clutches are engaged for driving the main hoisting drums 69 and 70. Thus, the actuation of hoisting cables 51 and 53 is entirely independent of the actuation of cable 90 which effects swinging of the boom 62.

It will be evident that when the boom 62 is swung from the position of Figure 2a to a position extending upwardly and outwardly at the adjacent side of the machine for transferring a load from the grapple to the receiving truck, considerable weight is present at this side of the machine which might tend to tilt the machine laterally, particularly when operating on an incline or the like. In order to counter-balance the machine automatically to overcome this tendency, a counterweight 130 is provided, together with means for automatically swinging

said counterweight 130 outwardly to a position wherein the same extends from the side of the machine opposite that from which the boom 62 extends. For this purpose, the counterweight 130 is carried by a horizontally swinging arm 131 fixed at one end to a horizontal pulley 132 that is mounted upon a vertical axis 133 at the side of the machine opposite that at which the boom 62 is located, and preferably at the rear of the platform 5. A cable 134 passes around the pulley 132 and extends inwardly around guide pulleys 135. The cable 134 extends forwardly from pulleys 135 and has its opposite ends respectively connected at 136 to different strands or flights of the cable 90, as shown in Figure 1. Thus, when cable 90 is actuated to swing the boom in one direction and to the position of Figure 2a with the grapple suspended in front of the machine, the counterweight 130 will be swung rearwardly and inwardly to the position of Figure 1a, thereby counterbalancing the machine longitudinally. On the other hand, when cable 90 is operated to swing the boom 62 to its laterally extending loading position, the counterweight 130 will be swung outwardly and forwardly to a position wherein the same projects from the opposite side of the machine from that from which the boom projects, thereby effectively counterbalancing the weight of the boom, the grapple and the load of the grapple.

It will be noted that the teeth 32 of the scoop 27 are so disposed that the members of the jaw 42 will pass between them and between said teeth 32 and the sides 28 of the scoop when the grapple is lowered into grappling position, as indicated by dotted lines in Figure 2. Also, the operative connection between brake band 74 and pedal 78 is indicated by dotted lines at 137, while that between brake band 73 and pedal 77 is indicated at 138. Also, the operative connection between clutch 76 and lever 80 is indicated at 139, while that between clutch 75 and lever 79 is indicated at 140. The connections 139 and 140 extend downwardly through slots 141 in the platform 5 and then forwardly under the platform to the lower ends of the levers 80 and 79.

In use, the boom 62 is normally positioned to extend forwardly and the grapple is raised to an elevated position and opened, clutches 75 and 76 being disengaged and brake bands 73 and 74 being applied. The transmission 11 having been set in the desired gear, transmission 19 is operated to place it in the desired gear and the operator leans backwardly on the back rest 23 so as to engage clutch 14. Drive is then transmitted to the rear supporting wheels 7 so as to cause the machine to move forwardly up the row of cut cane. As the machine moves ahead slowly, the cut cane is pushed ahead in front of the scoop 27 into a pile of sufficient size. Brake bands 73 and 74 are then released sufficiently to allow the drums 69 and 70 to turn slowly and permit the cables 51 and 53 to unwind thereon, thereby allowing the grapple to lower by gravity with its weight mainly sustained by the cable 53. Thus, as the grapple lowers, it remains open and is held in the longitudinally disposed position of Figure 2. At this time, the sleeve 82 turns and rod 81 lowers by sliding downwardly through sleeve 82 so that the grapple may shift rearwardly as it lowers and the jaw 42 may pass between the sides 28 of the scoop 27 behind the pile of cane. Clutch 75 is then engaged so as to wind cable 51 thereon for closing the grapple to grab and compact the pile of cane and then elevate the closed grapple to the

desired height. At this time, the rod 81 slides upwardly through the sleeve 82 and, by reason of its connection with the bail 85, the grapple is sustained in the same relation to the boom 62. Of course, after the grapple is closed, clutch 76 is actuated to simultaneously operate drum 70 and wind the cable 53 thereon while allowing a slight amount of slack to always remain in said cable 53 while the closed grapple is hoisted. When the grapple has reached the desired height, the clutches 75 and 76 are disengaged and said brake bands 73 and 74 are tightly applied, thereby holding the grapple in closed condition and in elevated position. The reversing mechanism at 94 is then conditioned by actuation of lever 128 to drive the drums 92 and 93 in the proper direction for actuating cable 90 so that the boom 62 is swung around to its laterally extending loading position, whereupon the lever 128 is set in neutral position so that the drums 92 and 93 are no longer driven. The counterweight 130 and the friction between movable parts of the swinging means for the boom and the counterweight 130 will insure retention of the boom in any position to which it is swung. At this time, the grapple is located directly above the body of the truck into which the pile of cane is to be loaded, and the brake bands 73 and 74 are then partially released so as to allow the loaded grapple to lower with most of the weight sustained by the cable 51 for insuring retention of the grapple in closed position until it reaches the body of the receiving truck. Brake band 73 is then fully released to allow a slight amount of slack in the cable 51, whereupon clutch 76 is engaged to wind cable 53 on drum 70 and cause the grapple to open, thereby depositing the load of cane into the body of the receiving vehicle with the cane disposed longitudinally of said body. Continued winding of cable 53 on drum 70 will cause the open grapple to be elevated, whereupon clutch 78 is disengaged and clutch 75 is engaged, thereby causing cable 51 to wind on drum 69, if closing of the grapple is desired. However, in normal use, this is not done until after the boom is swung back to receiving position and lowered to grip the next pile of cane. Obviously, the boom 62 may be swung back to its receiving position wherein it extends upwardly and forwardly in front of the machine by simply conditioning the reversing mechanism 94 so that the drums 92 and 93 are reversely driven for winding cable 90 on drum 92 and unwinding it from drum 93. While the boom was swung to the laterally extending position, cable 134 was actuated to swing the counterweight 130 forwardly and outwardly to its counterbalancing position wherein tendency of lateral tilting of the machine is overcome. On the other hand, when the boom is swung to its forwardly extending position, the counterweight 130 is actuated by cable 134 to assume the rearwardly extending position of Figure 1a, thereby counterbalancing the machine longitudinally. The latter is not ordinarily of greater importance, the main function of the counterweight 130 being to overcome the tendency of the machine to tilt laterally when the boom 62 extends upwardly and laterally from the machine in position to deposit the load of the grapple in the receiving truck. Of course, when desired or necessary, the forward travel of the machine may be stopped by simply allowing the clutch 14 to disengage and throwing the transmission 19 into neutral, release of clutch 14 being permitted by allowing the back rest 23 to move forwardly. The latter is permitted by the mere

act of the operator in leaning forward so as to not press rearwardly on the back rest 23 or interfere with its forward swinging movement. For convenience, the lever 79 may have a thumb control incorporated in the handle thereof for controlling the throttle of the engine E whereby the speed of operation of said engine may be varied at will, a common and elementary expedient in the construction of motor vehicles.

From the foregoing description, it is believed that the construction and operation, as well as the advantages of the present invention, will be readily understood and appreciated by those skilled in the art. It will of course be understood that the cycle of operation described with respect to the use of the machine will simply be repeated entirely up the row of cut cane so that the piling and loading operation may be continuously and expeditiously carried out. As soon as one receiving truck has been fully loaded, another may be driven into position for loading. The present machine has been in practical operation for a considerable time and has been found to operate very satisfactorily and efficiently under actual field conditions. By its use, the machine brings about a tremendous saving of time and labor in the piling and loading of sugar cane, it being merely necessary to cut the cane so that it falls transversely of the row, in advance of use of the machine. The invention is of course susceptible of many modifications and changes in details of construction illustrated and described, such as fall within the spirit and scope of the invention as claimed.

What I claim is:

1. In a cane piling and loading machine, a motor vehicle, a scoop mounted at the front of the vehicle for pushing cut cane into a pile upon forward travel of the vehicle, said scoop being open at the top and front, a grapple for picking up the piled cane including a jaw movable into grappling position between the sides of the scoop, and power-operated hoisting and opening and closing mechanism for the grapple mounted on the vehicle.

2. In a cane piling and loading machine, a motor vehicle, a scoop mounted at the front of the vehicle for pushing cut cane into a pile upon forward travel of the vehicle, said scoop being open at the top and front, a grapple for picking up the piled cane including a jaw movable into grappling position between the sides of the scoop, and power-operated hoisting and opening and closing mechanism for the grapple mounted on the vehicle, said scoop including side members having recessed front edges against which the piled cane is adapted to engage so as to leave a space within the scoop behind the piled cane for the passage of said jaw behind said cane in said grappling position.

3. In a cane piling and loading machine, a motor vehicle, a scoop mounted at the front of the vehicle for pushing cut cane into a pile upon forward travel of the vehicle, said scoop being open at the top and front, a grapple for picking up the piled cane including a jaw movable into grappling position between the sides of the scoop, and power-operated hoisting and opening and closing mechanism for the grapple mounted on the vehicle, said scoop including side members having recessed front edges against which the piled cane is adapted to engage so as to leave a space within the scoop behind the piled cane for the passage of said jaw behind said cane in said grappling position, said scoop further including

teeth arranged to engage under and elevate the rear portion of the pile of cane disposed in front of the scoop.

4. In a cane piling and loading machine, a motor vehicle, a scoop mounted at the front of the vehicle for pushing cut cane into a pile upon forward travel of the vehicle, said scoop being open at the top and front, a grapple for picking up the piled cane including a jaw movable into grappling position between the sides of the scoop, and power-operated hoisting and opening and closing mechanism for the grapple mounted on the vehicle, said last-named mechanism including a swinging boom mounted upon the front of the vehicle at one side of the latter and movable to a forwardly inclined grappling position and to a laterally extending discharge position, and means operatively connecting the grapple with the boom for maintaining the grapple in a definite relation to the boom at all times so that said jaw will be located to move between the sides of the scoop when lowered to grappling position.

5. In a cane piling and loading machine, a motor vehicle, a scoop mounted at the front of the vehicle for pushing cut cane into a pile upon forward travel of the vehicle, said scoop being open at the top and front, a grapple for picking up the piled cane including a jaw movable into grappling position between the sides of the scoop, and power-operated hoisting and opening and closing mechanism for the grapple mounted on the vehicle, said last-named mechanism including a swinging boom mounted upon the front of the vehicle at one side of the latter and movable to a forwardly inclined grappling position and to a laterally extending discharge position, and means operatively connecting the grapple with the boom for maintaining the grapple in a definite relation to the boom at all times so that said jaw will be located to move between the sides of the scoop when lowered to grappling position, said last-named means including a guide sleeve pivoted to the boom for turning about a horizontal axis transversely of the boom, and a slide rod projecting from the grapple and slidably extending through said sleeve.

6. In a cane loading machine, a motor vehicle, a grapple, power-operated hoisting and opening and closing mechanism for the grapple mounted on the vehicle, said mechanism including a boom mounted to swing to a discharging position extending laterally of the machine, and means for automatically counterbalancing the machine to overcome tendency of the latter to tilt laterally when the boom is swung to said laterally extending position, said last-named means including a counterweight mounted to swing horizontally, and means operatively connecting the counterweight to the boom, whereby the counterweight is caused to swing outwardly from one side of the machine when the boom is swung to extend laterally of the opposite side of the machine.

7. In a cane piling and loading machine, a motor vehicle, a scoop pivotally mounted at the front of the vehicle for vertical yielding movement and in position to push cut cane into a pile upon forward travel of the vehicle, a horizontally swinging boom mounted on the front of the vehicle, a grapple mounted on the boom for picking up the piled cane and including a jaw movable into grappling position between the sides of the scoop, when the grapple is lowered at the front of the vehicle power-operated hoisting and opening and closing mechanism for the grapple mounted on the vehicle, and power operated means for horizontally swinging said boom.

8. In a cane piling and loading machine, a motor vehicle, a scoop pivotally mounted at the front of the vehicle for vertical yielding movement and in position to push cut cane into a pile upon forward travel of the vehicle, a grapple for picking up the piled cane including a jaw movable into grappling position between the sides of the scoop, and power-operated hoisting and opening and closing mechanism for the grapple mounted on the vehicle, the mounting means for the scoop including a horizontal shaft mounted for turning movement across the front of the vehicle and having the scoop rigidly attached to one end thereof, a rearwardly extending arm on the other end of said shaft, and a counterweight carried by said arm for counterbalancing the weight of the scoop.

9. In a cane loading machine, a motor vehicle, a grapple for picking up piled cane, power-operated hoisting and opening and closing mechanism for the grapple mounted on the vehicle, said mechanism including a swinging boom mounted to turn about a vertical axis, cable means for turning the boom from a forwardly extending grappling position to a laterally extending discharging position and vice versa, power-operated means for actuating said cable means including a reversing gearing, a horizontally swinging arm carrying a counterweight and mounted on the opposite side of the vehicle from that at which the boom is located, and means operatively connected to the cable means for turning the boom for swinging the counterweight outwardly from the adjacent side of the vehicle so as to counterbalance the weight of the said mechanism for hoisting and opening and closing the grapple when the boom is swung to discharging position.

10. In a cane loading machine, a motor vehicle, a grapple for picking up piled cane including a bail, a pair of jaws, pivoted to said bail, cooperating elements carried by the bail and one of the jaws to limit swinging movement between the latter and said bail, the other jaw being freely movable relative to the first-named jaw and said bail, a boom having an elevated pivoted guide, and a slide rod carried by the bail and movable upwardly and downwardly through said guide.

11. In a cane loading machine, a grapple for picking up piled cane including pivotal grappling jaws, a bail in substantially fixed relation to one of the jaws, the other jaw being movable independently of the first-named jaw and bail, power-operated hoisting and opening and closing mechanism for the grapple including a boom, a guide pivotally carried by the boom, a slide rod slidable through said guide of the boom, a hinge connection between the bail and slide rod, and yieldable means resisting an increase in angular relation of the bail to the slide rod about said hinge connection.

12. In a cane loading machine, a grapple for picking up piled cane including pivotal grappling jaws, a bail in substantially fixed relation to one of the jaws, the other jaw being movable independently of the first-named jaw and bail, power-operated hoisting and opening and closing mechanism for the grapple including a boom, a guide pivotally carried by the boom, a slide rod slidable through said guide of the boom, a hinge connection between the bail and slide rod, and yieldable means resisting an increase in angular relation of the bail to the slide rod about said hinge connection, the hinge connection between the bail and the slide rod providing a rearwardly yielding knee action between the bail and said slide rod.

13. In a cane loading machine, a motor vehicle, a grapple for picking up piled cane, power-operated hoisting and opening and closing mechanism for the grapple mounted on the vehicle, said mechanism including a swinging boom mounted to turn about a vertical axis from a forwardly projecting grappling position to a laterally projecting discharging position, said boom being mounted at one side of the vehicle near the front of the latter, a counterbalancing device including 10

a horizontally swinging weighted arm mounted on the other side of the vehicle near the rear of the latter, and cable mechanism for automatically swinging the boom and simultaneously swinging the counterweighted arm so that the latter will extend laterally from one side of the machine when the boom is positioned to extend from the other side thereof.

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