Aug. 18, 1953 G. F. SCHMIDT 2,649,189

BOXCAR GRAIN UNLOADER

Filed Aug. 23, 1948 3 Sheets-Sheet 1

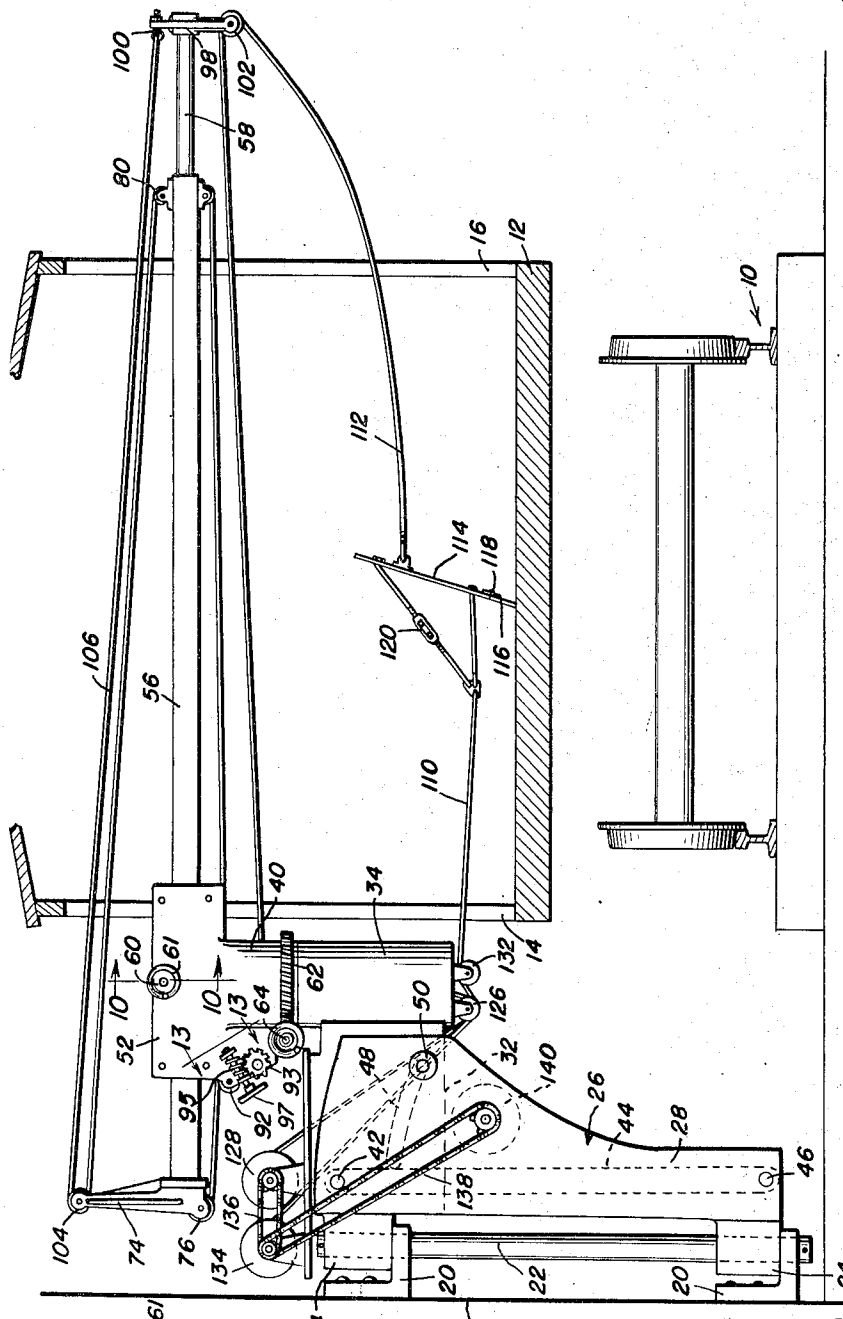

Fig. 1.

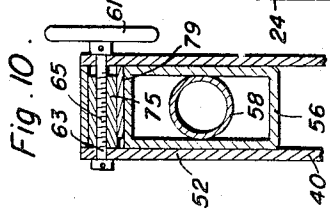

Fig. 10.

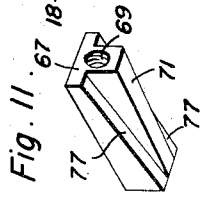

Fig. 11.

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BOXCAR GRAIN UNLOADER

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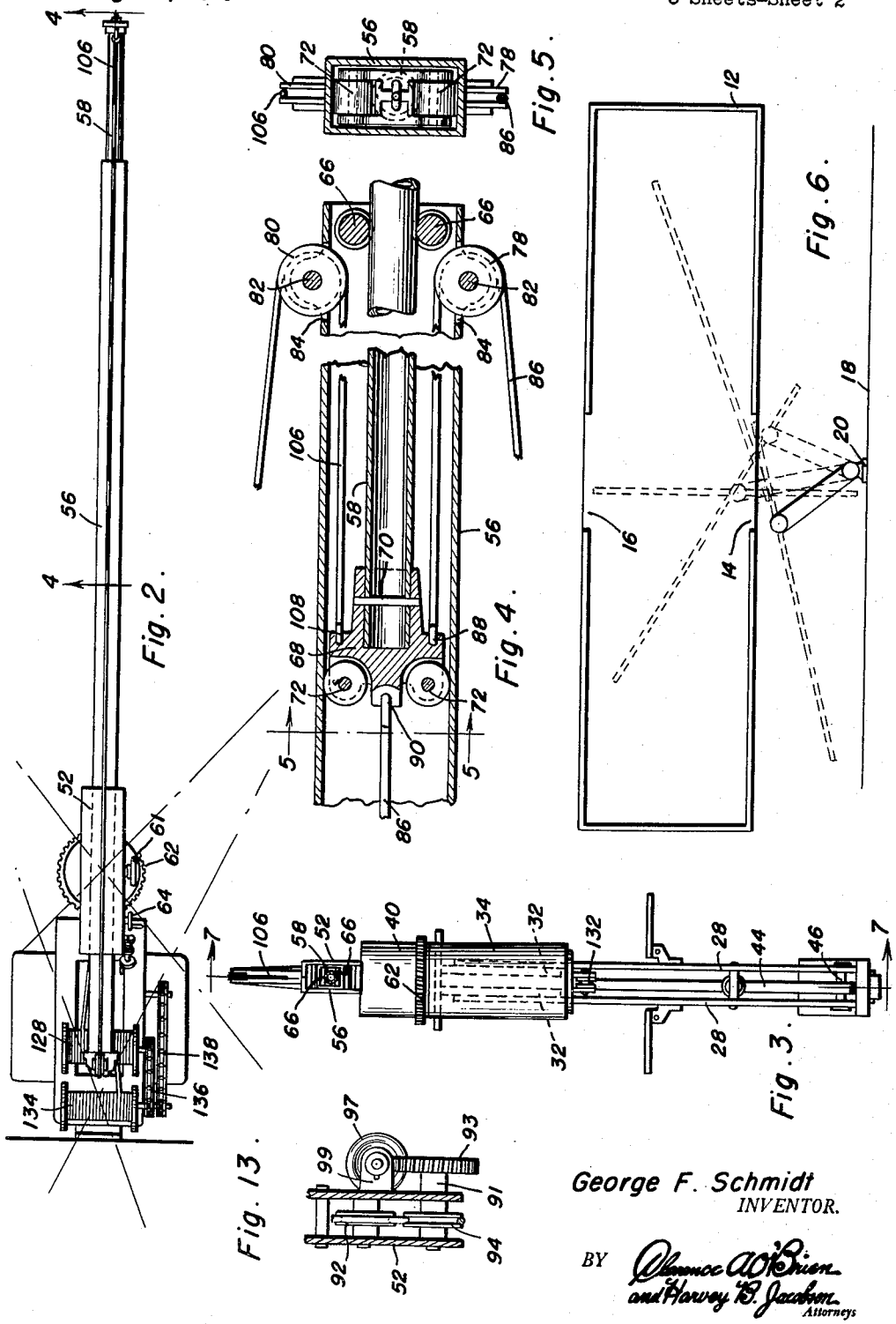

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BOXCAR GRAIN UNLOADER

Filed Aug. 23, 1948 3 Sheets-Sheet 3

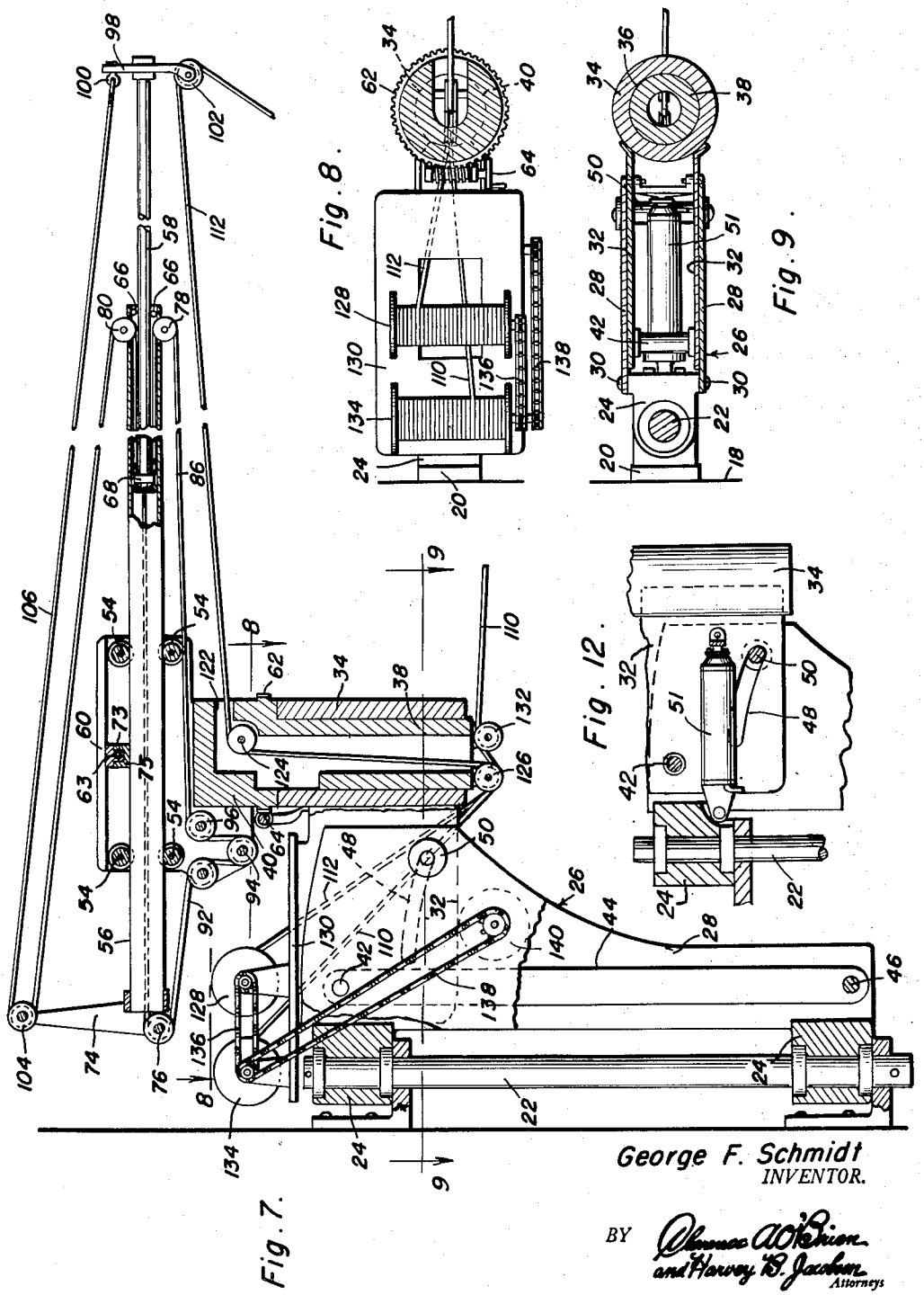

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 12.

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UNITED STATES PATENT OFFICE

2,649,189

BOXCAR GRAIN UNLOADER

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8 Claims. (Cl. 198—222)

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This invention comprises novel and useful improvements in a boxcar grain unloader and more specifically pertains to an improved scoop and dragline mechanism which may be readily inserted and manipulated within the interior of a grain car for scraping out the contents thereof.

The principal object of this invention is to provide a dragline apparatus wherein the scoop or bucket may be easily positioned and manipulated throughout all portions of a chamber from which the contents are to be removed, and wherein the apparatus may be compactly folded and stored in an unobtrusive manner when not in use.

The objects of this invention are attained by an apparatus which includes supporting brackets mounted upon any suitable supporting surface and from which are pivotally mounted for horizontal movement thereon, a supporting assembly including a frame pivoted to the support and a carriage assembly which is connected with the frame by a horizontal pivot for vertical oscillating movement thereabout, together with power-operated means for controlling the oscillatory movement of the carriage upon the frame, together with means for adjustably supporting an extensible boom upon the carriage and further including cable mechanism for supporting and controlling the operation of a scoop from the boom construction.

A further important feature of the invention resides in the provision of an arcuate guide slot and pin for guidingly and slidingly connecting the carriage to the frame and for limiting the pivotal movement therebetween, and wherein the fluid pressure operating means for controlling the pivotal movement of the carriage and frame are conveniently mounted within the side plates of these members.

A further important feature of the invention includes the provision of a vertically disposed cylinder carried by the outer extremities of the side plates of the carrier assembly together with a cylindrical body rotatably mounted in the cylinder and accompanied by a worm and pinion means for rotatably adjusting the body in its socket, which body serves to carry the boom construction.

A still further feature of the invention resides in the provision of an apparatus as set forth in the preceding paragraphs wherein the body is provided with a transversely extending guide bore, and wherein the boom is slidably received in this guide bore together with means for locking the boom in various adjusted positions in the guide bore.

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Yet another important feature of the invention resides in the construction of an apparatus as set forth in the foregoing paragraphs wherein the boom comprises a pair of telescoping tubular members, the inner member being guidingly and slidingly journaled in the outer member for longitudinal extension therefrom, the inner member supporting the cable carrying the scoop at its outer end, together with a sprocket chain for positively controlling the inward and outward movement of the telescoping members.

A still further feature of the invention comprises the provision of a power-operated pair of winches which are selectively but alternatively employed to tension the opposite ends of a flexible cable, these opposite ends being secured to opposite sides of the above mentioned scoop or bucket for positively moving the latter selectively in opposite directions for effecting the scraping action of the same.

And a final important feature and object of the invention to be specifically enumerated herein resides in the provision of an apparatus as set forth in the preceding paragraphs wherein there is provided a flexible reinforcing and bracing member which is tensioned and terminally connected to the inner and outer ends of the inner telescoping member and is entrained over a supporting and guiding pulley carried by a mast rising from the outer telescoping member, and wherein a constant tension is applied to this reinforcing member throughout all the ranges of movement of the telescoping members.

These, together with further ancillary features and objects of the invention which will later become apparent as the following description proceeds, are attained by this device, a preferred embodiment of which has been illustrated, by way of example only, in the accompanying drawings wherein:

Figure 1 is a side elevational view of a preferred embodiment of the principles of the invention, the same being shown applied in operative position to the interior of a boxcar, indicated in section, for emptying grain from the same;

Figure 2 is a top plan view of the dragline mechanism shown in Figure 1;

Figure 3 is an end elevational view of the mechanism;

Figure 4 is a fragmentary vertical longitudinal sectional view taken substantially upon the plane of the section line 4—4 of Figure 2, and showing the manner of journaling the telescoping members of the boom for relative sliding movement;

Figure 5 is a fragmentary vertical sectional

detail view taken substantially upon the plane of the section line 5—5 of Figure 4;

Figure 6 is a diagrammatic view illustrating the manner of manipulating the apparatus to reach various interior portions of a boxcar;

Figure 7 is a vertical longitudinal sectional view through the apparatus taken substantially upon the plane of the section line 7—7 of Figure 3;

Figure 8 is a fragmentary horizontal sectional view taken substantially upon the plane of the section line 8—8 of Figure 7;

Figure 9 is a further horizontal sectional view taken substantially upon the plane of the section line 9—9 of Figure 7;

Figure 10 is a fragmentary vertical sectional view through the boom locking member, taken substantially upon the plane of the section line 10—10 of Figure 1;

Figure 11 is an enlarged perspective view of an element of the locking device of Figure 10;

Figure 12 is a fragmentary side elevational view, parts being omitted, showing the mounting of the fluid pressure operating cylinder forming an element of the device; and

Figure 13 is a detail sectional view of the boom actuating mechanism taken substantially upon the plane of the section line 13—13 of Figure 1.

Referring now more specifically to the accompanying drawings, wherein like numerals designate similar parts throughout the various views, attention is directed first to Figure 1 wherein the numeral 10 designates generally a portion of a railroad bed or track, upon which is mounted a boxcar 12 of the usual type provided with oppositely disposed doors 14 and 16 through which grain or the like may be loaded into or unloaded therefrom.

In accordance with this invention, there is mounted upon a supporting surface 18 which may be the side of a building, or any other suitable substantial supporting structure, the drag-line apparatus forming the subject matter of this invention.

For this purpose, there are provided supporting brackets 20 suitably secured to the supporting surface 18 and providing hinges upon which are supported and journaled for rotation about a hinge pin or pivot pin 22, the upper and lower supporting brackets or lugs 24 forming an integral part of a support frame indicated generally by the numeral 26 and which is thus hinged thereon for horizontal movement.

This frame assembly, as will be best seen by reference to Figures 1, 7 and 9, includes a pair of parallel, vertically disposed and laterally spaced plates 28, see Fig. 9, which are supported by and secured to the supporting brackets 24, as by fastening means 30, although, if desired, these plates 28 could be integrally formed with the brackets 24. A carrier frame, including a pair of vertically disposed parallel plates 32 are slidably received between the upper extremities of the frame assembly plates 28, and at their outer extremities are integrally or otherwise rigidly secured to a cylindrical supporting member 34 provided with a hollow cylindrical bore 36 for rotatably receiving therein the cylindrical lower extremity 38 forming the reduced lower portion of a hollow body 40 to be later described.

The inner extremities of the carriage plates 32 are rigidly secured together by a pin or axle 42, see Figures 9 and 12, to which is pivotally connected the upper extremity of a link 44, see Figures 1 and 7, whose lower extremity is journaled upon a transversely extending axle or pin 46 carried by the lower ends of the frame plates 28.

As indicated in dotted lines in Figures 1 and 7, and also in Figure 12, the carriage plates 32 are provided with arcuate slots 48 which are struck upon a radius having the axis of the pin 46 as a center, and these slots constitute arcuate guides whereby the carriage plates 32 are permitted to have a guided and limited arcuate movement about the axis of the pin 46 between the frame plates 28, by means of a transversely disposed relatively stationary guide pin 50 which is carried by and extends transversely of the frame plates 28.

A fluid pressure operated cylinder and piston indicated in toto by the numeral 51 are mounted within the space between the parallel carriage plates 32, see Figures 9 and 12, are activated through fluid pressure conduits 53 in any desired manner, and are connected at their extremities to the frame plates and the carriage plates for effecting a controlled, relatively arcuate movement between these members, which arcuate movement in a vertical plane is independent of the horizontal swinging movement of the carriage and frame plate assembly about the vertical axis 22.

These arcuate and horizontal swinging movements are relied upon both to hold the apparatus back against the supporting wall 18 in a compact manner to prevent obstruction of the railway tracks 10, when the device is not in use, as well as to facilitate the introduction of the apparatus into the interior of a boxcar 12 through the doors 14 or 16 thereof, and for maneuvering the apparatus within the boxcar as set forth hereinafter.

The vertically oscillating movement of the carriage plates upon the frame plates enables the device supported by the carriage plates to be moved into and out of the boxcar and to be raised or lowered with respect to the floor thereof, as will be apparent.

Integrally formed upon the upper end of the body 40 is a transversely disposed member 52, see Figures 7 and 10, provided with a transverse bore which, as shown in Figure 7, is provided with pairs of upper and lower guide rollers 54 for slidably receiving and guiding the tubular outer member 56, of preferably rectangular cross section as shown in Figures 3, 5 and 10, within whose hollow interior is guidingly and slidingly received a telescoping inner member 58, forming a boom construction as set forth hereinafter.

Any conventional form of manually operated locking means indicated at 60 in Figure 1 may be employed for locking the boom member 56 in various positions of sliding adjustment within the transverse bore of the body 40. One suitable means to effect the desired result is shown in Figures 7, 10 and 11, wherein an operating wheel or crank 61 is fixed to a transverse shaft 63, threaded at 65 and journaled transverse the member 52. A sliding wedge locking device is actuated by the shaft 63 and includes an upper body 67, internally bored and threaded at 69, to receive the screw 65. This upper body has a rectangular depending guide portion 71 slidable in a longitudinal channel 73 in the U-shaped lower body 75. Thus, the upper body is guided for longitudinal sliding movement in the lower body in a direction transverse the walls of the housing 52.

The upper body has lateral cam or wedge-

shaped flanges or shoulders 77 which are slidable upon the correspondingly inclined sides of the U-shaped member 75, so that as the screw 65 is rotated, the sliding movement of the upper body will cause, through the wedging surfaces, a downward movement of the lower body.

This latter movement causes the under surface of the body 75 to press downwardly upon the upper surface of the member 56 and wedge or lock the same against sliding movement in the housing 52. If desired, a suitable friction or pressure plate 79 may be interposed between the members 75 and 56 as shown in Figure 10.

Secured upon the periphery of the body 40 is an annular gear rack or pinion 62 which is manually operated by a worm gear 64 of any suitable construction and mounted in any suitable manner upon the stationary cylindrical member 34. By this means, that is, by the worm gear and pinion, the body 40 and the boom adjustably carried thereby may be swung horizontally in any desired direction in order to position the boom at any portion of the interior of the boxcar, as indicated in dotted lines in Figure 6.

As will be best seen by reference to Figure 4, the outer end of the tubular boom member 56 is provided with upper and lower guide rollers 66 which guide and journal the inner boom member 58, while the latter is provided with a rigidly attached cross-head or slide 68 at its inner end which is secured to the tubular inner member 58, as by a fastening pin 70, and which, in turn, is provided with anti-friction rollers 72, which are slidable upon the inner surface of the outer boom member 56, as shown in the detail view of Figure 5. It will thus be seen that the inner member is freely slidable longitudinally of the outer member, to provide a longitudinally extensible boom controllable in the manner set forth hereinafter.

Secured to what may be termed its rear or base end, the outer boom member 56 is provided with an upwardly extending, rigidly attached mast 74 and a guide pulley 76 is suitably journaled upon the lower end of this mast, similar guide pulleys 78 and 80 being journaled as at 82 in slots 84 in the side wall of the outer boom member 56 adjacent the other end of the latter as shown in Figure 4.

A cable 86 has its terminals connected as at 88 and 90 to opposite sides of the slide or cross-head 68, as shown clearly in Figure 4, and this cable is entrained over the pulleys 78 and 76 and thence over the pulleys 92, 94, and 96 journaled in the hollow body 40 as shown in Figure 7. One of these pulleys, such as the pulleys 94, see Figure 13, may be provided with a hand crank or other means for applying a tension to the cable at either of the fastenings 88 or 90 selectively, to thereby positively urge the slide or cross-head 68 and the inner boom member 58 longitudinally of the outer member 56. As will be noted, the cable, in effect, constitutes a flexible endless member, of substantially unvarying tension whereby the inner member of the boom may be positively urged inwardly or outwardly of the outer member as desired.

The pulley 94 is carried by a shaft 91 having a pinion 93. The latter is in mesh with a worm gear 95 having an operating wheel or handle 97 and is supported by a lug 99. The worm thus provides an irreversible drive for the pinion to thus adjust and lock the boom in various positions.

By this means, the free end of the inner member 58 may be thus extended, and by means of the above mentioned various pivotal movements of the mechanism, may be positioned at various distances and various angles within the boxcar for accessibly reaching all portions of the same.

It will be noted that both ends of the outer boom member 56 are open, whereby the cable may freely enter the rear end to engage the slide 68 at the connection 90, and whereby the inner boom member 58 may be freely moved inwardly and outwardly of the outer member.

At its outermost extremity, the inner boom member 58 is provided with a head plate 98 which, at its upper extremity, is provided with an adjusting eye-bolt 100, and at its lower extremity is provided with a rotatable pulley 102. The upper end of the mast 74 is likewise provided with a pulley 104 journaled thereon. As will be best seen by reference to Figures 1, 4 and 7, a flexible cable 106 is provided as a tensioning and reinforcing member to perform a trussing action for the extensible boom, this cable being entrained over the pulley 104, and over the above mentioned pulley 80, and has its ends connected to the eye-bolt 100 and at 108, see Figure 4, to the cross-head or slide 68. By means of the eye-bolt 100, any desired tension may be imparted to the flexible cable 106, which thus serves to impart rigidity and a truss-like strength to the telescoping boom construction. It will be noted that the arrangement of the flexible cable 106 about its supporting pulleys is such that the tension of the cable is not impaired by the telescoping action of the two boom members.

A pair of flexible cables 100 and 112 are secured to opposite sides of a dragline scoop or bucket 114, for positively scraping the same in opposite directions, as set forth hereinafter. This scoop, which may be in the form of a plate, is preferably provided with a hinged lower portion 116, pivoted or hinged as at 118, but maintained in the position shown in Figure 1 as by spring means or the like, whereby the scoop is free to yield at its lower end if an obstruction such as a cleat or the like is encountered in dragging the scoop across the floor of the boxcar. A suitable turnbuckle 120 is provided for varying the angle of inclination of the plate 114 with respect to the two draglines 110 and 112.

The line 112 is entrained over the pulley 102 and thence, as shown in Figure 7, enters, by means of the opening 122, the hollow interior of the body 40 and its cylindrical bearing portion 38, being therein entrained over a pulley 124 journaled in the interior of the body. The cable thence extends over a guide pulley 126, and emerging from the open lower end of the hollow cylindrical portion 38 is wound upon a winch 128 suitably mounted upon a supporting plate 130 carried by the carriage plate assembly.

The cable 110 is, in turn, entrained over a pulley 132, and is then wound upon a winch 134, likewise mounted upon the supporting plate or platform 130. The two winches 120 and 134 are connected together as by a sprocket gearing assembly 136, while a second sprocket chain assembly 138 connects the two winches with a power source such as an electric motor indicated at 140 in Figure 7. Preferably, each of the winches is provided with a friction brake and with a clutch assembly whereby the winches may be alternatively rotated by the motor 140, these clutches being interposed between the sprocket gearing 136 and the winch shafts, these brakes and clutches being of a known construction and therefore not being illustrated in the drawings.

As will be readily understood, when the motor 140 is actuated, either of the clutches may be operated so that the corresponding winch is rotated, whereby one of the cables 110 or 112 is tensioned and thus moves the dragline scoop 114 in a predetermined direction, the other cable being drawn off the reel or winch against the resistance of the brake applied thereto. Thus, the dragline scoop may be positively operated in either direction, and by means of proper manipulation of the boom, may be maneuvered to cover the entire interior of the boxcar.

From the foregoing, it will be seen that the boom may be extended to various lengths as desired and during this extension the truss-like bracing action of the tensioning member 106 remains unimpaired, while the dragline cables 110 and 112 are free to operate. Further, the entire boom assembly may be moved laterally of the transverse member 52, and locked in various desired positions by means of the locking mechanism 60, to further facilitate the action of the device. Moreover, the boom may be swivelled in the cylindrical socket member 34 by means of the worm and pinion construction 62 and 64 to position the same at various angles with respect to a transverse plane of the boxcar. Finally, the boom may be inclined with respect to the horizontal plane by means of the pivotal movement of the carrier plate assembly through the action of the slot 48 and guide pin 50, while the entire device may be moved about a vertical pivot by means of the journals of the brackets 24 upon the hinge pin 22.

Thus, the device may be compactly positioned for storage without obstructing the clearance necessary for railroads, but may be conveniently manipulated to easily reach the entire interior of a boxcar for quickly dragging by means of the winch actuation of the scoop, the grain or other material from the interior thereof.

From the foregoing, the construction, operation and advantages of the device will be readily understood, and further explanation is believed to be unnecessary. However, since numerous modifications will readily occur to those skilled in the art after a consideration of the foregoing specification and accompanying drawings, it is not desired to limit the invention to the exact construction shown and described, but all suitable modifications and equivalents may be resored to, falling within the scope of the appended claims.

Having disclosed and described the invention, what is claimed as new is as follows:

1. In a car unloader, a support, a frame pivoted to said support for horizontal swinging movement, a carriage pivoted to said frame for movement towards and away from said frame about a horizontal pivot, a body rotatably mounted on said carriage for movement about a vertical axis, a horizontally extending boom on said body and a scoop depending from and movable longitudinally of said boom, said boom including telescoping outer and inner members, manually operable means for effecting longitudinal movement of said members, said manually operable means including a cable secured at its opposite ends to said inner member and a pulley for moving said cable, truss means supporting the outer ends of said inner and outer members which automatically adjusts itself to relative longitudinal movement of said members.

2. In a car unloader, a support, a frame pivoted to said support for horizontal swinging movement, a carriage pivoted to said frame for movement towards and away from said frame about a horizontal pivot, a body rotatably mounted on said carriage for movement about a vertical axis, a horizontally extending boom on said body and a scoop depending from and movable longitudinally of said boom, said boom including a telescoping outer and inner member, manually operable means for effecting longitudinal movement of said members, said manually operable means including a cable secured at its opposite ends to said inner member and a pulley for moving said cable, truss means supporting the outer ends of said inner and outer members which automatically adjusts itself to relative longitudinal movement of said members, a mast, said truss means including a cable terminally attached to opposite ends of said inner member and attached intermediate its ends to said mast and to the outer end of said outer member.

3. The combination of claim 2 wherein said mast is attached to said outer member.

4. In a car unloader, a support, a frame pivoted to said support for horizontal movement, a boom, means attaching said boom to said frame for horizontal and vertical pivotal movement relative thereto, said boom including telescoping inner and outer members, means for reciprocating said inner member relative to said outer member, truss means supporting the outer ends of said inner and outer members which automatically adjusts itself to relative longitudinal movement of said members, a mast, said truss means including a cable terminally attached to opposite ends of said inner member and attached intermediate its ends to said mast and to the outer end of said outer member.

5. The combination of claim 4 wherein said mast is attached to said outer member.

6. The combination of claim 4 wherein said outer member is reciprocably attached to said attaching means, means for locking said outer member relative to said attaching means.

7. A car unloader comprising a vertical support, a vertically elongated frame hingedly secured to said support for horizontal swinging movement thereabout, a carriage secured to said frame and being mounted to extend from and retract within said frame, a boom supporting structure pivotally mounted on said carriage and an extensible boom carried by said supporting structure, and means for extending and retracting the carriage, said frame comprising a pair of parallel side plates, brackets hinging said side plates to said support, said carriage being mounted on said frame between said side plates adjacent the upper end of said side plates, said carriage including spaced parallel side plates received between said frame side plates, a vertically swingable arm pivotally secured at its lower end to the lower portion of said frame side plates and at its upper end to said carriage side plates, said carriage side plates having slots therein struck at a radius from the lower pivotal securement of said arm, a pin extending between said frame side plates and through said slots and being secured at its ends to said frame side plates to guide movement of the carriage.

8. A car unloader comprising a vertical support, a vertically elongated frame hingedly secured to said support for horizontal swinging movement thereabout, a carriage secured to said frame and being mounted to extend from and retract within said frame, a boom supporting structure pivotally mounted on said carriage and

an extensible boom carried by said supporting structure, and means for extending and retracting the carriage, said carriage having a vertically disposed cylinder secured thereto, said boom supporting structure being rotatably journaled on said cylinder and means for manually rotating said supporting structure from said cylinder.

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