

April 3, 1934.

E. ZEUTHEN

1,953,579

HYDRAULICALLY OPERATED AUTOMATIC REFUSE LOADER

Filed Sept. 20, 1932

8 Sheets-Sheet 2

Fig. 2

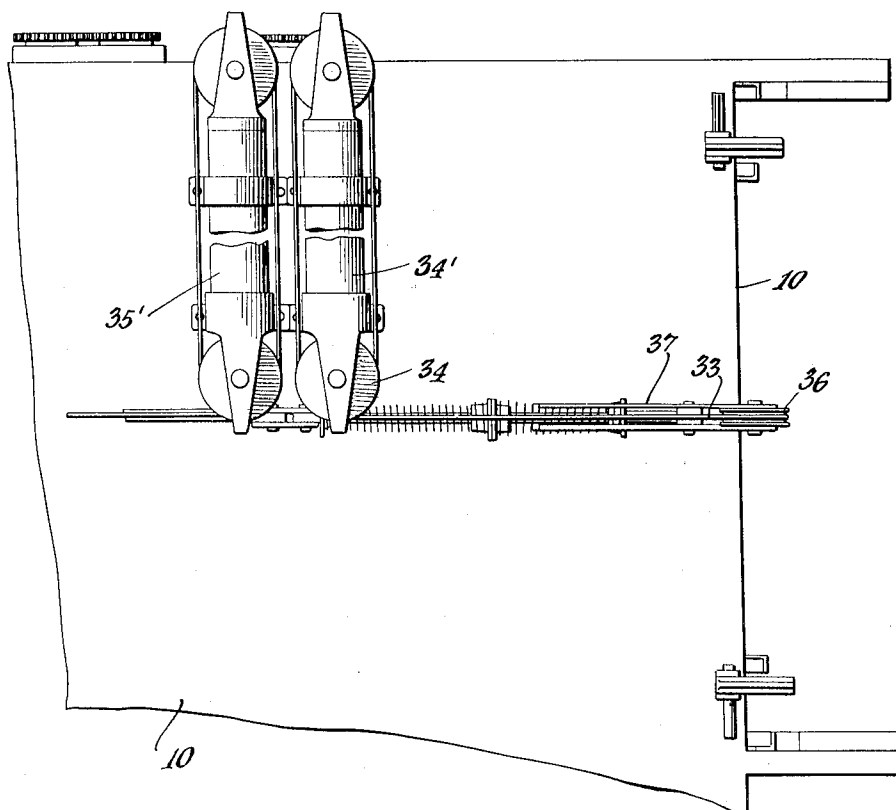
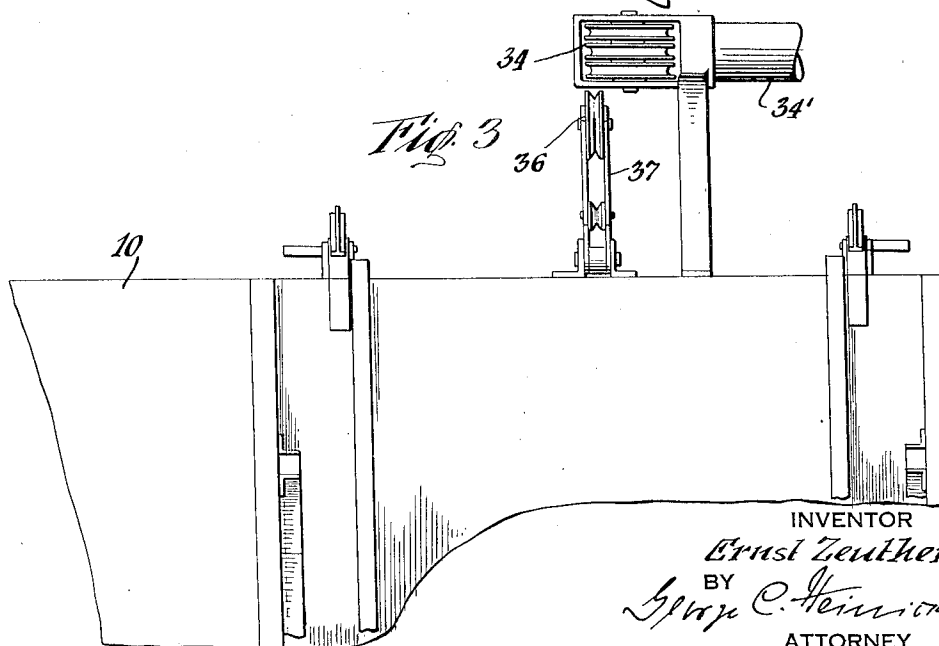


Fig. 3



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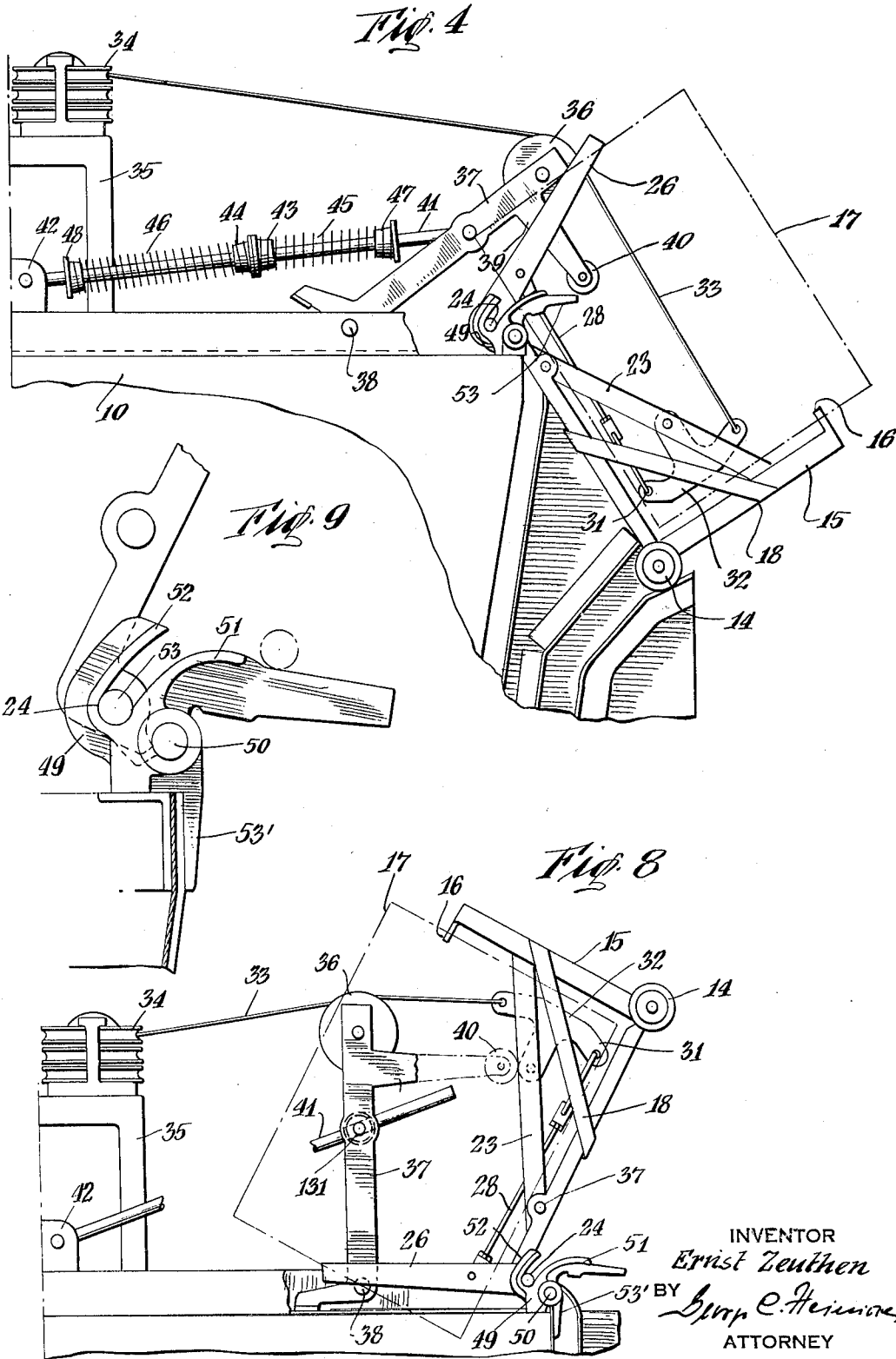
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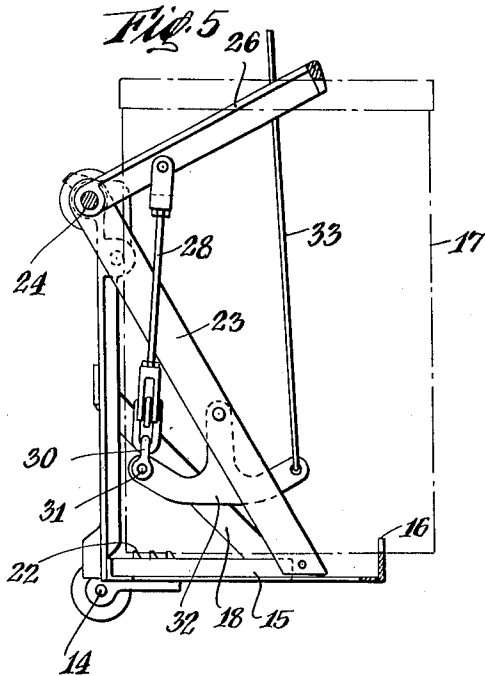
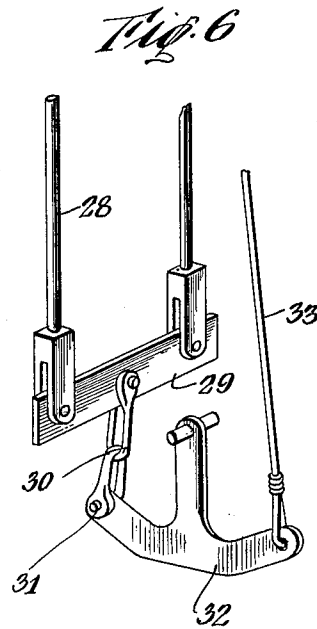
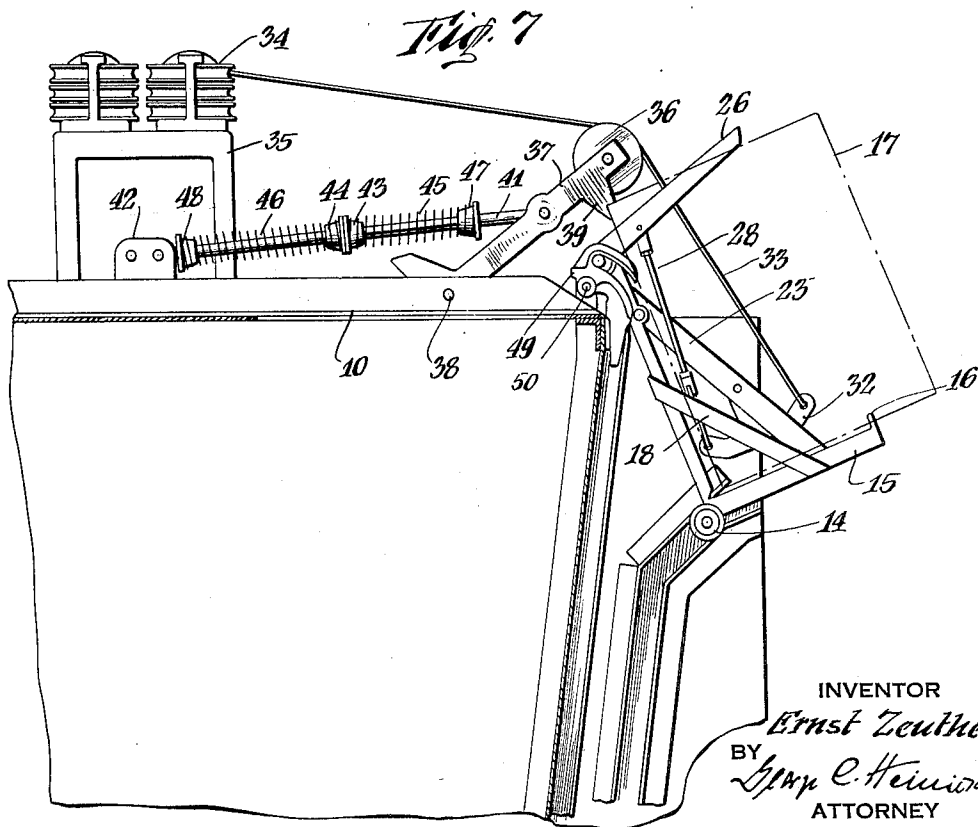
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HYDRAULICALLY OPERATED AUTOMATIC REFUSE LOADER

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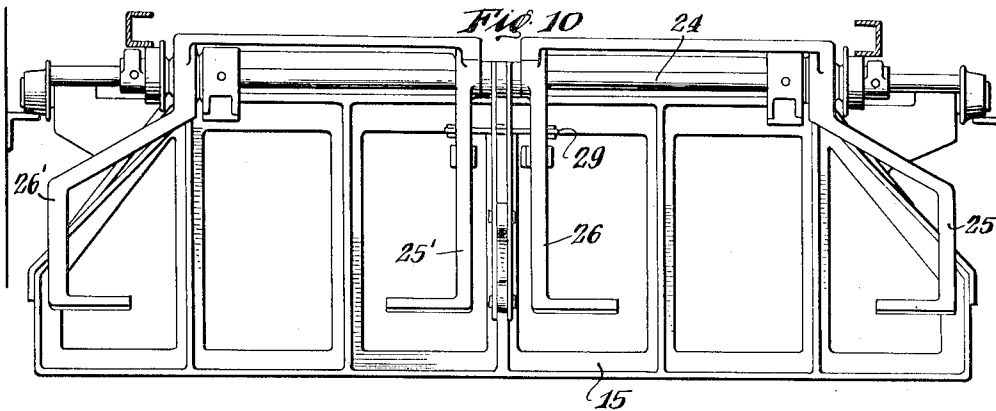
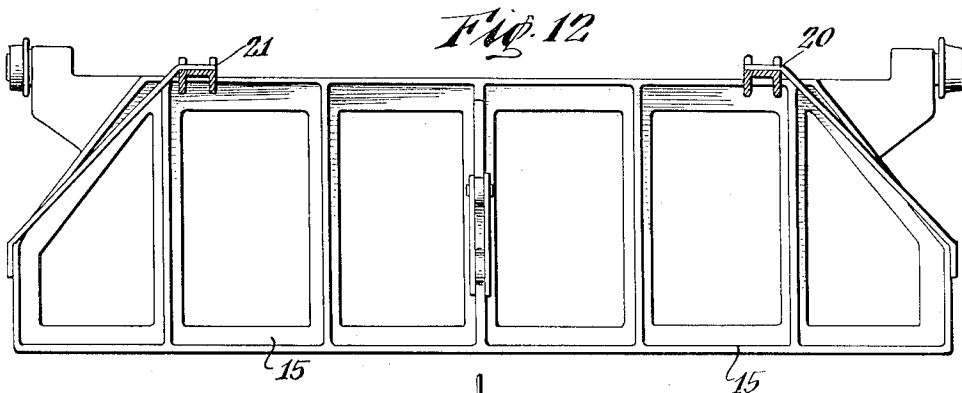
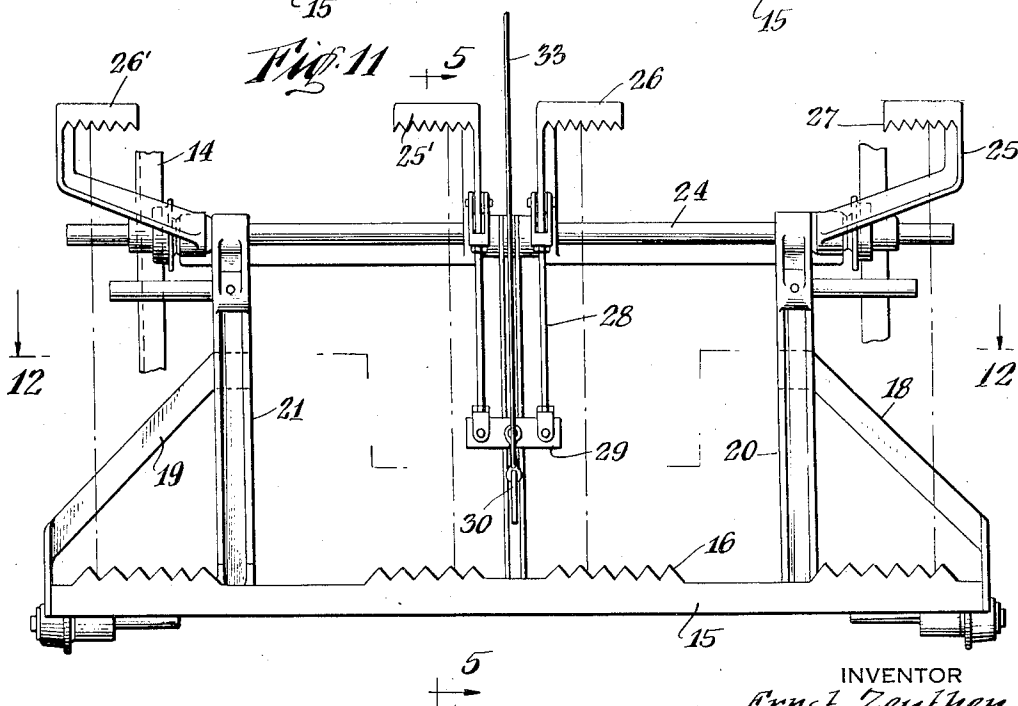
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HYDRAULICALLY OPERATED AUTOMATIC REFUSE LOADER

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8 Sheets-Sheet 5



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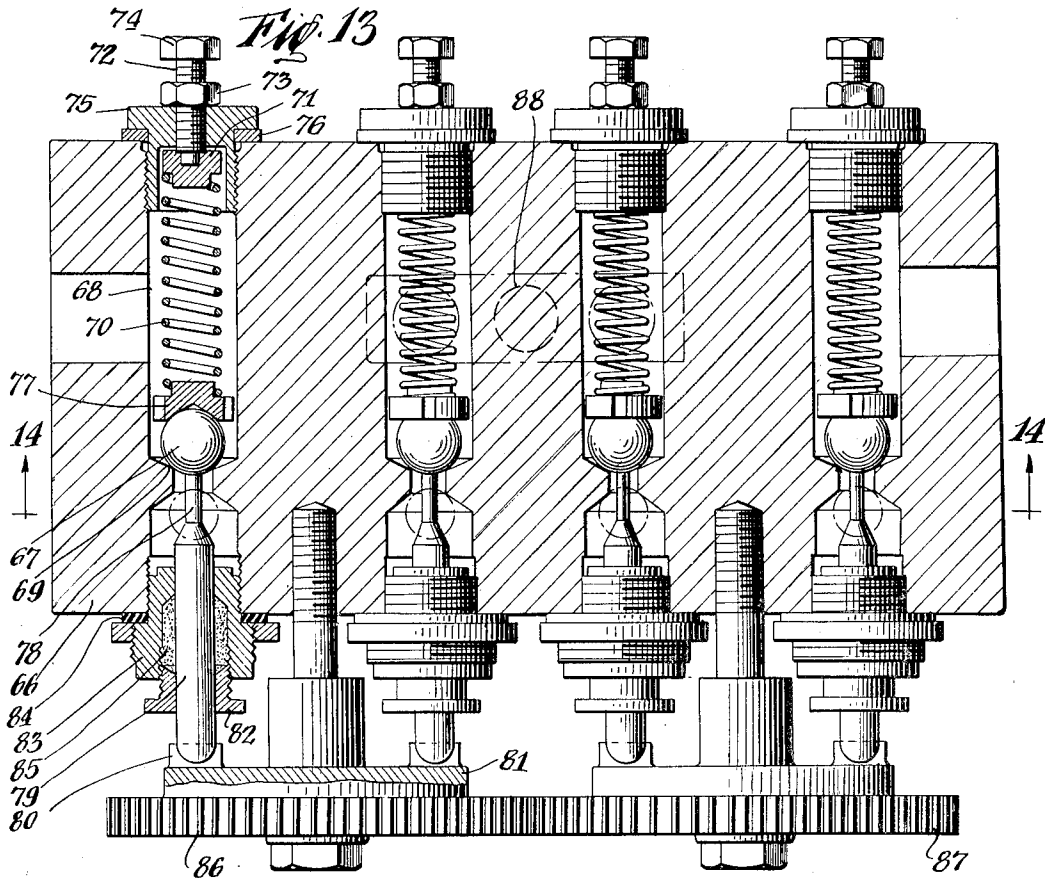
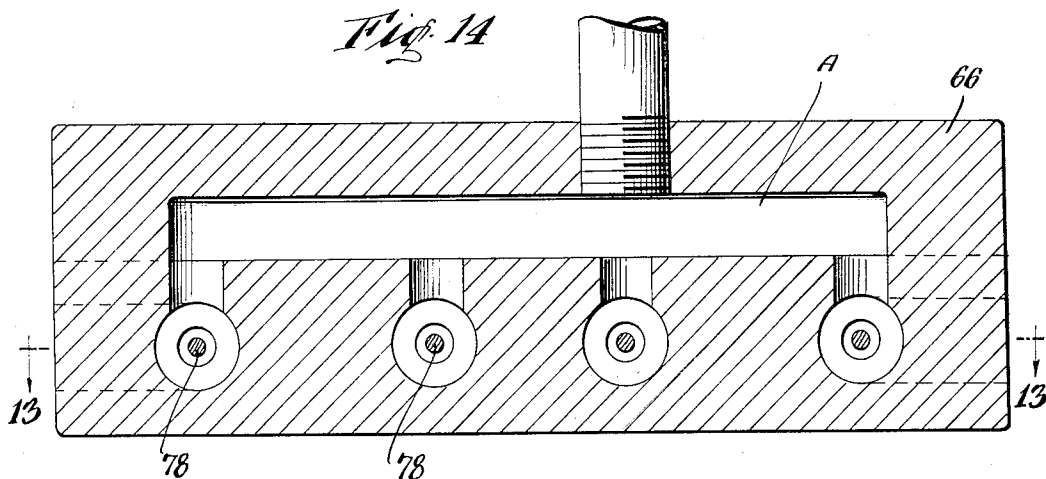
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HYDRAULICALLY OPERATED AUTOMATIC REFUSE LOADER

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8 Sheets-Sheet 6



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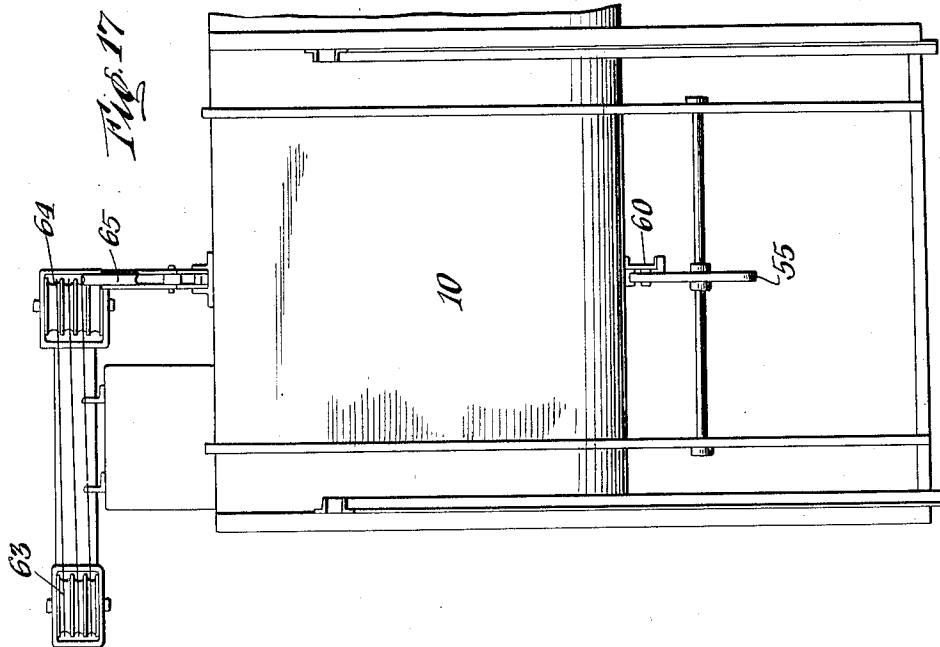
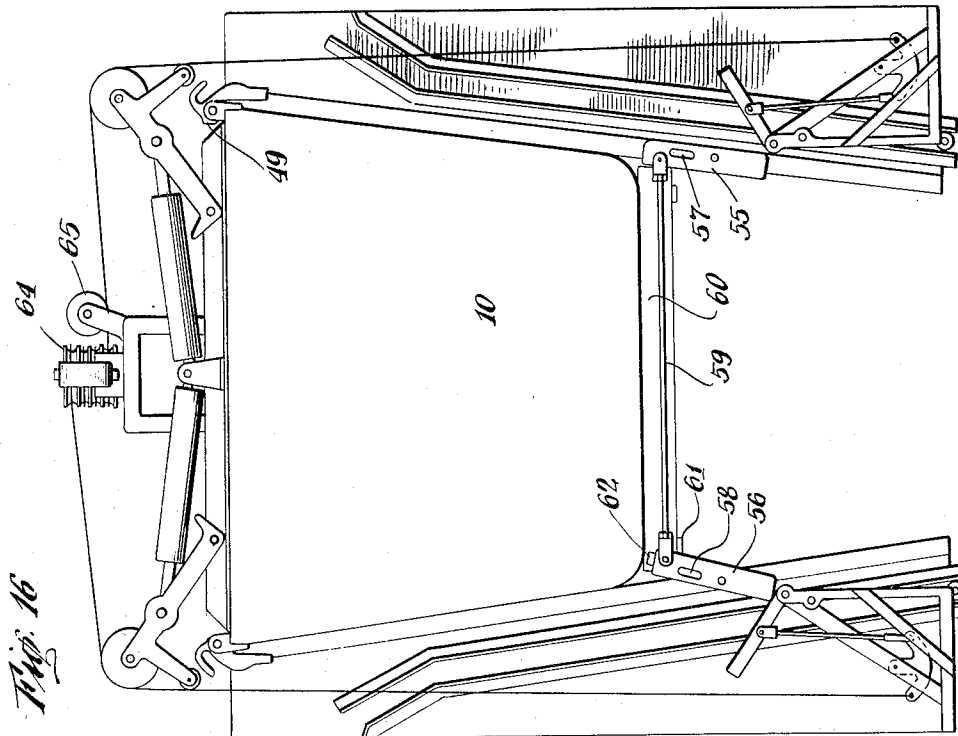
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HYDRAULICALLY OPERATED AUTOMATIC REFUSE LOADER

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8 Sheets-Sheet 7



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HYDRAULICALLY OPERATED AUTOMATIC REFUSE LOADER

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Fig. 18.

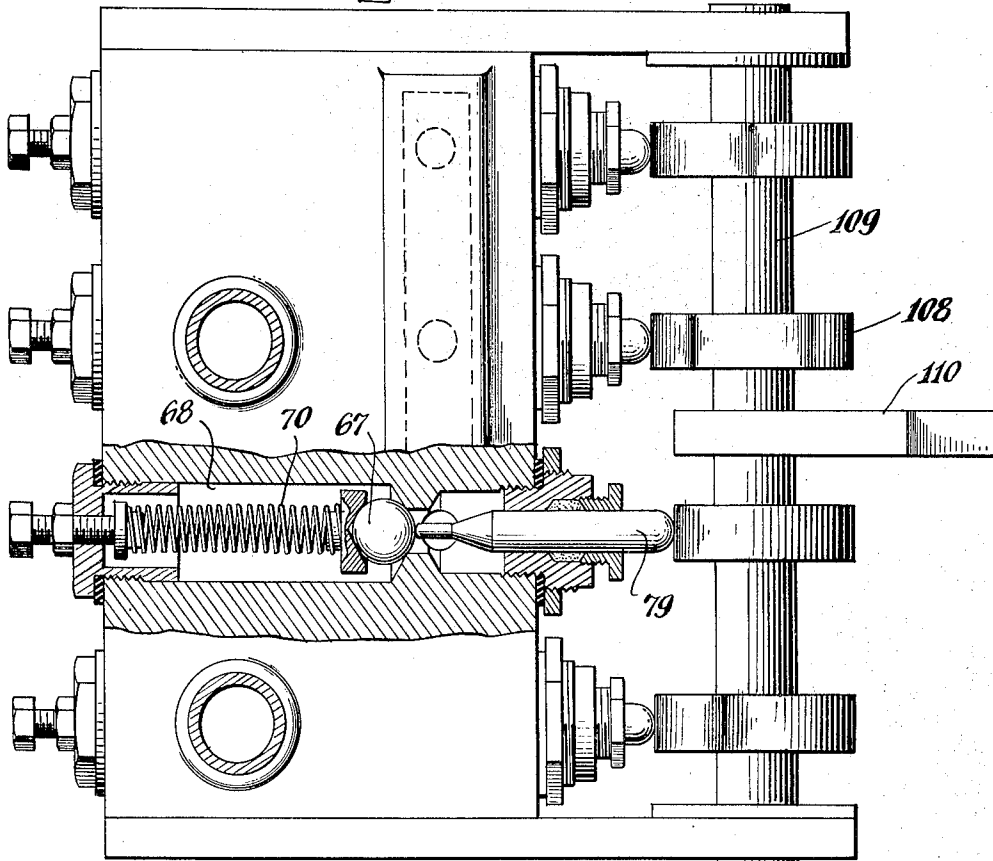


Fig. 19.

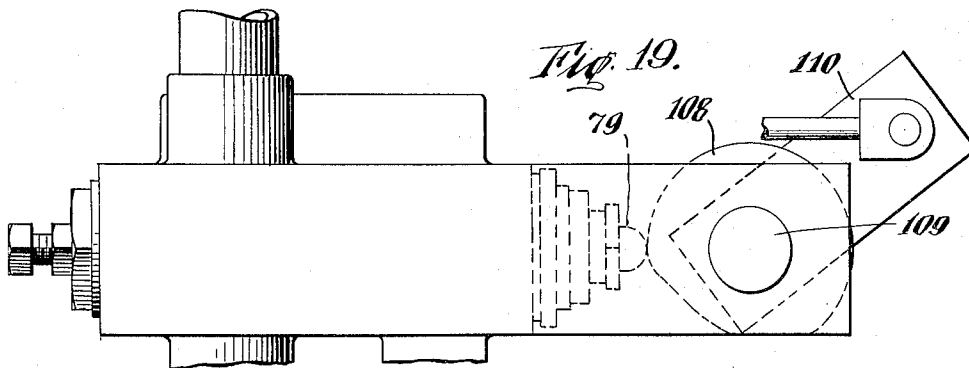
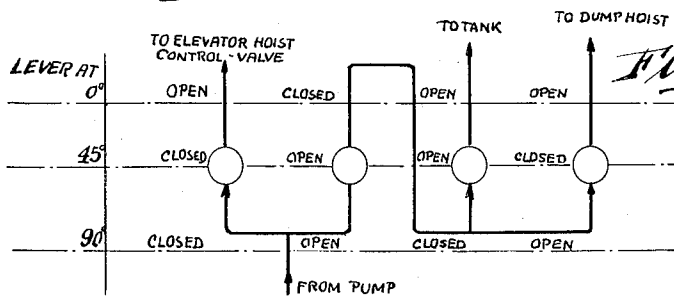


Fig. 20.

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UNITED STATES PATENT OFFICE

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HYDRAULICALLY OPERATED AUTOMATIC
REFUSE LOADER

Ernst Zeuthen, Brooklyn, N. Y.

Application September 20, 1932, Serial No. 633,953

3 Claims. (Cl. 214—67)

This invention relates to improvements in refuse loaders, particularly hydraulically operated loaders, and it is the principal object of my invention to provide a novel and improved valve arrangement by means of which it is possible to regulate the manipulation of the loading mechanism by means of a lever in the cab of the truck controlling a common oil pressure pump.

Another object of my invention is the provision of a novel and improved valve arrangement the valves of which include steel balls seated on cone-shaped openings against which they are held by spiral springs, and which are adapted to be removed from their seats by means of rods actuated by cams on a rotatable disc, or by eccentric cams on a cam shaft, in order to obtain various relative positions of the balls by a change of the cams under the rods. Each valve is made in two sections which are interconnected by gear wheels fastened concentrically to the cam discs and each section has two ports one of which controls the admission of the oil to the hydraulic hoist, while the other connects directly or indirectly to the return line to the tank.

Still another object of my invention is the provision of a hydraulically operated refuse loader equipped with elevators on each side of the truck, each adapted to support one or more cans and provided with means to automatically lock the cans to the elevators as soon as their upward movement commences, automatically accommodating itself to cans of various sizes, and to release the cans automatically at the end of their downward movement.

A further object of my invention is the provision of hydraulically controlled means for holding the elevators during their dumping operation by means of recessed fittings rotating about a fixed point and adapted to be cantilevered back to their original position by an organ on the elevators, to allow a return travel of the elevators with the emptied cans into loading position.

A still further object of my invention is the provision of a novel and improved boom and a hydraulic "wind-up" arrangement to operate the cables controlling the elevators by the intermediary of oil operated, valve controlled standard hoist cylinders.

My invention also comprises novel and improved means for locking the elevator on one side of the truck, in its loading position, while the elevator on the other side is operated.

These and other objects and advantages of my invention will become more fully known as the description thereof proceeds, and will then be

more specifically defined in the appended claims.

In the accompanying drawings, forming a material part of this disclosure:

Fig. 1 is a fragmentary cross-section through the truck body showing part of the elevator hoist in side elevation, with the elevator hoisted half-way up.

Fig. 2 is a fragmentary top plan view of an automatic refuse loader constructed according to my invention.

Fig. 3 is a fragmentary side elevation of the upper end of the loader.

Fig. 4 is a fragmentary side elevation of the upper part of the loader illustrating the elevator about to be tilted.

Fig. 5 is a side elevation of one of the elevators, partly in section on line 5—5 of Figure 11.

Fig. 6 is a detail view of part of the can locking mechanism.

Fig. 7 is a view similar to Figure 4, showing the elevator position after the tilting operation.

Fig. 8 illustrates the elevator and co-operating parts in the moment of tilting.

Fig. 9 illustrates a detail view on an enlarged scale of the cantilever fitting.

Fig. 10 is a top plan view of the elevator.

Fig. 11 is a front elevation thereof.

Fig. 12 is a section on line 12—12 of Figure 11.

Fig. 13 is a sectional detail view of the multiple control valve mechanism.

Fig. 14 is a section on line 14—14 of Figure 13.

Fig. 15 is a diagrammatic view of the hydraulic system.

Fig. 16 is a front elevation of a device for operating the elevators, one at a time, by means of a common hydraulic plunger.

Fig. 17 is a side elevation.

Fig. 18 illustrates a modified form of valve mechanism.

Fig. 19 is an end view thereof.

Fig. 20 is a diagram of the valve mechanism.

As illustrated, the truck body 10 is provided on both of its sides with pairwise arranged laterally disposed extensions or walls 11, on the oppositely disposed inside of which tracks 12 and 13 are arranged, the channels 12 being intended for the guidance of the lower rollers 14 of the elevators' bottoms 15 which are pairwise arranged, one on each side of the truck.

The elevators are constructed alike, so that the description of one will sufficiently explain the construction and operation of the others also.

The bottom plates 15 of the elevators have raised toothed front guards 16 to hold the cans 17 in position. The bottom plates are braced by

braces 18, 19, against the uprights 20, 21, and the ends of the bottom are also provided with raised toothed guards 22 and diagonal braces 23 brace the bottom against the shaft 24 carrying the holder arms 25, 26, and 25', and 26', for engaging the upper parts of the cans and provided with teeth 27. The arms are connected by means of the draw bars 28 to a connecting member 29, which by means of a short chain 30 is connected intermediate its ends to one of the flukes 31 of an anchor-shaped element or member 32.

The other fluke of anchor 32 is connected to a cable 33, which is wound about pulleys 34, arranged on a supporting frame 35, on top of the loader truck body 10, carrying standard oil cylinders, a stationary one 34' and a movable one 35'.

The cable 33 intermediate its ends is guided over a pulley 36 journaled at the outer end of a boom 37 pivoted at its opposite knee-shaped end, as at 38, to the truck body.

This boom has an angularly disposed arm 39 formed therewith carrying a roller 40 at its outer end adapted to engage the diagonal brace 23 when the elevator is in the dumping position, (Figure 8). Intermediate its ends the boom has a fitting 131 in which slides a rod 41 attached at its inner end to a bracket 42 on the truck body, and carrying a spring arrangement 46.

The rod 41 carries the spring guides 43, 44, and springs 45, 46, are wound about the parts of rod 41 between collar 43 and an outer collar 47, and between collar 44, and an outer collar 48 respectively.

The cantilever fittings 49 illustrated in detail in Figure 9 are turning about pivot point 50 and include two arms 51, and 52, somewhat curved and having their inner faces separated by a recess 53 ending at their apex into which engages rod 24 during the turning of the elevators before dumping while a third arm 53' is limiting the cantilever, as will be later more fully described in the operation.

As shown in Figures 16 and 17, it is sometimes desirable to operate the elevators optionally one at a time, by means of a common hoist. For this purpose, I provide the two members 55, 56, pivoted intermediate their ends and provided with the handle slots 57, 58.

The members 55, 56, are connected at their upper ends by means of a rod 59 within a channel 60 on the underside of body 10.

In Figure 16, the right hand elevator is free to operate while the elevator on the left hand side is locked against operation, by means of the strips 61, 62, and the engagement of the lower face of member 56 with the elevator, the construction is otherwise the same as in the preferred form with the exception that I use three pulleys 63 on the plunger of the hydraulic hoist and four pulleys 64 on the stationary part of the hydraulic hoist, while an idler 65 is arranged on one side of the pulleys 64.

In Figures 13 and 14, I have illustrated in detail the arrangement and construction of the valves, which are arranged in any required number in a block 66.

Each valve consists of a steel ball 67, within a valve chamber 68 held against a cone-shaped perforated seat 69 by means of the spring 70 resting with its upper end against the block 71 adjustable by means of screws 72 carrying the locking nuts 73, 74, and passing through the threaded bushings 75 pressing against washers 76. The lower ends of the spring rests against the block 77 within chamber 68. Pins or studs 78

engage with their upper ends the balls 67 of the several valves, and are arranged at the upper ends of plungers 79 actuated by cams 80 on a disc 81 which can be rotated. The plungers 79 are held in place by means of adjusting screws 82 in bushings 83 carrying washers 84 and an inner packing 85.

Each valve consists of two sections interconnected by the gear wheels 86 and 87 turning in opposite directions and fastened concentrically to its particular disc of the cam discs 81, and each section has two holes one of which 88' admits the oil to the hydraulic hoist while the other connects directly or indirectly to the return line 88 to the tank.

Valve, Figure 18, is identical with part 113, in diagram Figure 15, and is used as a combination of a dump hoist control valve and a three-way valve facilitating the sectional use of either the dump hoist or the elevator operation by means of a common pump.

Valve, Figure 13, on the other hand, is a combination of two elevator control valves whose cam-arrangement and gear interconnection function so that the operation of one elevator automatically makes the other inoperative and vice versa.

Valve arrangement

1. The two elevators have individual hydraulic hoists. Their control valves are combined in a common block and interconnected with spur gears fastened concentrically to the cam-discs.

When one elevator is operated by turning the control valve cam disc, the gears turn the corresponding disc for the other elevator in a direction opposite to the operating direction and thereby set up a cam displacement which will render the elevator inoperative during the travel of the manually controlled elevator.

2. The two elevators have a common hoist controlled by a valve with levers on both sides of the truck.

The two elevators are mechanically interlocked.

In Figures 18 and 19, I have illustrated a modified form of my valve operating mechanism, which is in general constructed the same as the valve mechanism, illustrated in Figure 13 with the exception that I use cam discs 108 on shaft 109 to actuate the rods 79 operating the valves 67, while a lever 110 is used to operate the shaft and discs thereon by means of a connecting rod carried to the driver's seat in the cab.

In operation the oil is brought from the tank 111 by means of a rotary pump 112 to a valve 113 which consists of two sections operated together by the elevator levers 114 in the cab 115 of the truck 10. One section of this valve acts as a three way valve which selectively directs the oil to either the main dump hoist 116 or to the control valve 117 controlling the hoists for the refuse elevators.

The valves consisting of steel balls adapted to be pushed from their cone-shaped seats on which they are normally held by suitable springs by the rods 79 are actuated by the cams on their discs. It will be clear that by changing the cams under the rod various relative positions of the balls may be obtained. As each valve consists of two sections interconnected by gear wheels fastened concentrically to the cam discs and each section has two balls one will admit the oil to the hydraulic hoist while the other connects directly or indirectly to the return line of the tank. This is shown in Figures 13 and 14, where

88' at the right and left hand side are the parts connecting to the hoist and 88 is the return line to the tank.

The dump hoist operating lever 110, or 114 respectively, and both elevator levers are assumed to be in the "lowering position".

The oil flows from the tank 111 through the pump 112 to valve 113 and through valve 117 and back to the tank. Valve 113 is operated if operation of the dump hoist is desired and valve 117 if the elevator hoists shall be operated. By turning the cam disc 45 degrees, on the valve 113, the valve 117 is cut out and the oil returned directly to the tank.

If, however, the cam disc is turned an additional 45°, the return to the tank is closed and the oil is forced into the dump hoist cylinder or cylinders thereby raising the truck body. If the control lever 114 is left in this position and the end of the dumping action is reached the ball connecting to the tank will be raised by the excessive pressure and act as a relief valve. When now the control lever 100 is returned 45° the oil is trapped in the dump hoist which remains in a stationary position while the oil from the pump is allowed to flow back into the tank. This is effected in the following manner: The operation of one valve section by means of the manipulation of the corresponding cam disc in a clockwise direction causes the other cam disc to rotate in a counter clockwise direction due to the intermeshed gear wheels. The cam sectors are so developed that the indirectly operated disc will shut off the oil pressure line to the corresponding hoist.

Returning the control lever another 45° causes the valve to permit the oil to flow from the hoist cylinder back into the tank, and the oil from the pump to circulate through 117 and back to the tank.

The valve 117 is similar to the valve 113 except for the arrangement of the cams on the disc. If now one elevator is to be operated, the corresponding control lever 114 is operated causing the disc to rotate 72 degrees (clockwise for raising the elevator). The cams will manipulate the rods and the balls in the corresponding section of the valve arrangement and the oil flow is controlled in a manner similar as described for the dump hoist. During this operation of one elevator the valve section for the other elevator is made inoperative by means of the arrangement illustrated in Figures 16 and 17. As shown in these figures, the elevators are mechanically interlocked and have a common hoist operated by means of a simple control valve. If one elevator is held by means of the interfering members 56 and 62, the elevator on the opposite side of the truck will go up when oil is admitted to the hoist. As shown in Figure 16 member 56 has been manually turned about its pivot point by the engagement of the operator's fingers in slot 58 so as to engage the operating lever for the elevator with its lower end and with its upper end the body 10. When an elevator has reached its extreme top position the oil pressure builds up and opens the relief valve to the tank so that the elevator remains stationary until the control lever 150 is moved to the lowering position. During the dumping of the elevator when the same has reached its highest position it is turned up-side down, by the pull of the cable and in so doing it carries the boom 37 along from a slanting position (Figure 4) to a

vertical position (Figure 8) thereby engaging wheel 40 of the boom with diagonal strut 23 and compressing spring 45, 46. When now the oil is permitted to flow back to the tank the spring 45, 46, will return the boom 37 into slanting position and the cable will retract the hydraulic hoist and roller 40 will push the elevator from its inverted position to its downward traveling position. When the elevator has reached its inverted position it will be necessary to hold the ends of the shaft 24 in their fulcrums fixed until the wheels are confined within the track 12, 23, as otherwise the elevator is apt to come down up-side down. This is effected by the cantilever of member 49 engaging with its member 53' the truck.

The elevators are designed to accommodate cans varying in sizes, of diameters as well as of height and the cans are placed on the chutes side by side. As soon as the cable 33 tautens, the bracket arms 26, 27, 26', 27', will engage and clamp the refuse cans adjusting themselves to cans of varying sizes. Coming down, the bracket arms will be lifted by their engagement with the stops or abutments 118 and release the cans.

It will be understood that I have described and shown the preferred forms of my invention only as examples of the many possible ways to practically construct the same and that I may make such changes in the general arrangement and in the construction of the minor details thereof as come within the scope of the appended claims without departure from the spirit of my invention and the principles involved.

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

1. In an automatic refuse loader, elevators, a spring controlled movable boom, a pulley on said boom, a cable attached to said elevators and guided over said pulley, an hydraulically operated hoist including cable sheaves at both of its ends to raise said boom from a slanting into a vertical position during the tilting and dumping of the cans, compressing its controlling spring, an arm on said boom having an end roller adapted to engage the elevator to effect its rightening after the dumping of the cans on said elevators, and holding the cable tight at all times, thereby holding the cans in the elevator.

2. In an automatic refuse loader, elevators to both sides of the loader, means to guide said elevators during their upward and downward motion, a draw-bar on said elevators connected at their lower ends, an anchor shaped element having one of its flukes connected to said draw bars, and a hoist cable connected to the other fluke of the anchor, means for hydraulically hoisting said elevators by means of said cable, means operating by the operation of said anchor to accommodate and lock a number of cans of varying sizes to said elevators during their hoisting and dumping, and abutments to release said locking means.

3. In an automatic refuse loader as described, including elevators and cans thereon, holder arms engaging the cans to hold them on said elevators, a shaft carrying said holder arms, cantilever fittings turning about a pivot point and including two curved arms having their inner faces separated by a recess into the apex of which said shaft engages, during the turning of the elevators before dumping, and a third arm on said fittings engaging the loader.

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