Sept. 20, 1955 J. S. PILCH 2,718,312

MATERIAL HANDLING APPARATUS

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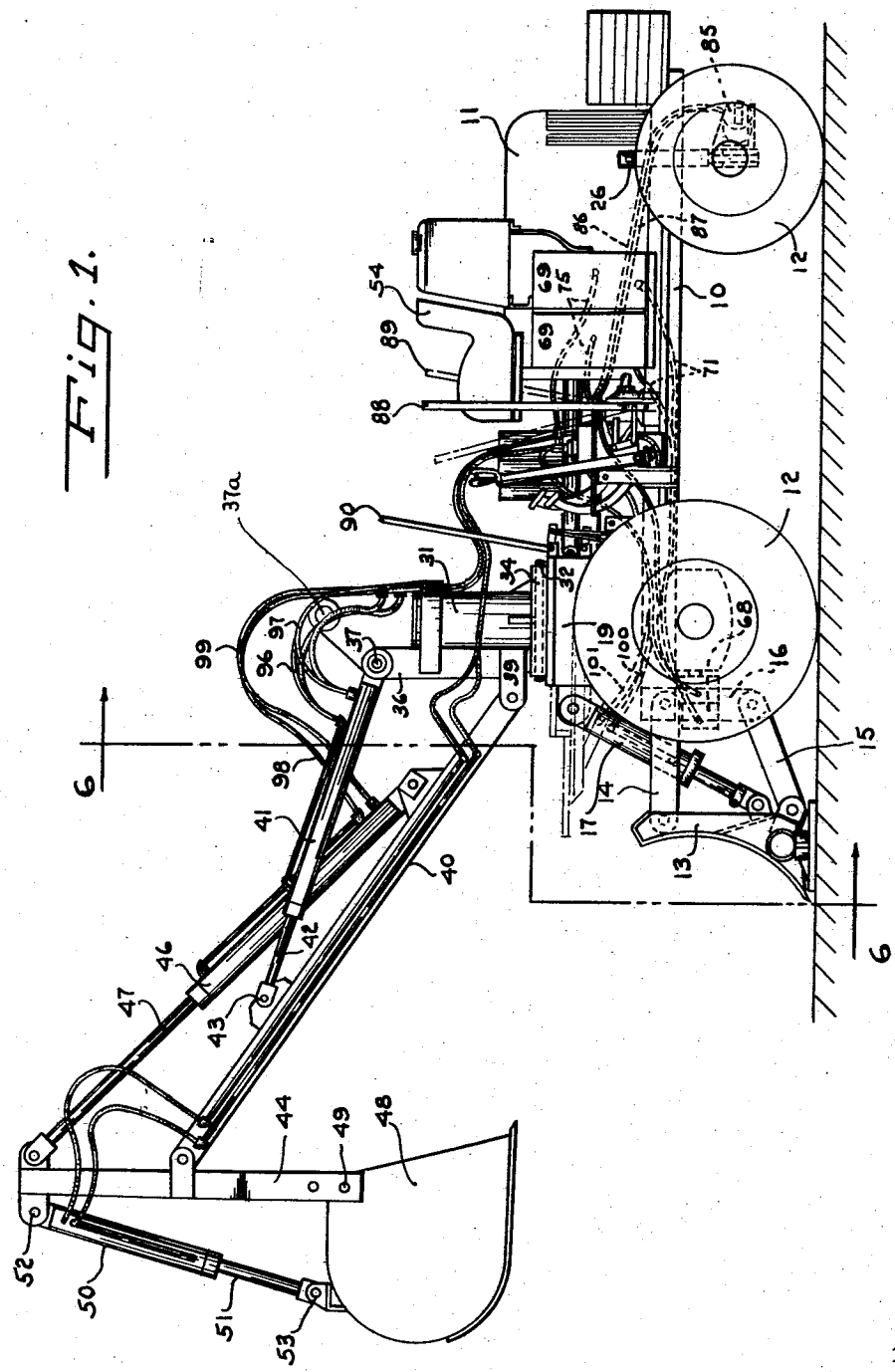
Fig. 1.



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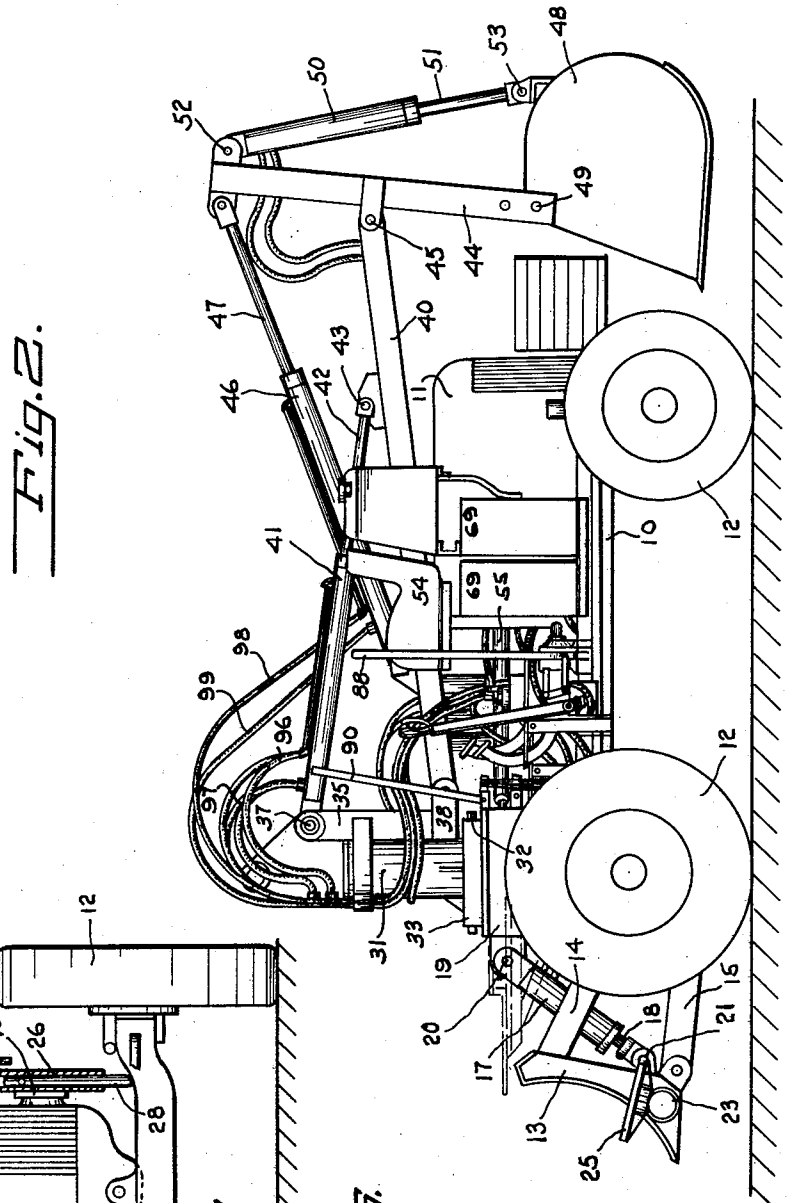

Fig. 2.

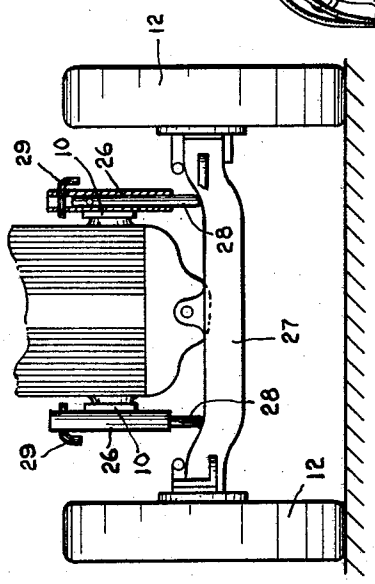

Fig. 1B.

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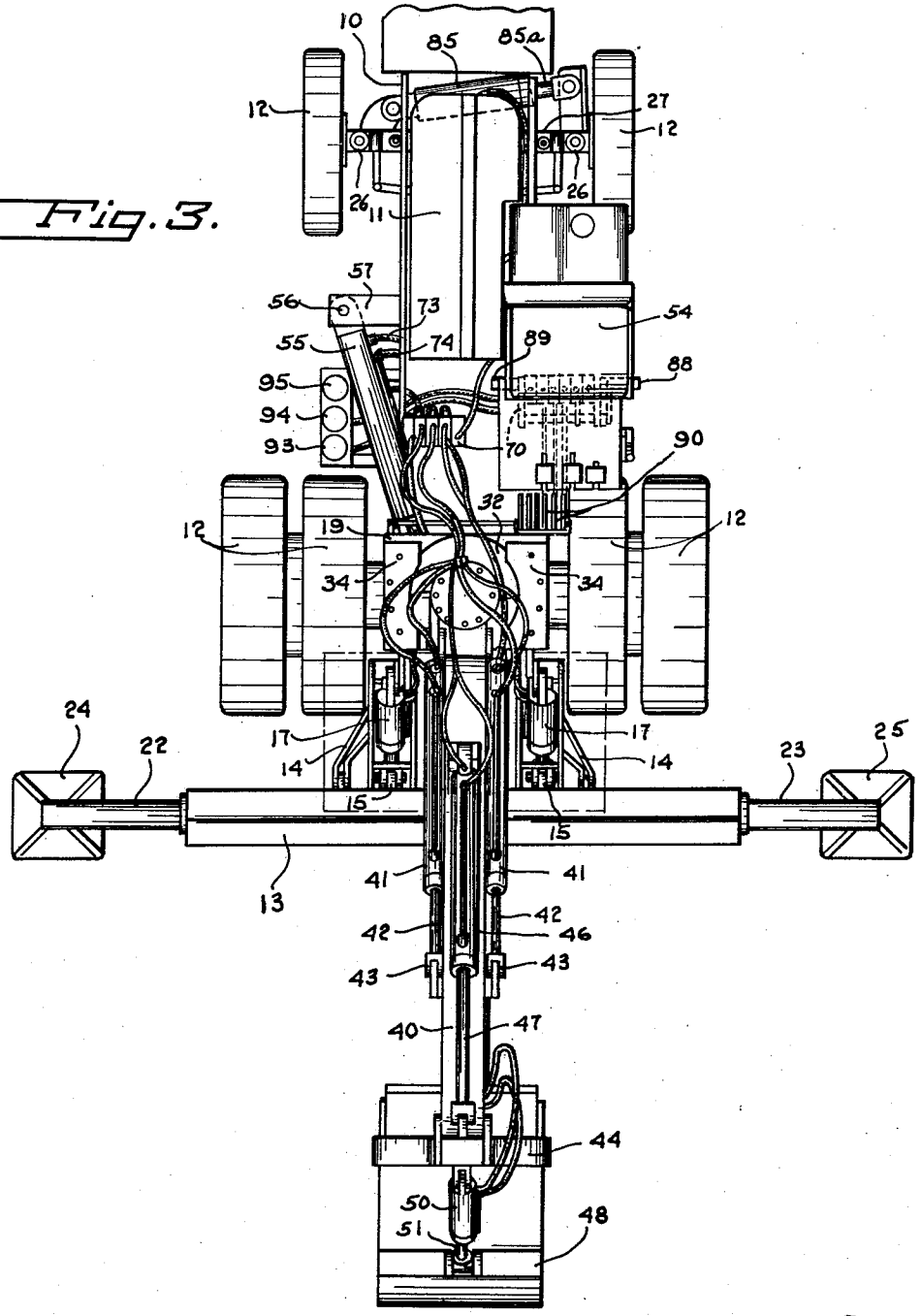
Fig. 3.



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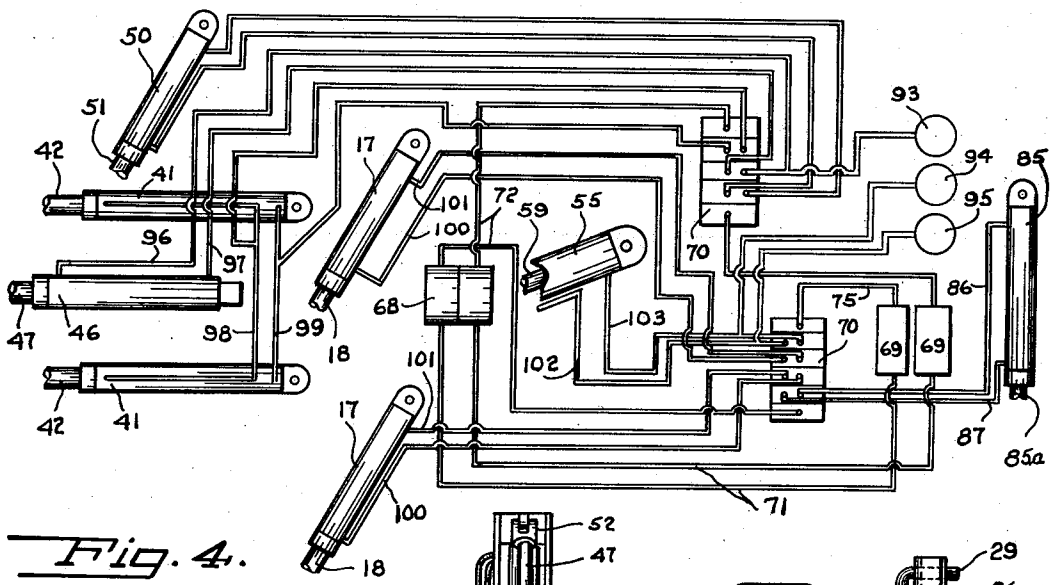

Fig. 4.

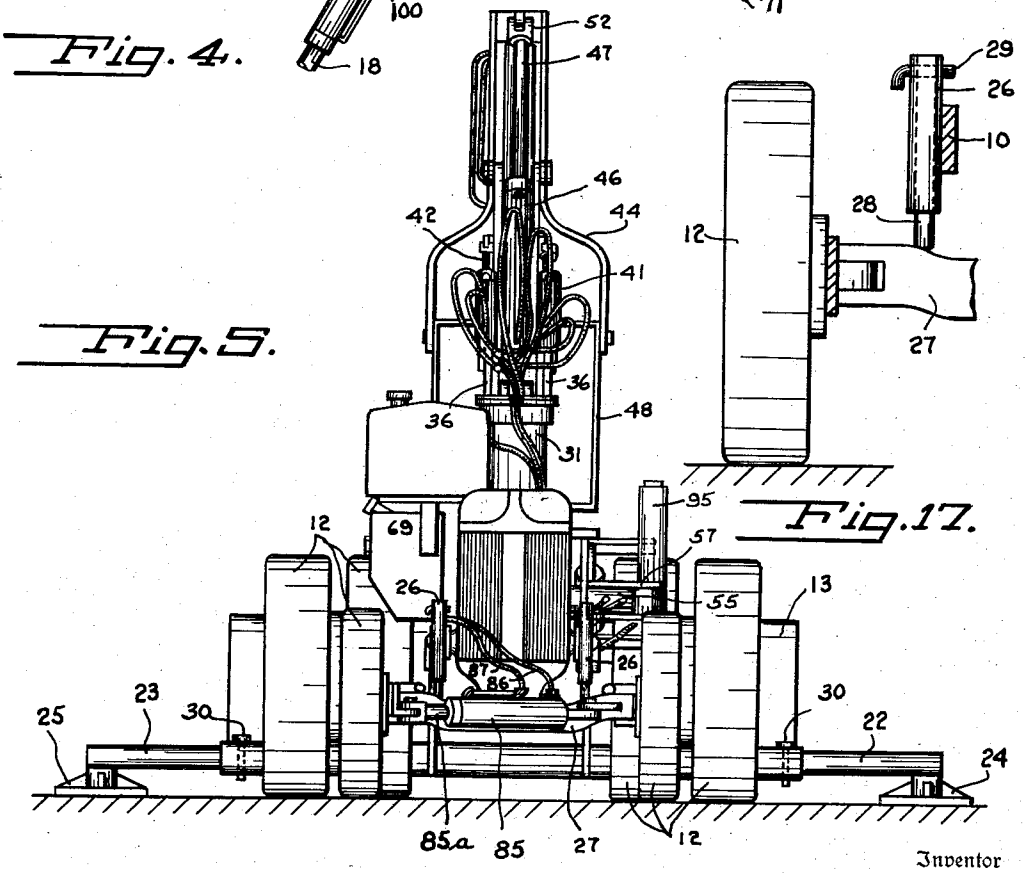

Fig. 5.

Fig. 17.

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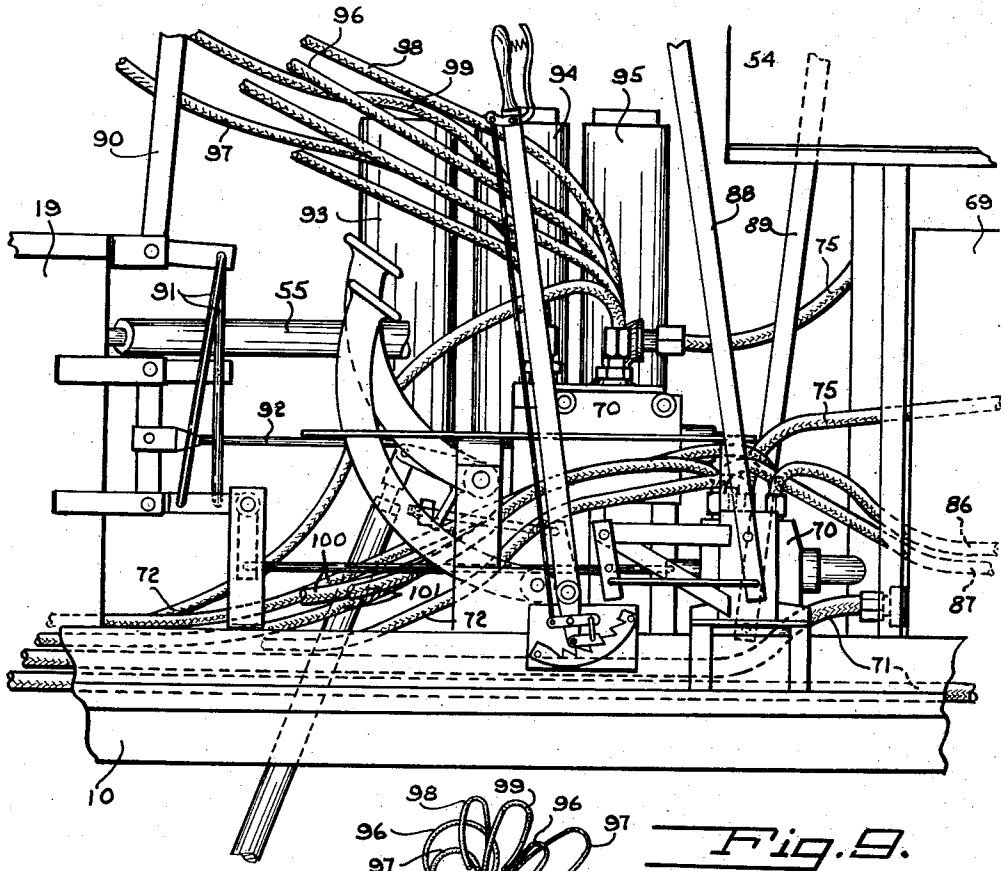

Fig. 9.

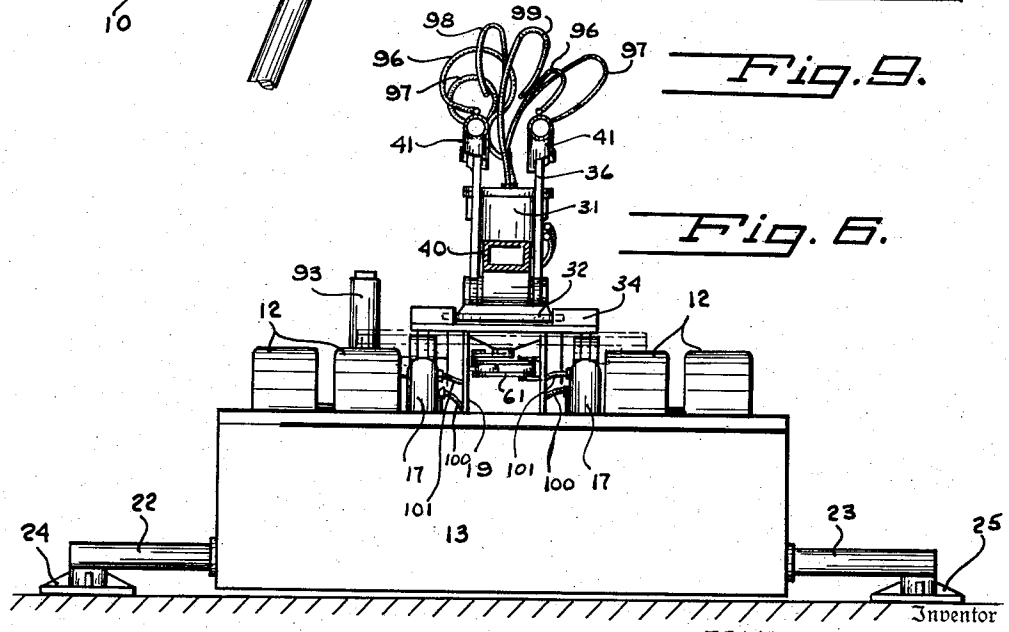

Fig. 6.

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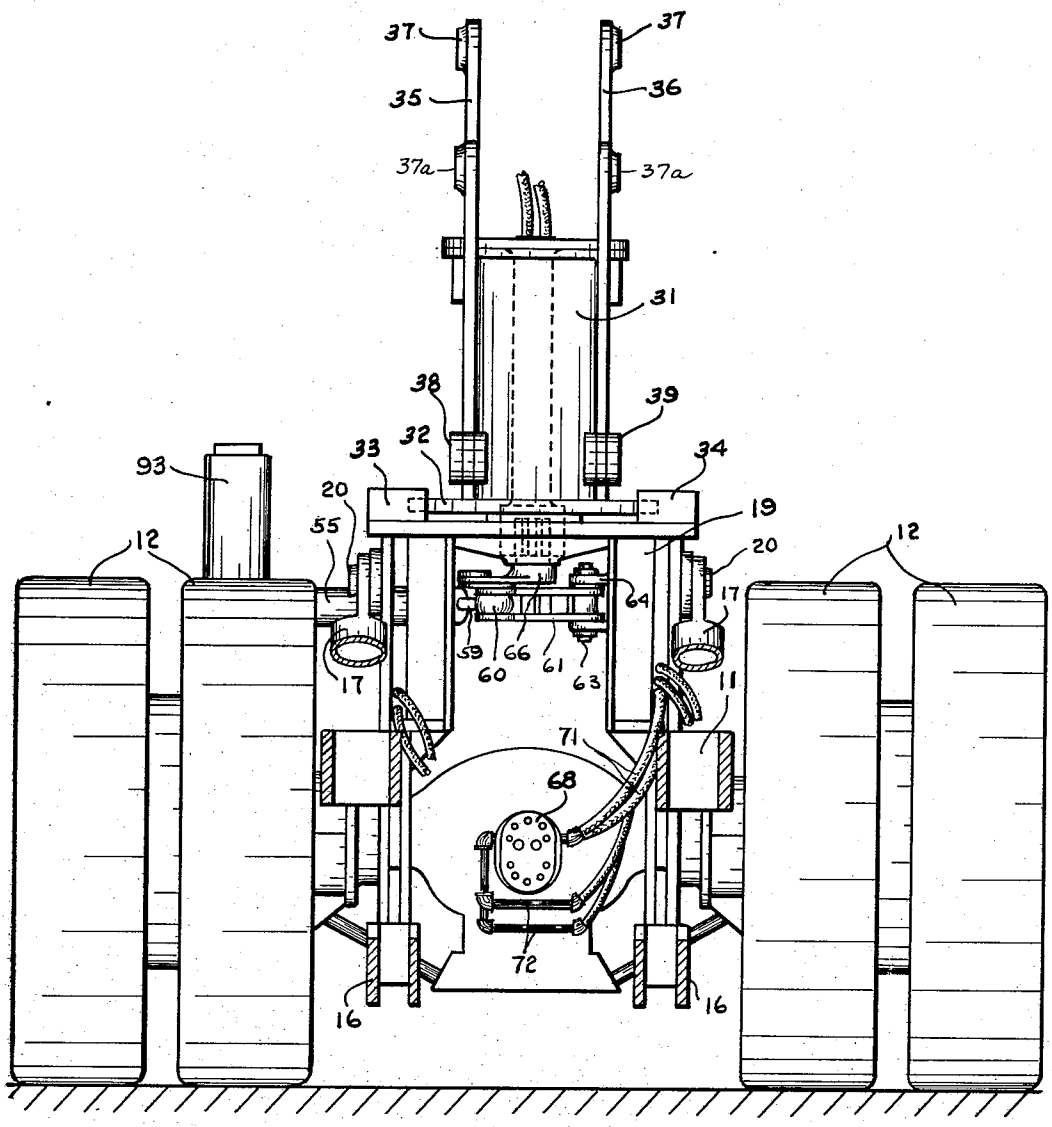

Fig. 7.

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Fig. 8.

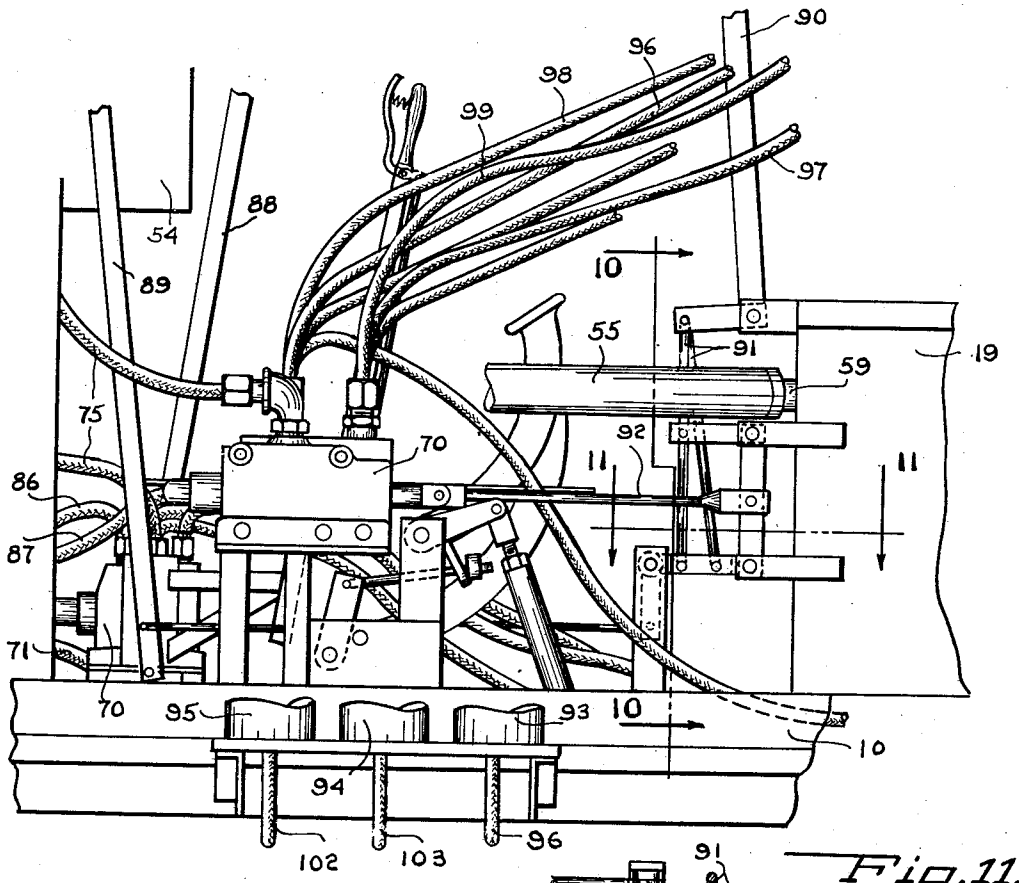
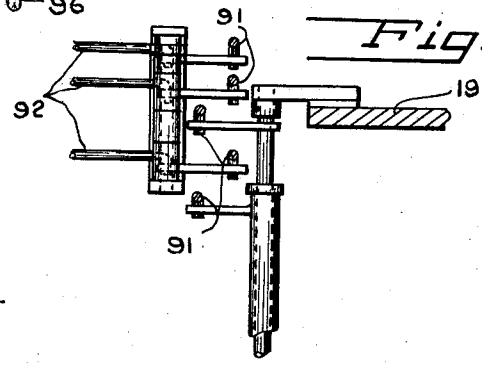


Fig. 11.



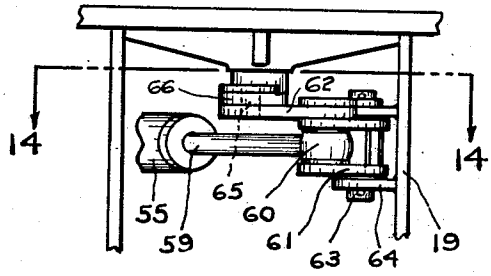


Fig. 13.

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Fig. 10.

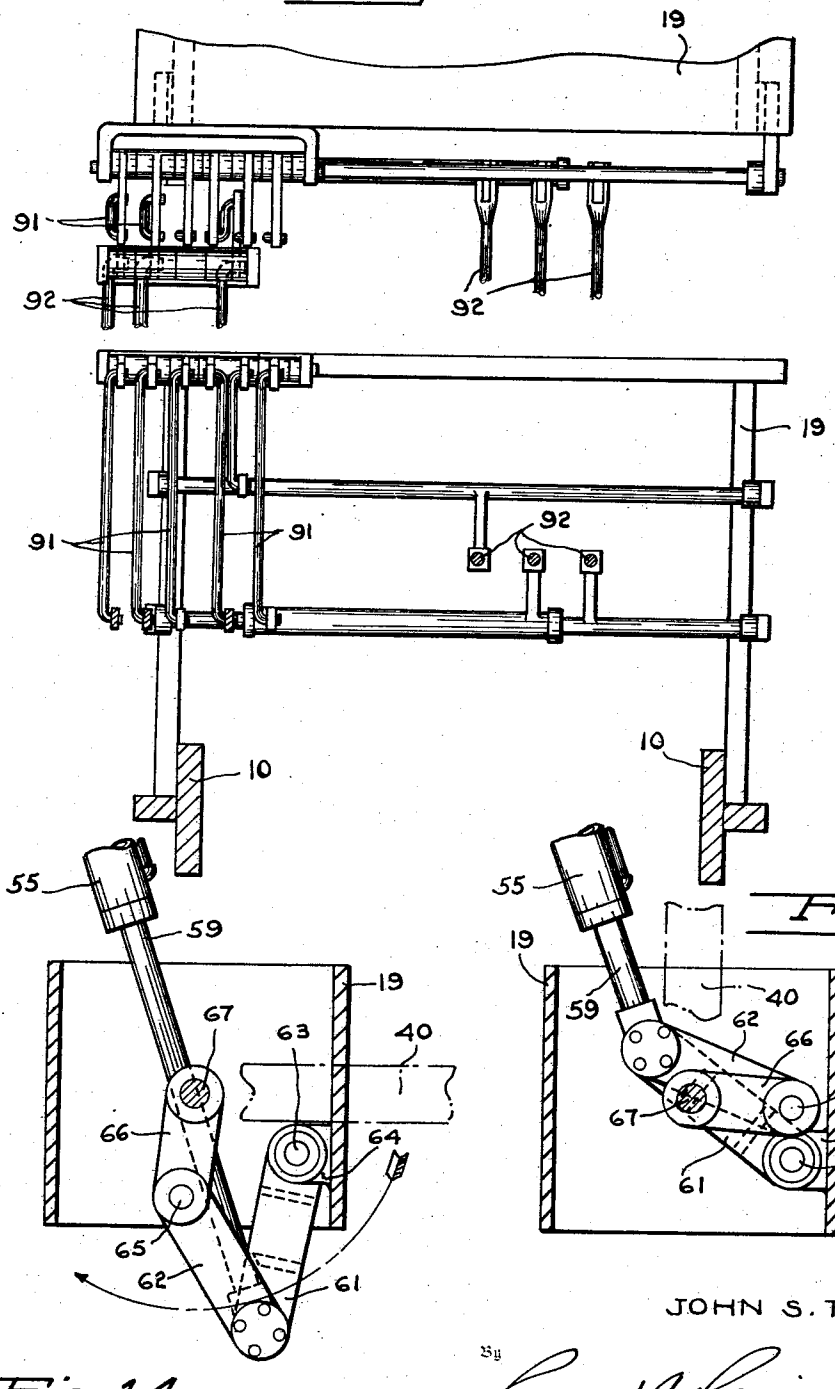

Fig. 14.

Fig. 15.

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Fig. 12.

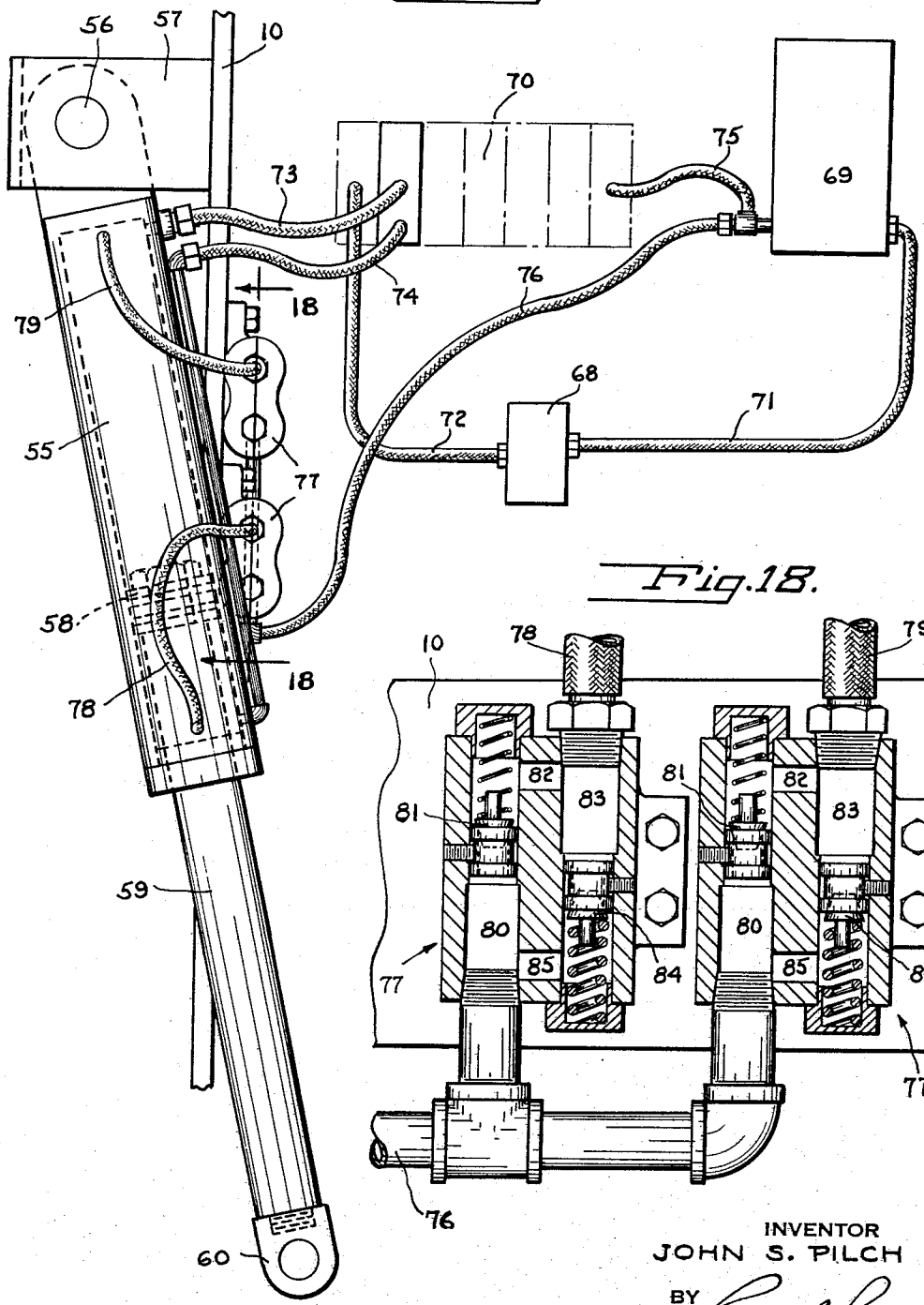

Fig. 18.

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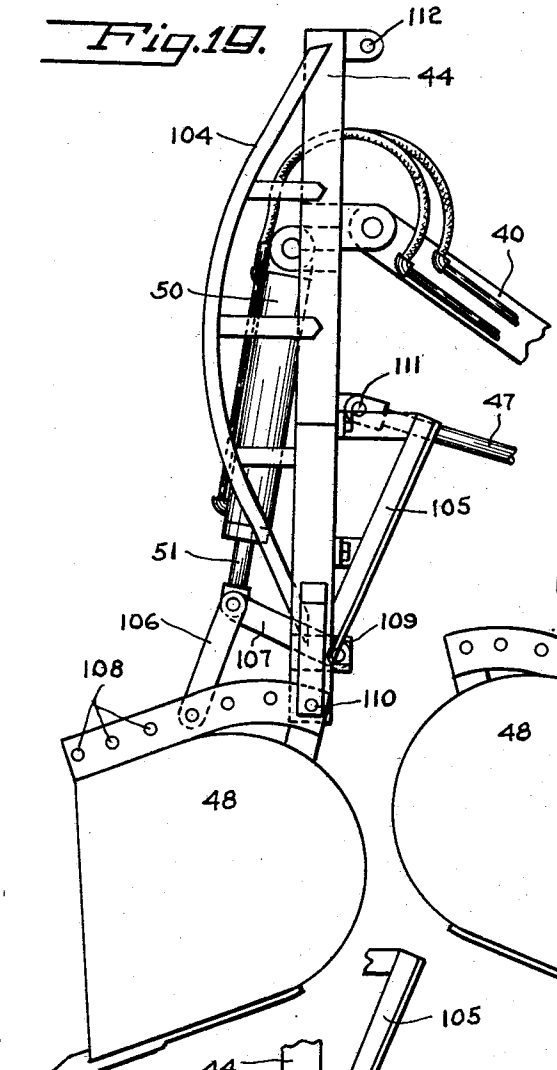
Fig. 19.



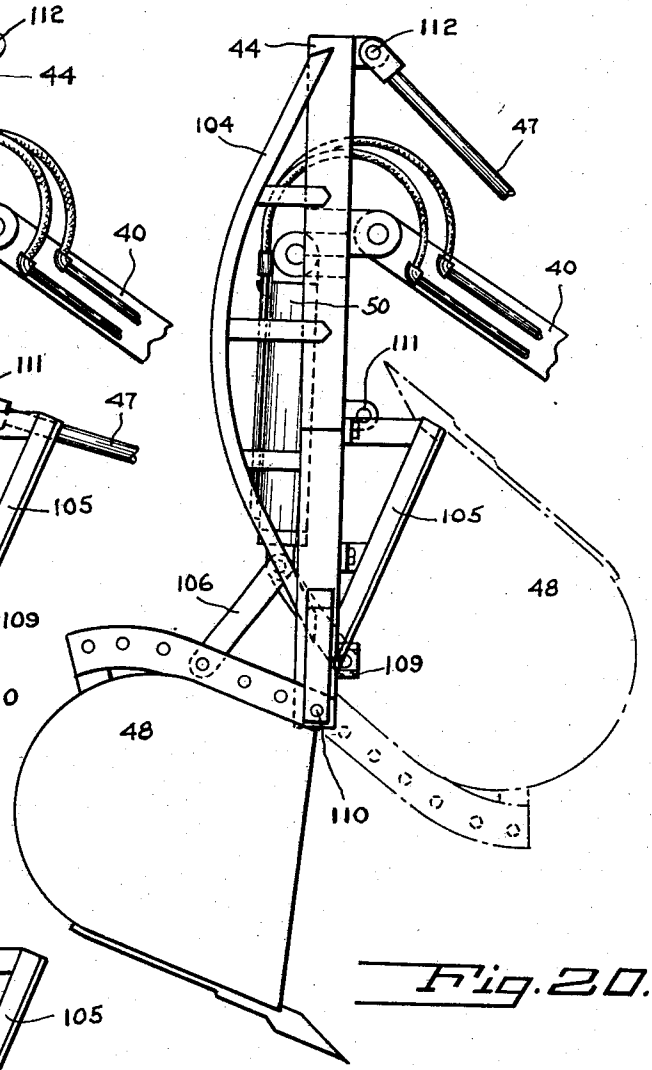


Fig. 20.

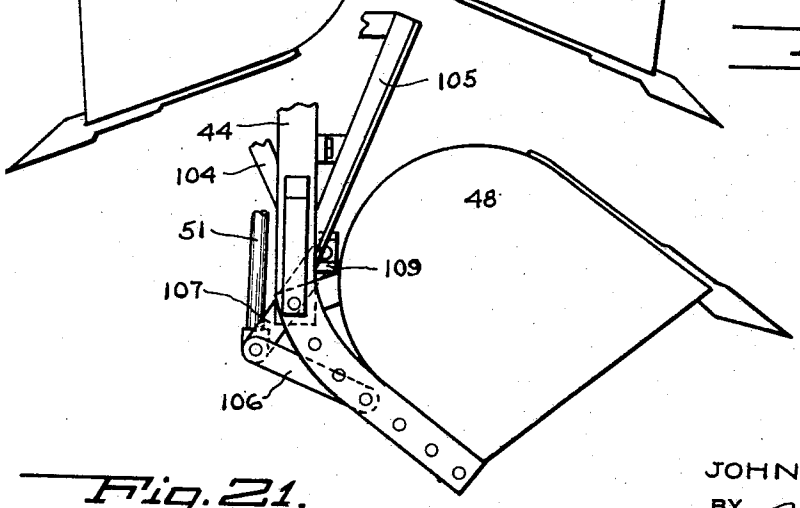


Fig. 21.

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United States Patent Office

2,718,312

Patented Sept. 20, 1955

2,718,312

MATERIAL HANDLING APPARATUS

John S. Pilch, Ware, Mass.

Application June 23, 1951, Serial No. 233,151

2 Claims. (Cl. 212—66)

This invention relates to material handling apparatus and has particular reference to a new and improved device which is capable of use as a backhoe or trencher adapted for use with a tractor and which derives its power from the tractor engine and which embodies a filling or levelling member.

An object is to provide new and improved means for rotation of the operating mechanism which allows a greater degree of rotation and which mechanism requires but a single cylinder and eliminates the necessity of expensive chains, sprockets and gears.

Another object is to provide a device of the type set forth with an arrangement providing higher speed of turning of the operating mechanism.

Another object is to provide a hydraulically operated device of the type set forth with means for cushioning the beginning and ending of the rotative movement of the mechanism.

Another object is to provide a unit of the type set forth which may be mounted on a conventional tractor without requiring a completely special unit and wherein a narrow turret may be employed, thereby providing good visibility for the operator and which is so designed that the operator sits close to the turret and looks over or beside it.

Another object is to provide a device of the type set forth which eliminates the use of chains in the rotating mechanism and therefore eliminates the backlash and play inherent in chain constructions and still provides a construction wherein the operator has perfect control of the boom position at all times.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings wherein the preferred form has been shown by way of illustration only.

Referring to the drawings:

Fig. 1 is a side view of a unit embodying the invention in operative position;

Fig. 2 is a side view, similar to Fig. 1, but showing the unit with the boom in travelling position;

Fig. 3 is a top or plan view of the unit with the boom in operative position;

Fig. 4 is a schematic view showing the hydraulic system of the unit;

Fig. 5 is a front view of the tractor with the apparatus mounted thereon;

Fig. 6 is a view taken on line 6—6 of Fig. 1 looking in the direction of the arrows and showing the tractor with the apparatus mounted thereon;

Fig. 7 is a view generally similar to Fig. 6 but with the dozer blade and stabilizing mechanism removed;

Fig. 8 is a fragmentary side view showing a portion of the apparatus;

Fig. 9 is a view, similar to Fig. 8, but showing the opposite side of the device;

Fig. 10 is a fragmentary sectional view taken on line 10—10 of Fig. 8, looking in the direction of the arrows;

Fig. 11 is a fragmentary sectional view taken on line 11—11 of Fig. 8, looking in the direction of the arrows;

Fig. 12 is a fragmentary view showing the turret actuating mechanism and hydraulic system therefor;

Fig. 13 is a fragmentary view of the turret rotating mechanism;

Fig. 14 is a sectional view taken on line 14—14 of Fig. 13, looking in the direction of the arrows;

Fig. 15 is a view similar to Fig. 14 but showing the position of the mechanism at another point of boom rotation;

Fig. 16 is a fragmentary view showing the arrangement for stabilizing or eliminating or limiting the oscillation of the front wheels and axle;

Fig. 17 is a fragmentary view of the arrangement shown in Fig. 16, but on an enlarged scale;

Fig. 18 is a sectional view taken on line 18—18 of Fig. 12 looking in the direction of the arrows and the pressure relief and vacuum eliminator apparatus; and

Figs. 19 through 21 are side views of the reversible bucket construction.

Referring more particularly to the drawings wherein similar reference characters designate corresponding parts throughout, the apparatus is shown embodied in a tractor comprising a frame **10**, supporting the engine **11** and supported on the wheels **12**.

At that end of the tractor which is normally the rear of the tractor is positioned the dozer blade **13**, as shown in Figs. 1, 2 and 3, and this blade **13** is connected to the tractor frame by the spaced pivotable supports **14** and **15** which are provided adjacent the opposite sides of the tractor and which are pivotally connected to dozer blade **13** and brackets **16** on frame **10**.

Cylinder **17** and piston rod **18** are pivotally connected to the supporting frame **19** and dozer blade **13** at **20** and **21** respectively and are adapted to raise or lower blade **13** to desired position. These cylinders and pistons are individually or separately controllable allowing dozer **13** to be oscillated both for dozing and stabilizing on uneven terrain.

In telescoping relation in the opposite sides of dozer blade **13** are the stabilizing members **22** and **23** which may be pulled out to desired position and which are provided with stabilizing pads **24** and **25** respectively adjacent their free ends which pads are adapted to rest on the ground for stabilizing the apparatus in operation. Pins **30** lock members **22** and **23** in adjusted position. Thus the dozer blade forms part of the stabilizing mechanism. In addition the tubular members **26** may be provided in alignment with the front axle **27** and telescoping bars **28** are positioned within said tubular members **26** and pins **29** in aligned openings in said tubular members **26** limit the movement of said telescoping bars **28** thereby eliminating or limiting, as desired, any oscillation of the front wheels and axle.

On supporting frame **19** which is supported on tractor frame **10** is positioned rotary turret **31** which has lower flange **32** over which are positioned the locking plates **33** and **34** for retaining turret **31** in operative position on supporting frame **19** while allowing rotation thereof and on turret **31** are secured the spaced uprights **35** and **36** having the aligned pivot openings **37** and having the lower projecting members **38** and **39** with aligned pivot openings and to which is pivotally connected the end of boom **40** which is raised and lowered by cylinders **41** connected to pivots **37** on uprights **35** and **36** and which are provided with pistons having piston rods **42** each of which is pivotally connected to boom **40** at **43**.

Alternate pivot connection **37***a* for boom cylinder **41** is provided for use in those cases where less height of lift but additional power is desired.

Dipper stick **44** is pivotally connected to the free end of boom **40** at **45** and cylinder **46** and piston and piston rod **47** are pivotally connected to boom **40** and free end

of dipper stick 44 respectively to actuate dipper stick 44 relative to boom 40. Dipper stick 44 carries bucket 48 which may be rotated relative to dipper stick 44 to which it is pivotally connected at 49 by means of cylinder 50 and piston and piston rod member 51 which are connected to dipper stick 44 and bucket 48 respectively at 52 and 53 respectively.

On the tractor is provided the operator's seat 54 which is at one side of the tractor and facing the rear thereof whereby boom 40 may be positioned over the tractor beside the operator when travelling, as shown in Fig. 2.

The cylinder 55 which is pivotally connected at 56 to lug 57 on tractor frame and piston 58 and piston rod 59 are provided for rotating turret 31 for positioning boom 40 and bucket 48 to desired angular relation as may be necessary for desired working position during operation of the device.

The end 60 of piston rod 59 is pivotally connected to link 61 and link 62. Link 61 is pivotally connected at 63 to lug 64 which is secured to the side, top or bottom of supporting frame 19. Link 62 is pivotally connected at 65 to lever 66 to which is secured upright 67 which extends upward through turret 31 and is secured thereto adjacent the upper end of the turret so that rotation of upright 67 effects simultaneous rotation of turret 31.

In Figs. 14 and 15 the boom 40 is shown adjacent its opposite ends of travel which is in the direction indicated by the arrow in Fig. 14 to the position shown in Fig. 15 from which it will be seen that this turning or rotation is approximately 270 degrees.

This construction allows the use of but a single cylinder and piston for rotating the turret and provides a greater angle of rotation with a more simple and economical construction which does not employ any expensive chains, sprockets or gears.

The hydraulic system comprises the hydraulic pump 68, reservoir or fluid tank 69 and control valves 70.

Pump 68 is connected to reservoir 69 by pipe line 71 and said pump 68 is connected to control valves 70 by line 72. Cylinder 55 is connected to control valves 70 by lines 73 and 74. Reservoir 69 is connected to valves 70 by line 75 and a branch 76 of line 75 is connected to pressure relief and vacuum eliminator members 77 which in turn are connected by lines 78 and 79 to the opposite ends of cylinder 55.

The members 77 each have a passage 80 connected to line 76 and communicating through check valve 81 with lines 78 and 79 respectively through passages 82 and 83. Passage 83 communicates through check valve 84 and passage 85 with passage 80.

This arrangement provides a hydraulic cushion in the system on each side of the piston 58 in cylinder 55 thus cushioning the start and stop of rotation of turret 31 and boom 40.

The hydraulic system employs a pair of tanks or reservoirs 69, pumps 68 and banks of valves 70, although other arrangements could be employed.

The hydraulic cylinder 85 and piston and piston rod 85A is provided for steering the tractor and is connected to valves 70 by means of lines 86 and 87 and said steering valves are controlled by control levers 88 and 89.

Control levers 90 are connected through links 91 and control rods 92 with valves 70 for actuating the same.

Accumulator or hydraulic shock absorber 93 is provided in the system on the left side of the cylinders 41 for lifting the boom and the hydraulic shock absorbers or accumulators 94 and 95 may be provided in the lines on the opposite sides of the turret actuating piston 55 instead of the pressure relief valve if desired.

Cylinder 46 is connected to valve 70 by lines 96 and 97. Cylinders 41 are connected to valve 70 by lines 98 and 99, cylinders 17 are connected by lines 100 and 101 and cylinder 55 is connected to the valve by lines 102 and 103.

An important feature of the present invention is that

the various hydraulic hoses for the dipper stick cylinder, boom cylinder and the like are coiled around turret 31 as shown particularly in Fig. 2 and are secured to the upper end of said turret. If desired they may be positioned within a container or shoe. As the turret 31 is rotated, the hoses merely coil and uncoil depending upon the direction of rotation of the turret and without any twisting of the hoses. It will be seen that this construction eliminates the need for swivel joint couplings for the hose lines which couplings are both expensive and troublesome.

In Figs. 19 through 20 is shown the reversible bucket arrangement which allows merely the reversal of the bucket to convert the device from a loader to a trencher and vice versa without the addition of any additional parts thereby eliminating the necessity of the operator carrying any such parts for changes in the field.

Also a construction is provided which gives a greater degree of bucket rotation.

In this arrangement dipper stick 44 is provided with the reinforcing structure 104 and also carries the closure 105 for closing the bucket 48 on high lifts as for dumping in a high truck.

The closure 105 is stationary on the dipper stick and does not interfere with other uses of the apparatus and operates only when the bucket is adapted for use as a trencher as shown in Fig. 20, in which case the bucket is rotated until the bucket is closed by closure 105.

In this construction piston rod 51 for rotating bucket 48 is connected to bucket 48 by pivotable links 106 and 107 of which link 106 is pivotally connected to said piston rod and to any desired one of the hitch points 108 on bucket 48 and link 107 is pivotally connected to said piston rod 51 and to a lug 109 which is offset on dipper stick 44 as shown. The various hitch points 108 allow adjustment for desired amounts of rotation and speed of rotation. If desired, the bucket pivot 110 could be offset instead of lug 109. This offset, in either case, allows sufficient rotation or swing that the bucket can be used without a door.

The wide angle of rotation of the bucket 48 by piston rod 51 is illustrated in Figs. 19 through 21 of the drawings wherein Figs. 19 and 20 show the bucket adapted for loading and Fig. 21 shows the bucket adapted for trenching. In Fig. 20, the bucket is shown in closed position in dotted lines.

This arrangement allows use of the bucket as loader or trencher by merely reversing the bucket and the linkage arrangement allows wide angle rotation regardless of which use is being made of the bucket.

This construction allows changing of piston rod connection from connecting point 111 to point 112, as shown in Figs. 19 and 20, without the necessity of changing hoses in the field.

Due to the fact that cylinder 46 needs necessarily be fairly large for reasons of strength and displacement purposes to allow a fairly quick return of the dipper stick into normal digging position, it would, therefore, have a considerable amount of power when pushing on piston rod 47 and therefore when the device is used as a loader, piston rod 47 is connected to point 111 as shown in Fig. 19 and where the bucket is used as a trencher, the piston rod 47 is connected at 112 to give desired power for trenching.

It is pointed out that when the device is used as a loader with the bucket in question shown in Fig. 19, that the bucket is on a dipper stick 44 and the rotation of both the bucket and dipper stick are controlled with the rotation of the bucket effected either directly or through a linkage that the throttle discharge of the bucket can be controlled when the device is employed as a loader, thus providing a loader arrangement with the bucket on a dipper stick and having a controlled discharge.

From the foregoing it will be seen that I have provided

means for obtaining all of the objects and advantages of the invention.

I claim:

1. In a device of the character described, a support, a turret mounted for rotation on said support, a bucket carrying boom pivotally connected to said turret, a pivotable lever connected to said turret for effecting rotation thereof, a pair of pivotally connected links, one of said links being pivotally connected to said lever and the other of said links being pivotally connected to said support and actuating means connected to said links and said support for effecting pivotal movement of said lever and thereby pivoting said turret and boom.

2. In a device of the character described, a support, a turret mounted for rotation on said support, a bucket carrying boom pivotally connected to said turret, a pivotable lever connected to said turret for effecting rotation thereof, a pair of pivotally connected links, one of said links being pivotally connected to said lever and the other of said links being pivotally connected to said support and actuating means connected to the pivotal connection between said links and said support for effecting pivotal movement of said lever and thereby pivoting said turret and boom.

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