Jan. 6, 1953 E. M. MOORE 2,624,415

EARTH MOVING APPARATUS

Filed June 7, 1949 3 Sheets-Sheet 1

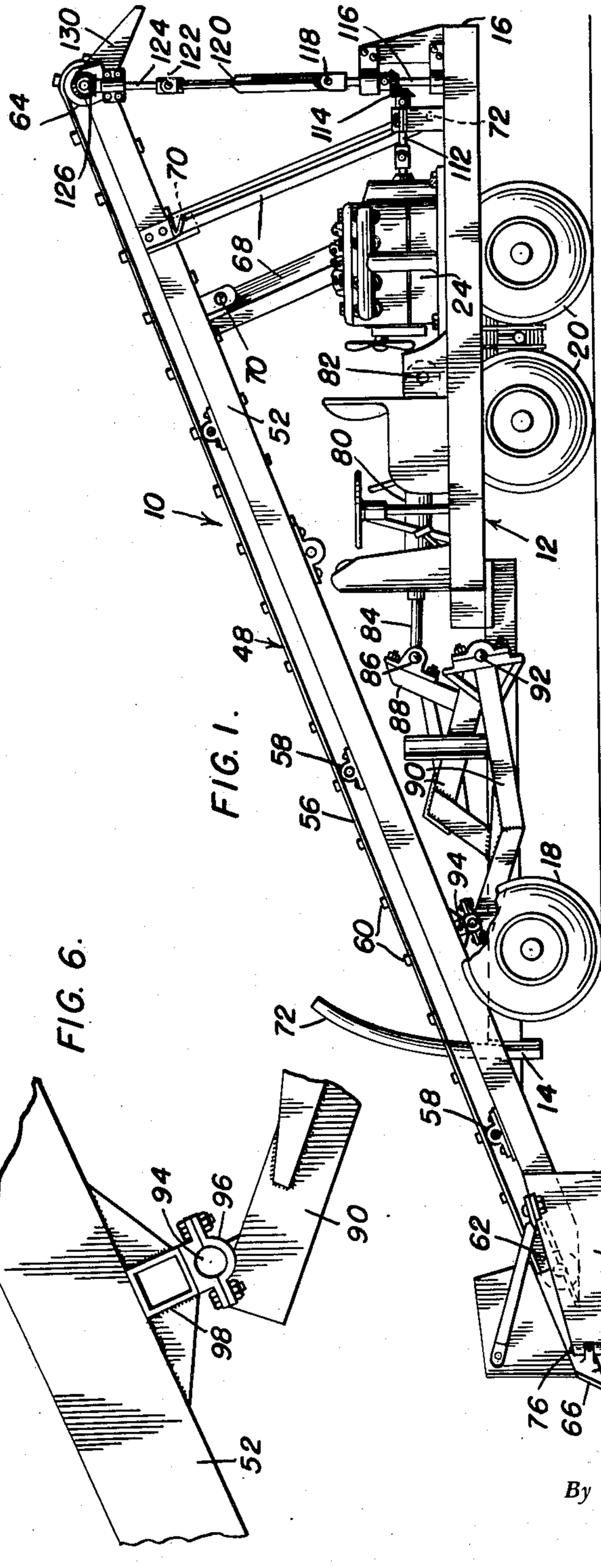

FIG. 1.

FIG. 6.

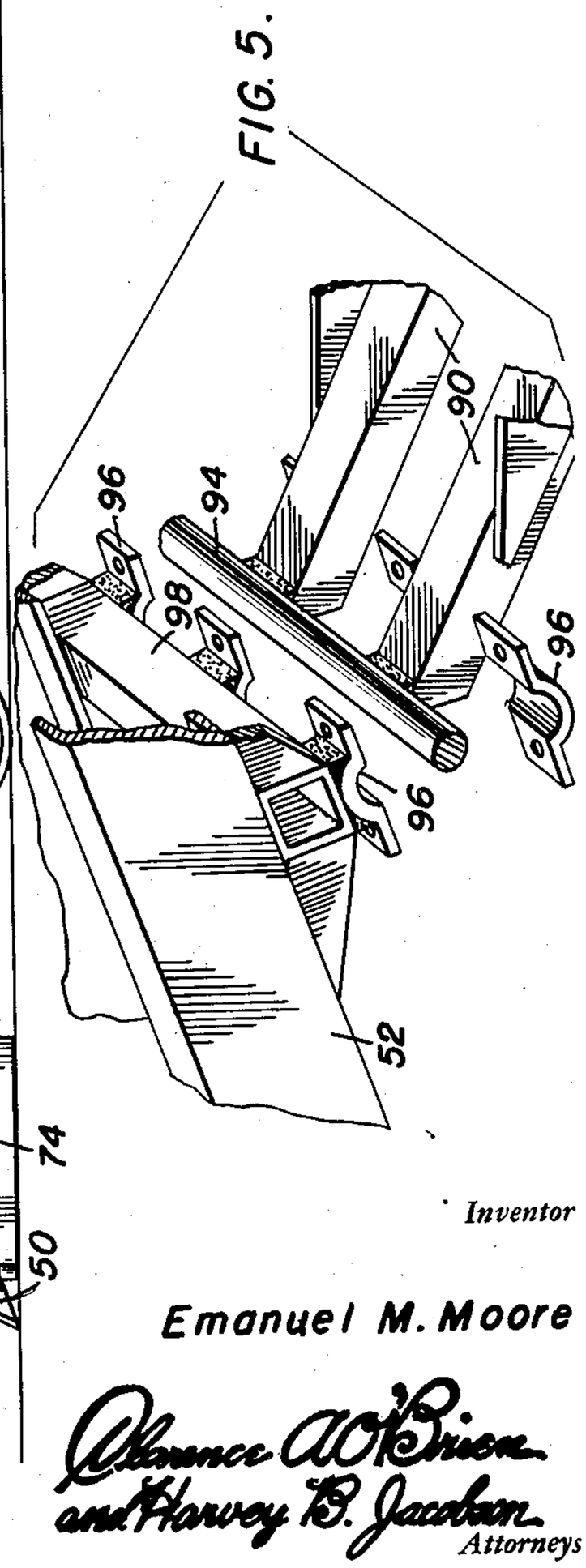

FIG. 5.

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FIG. 2.

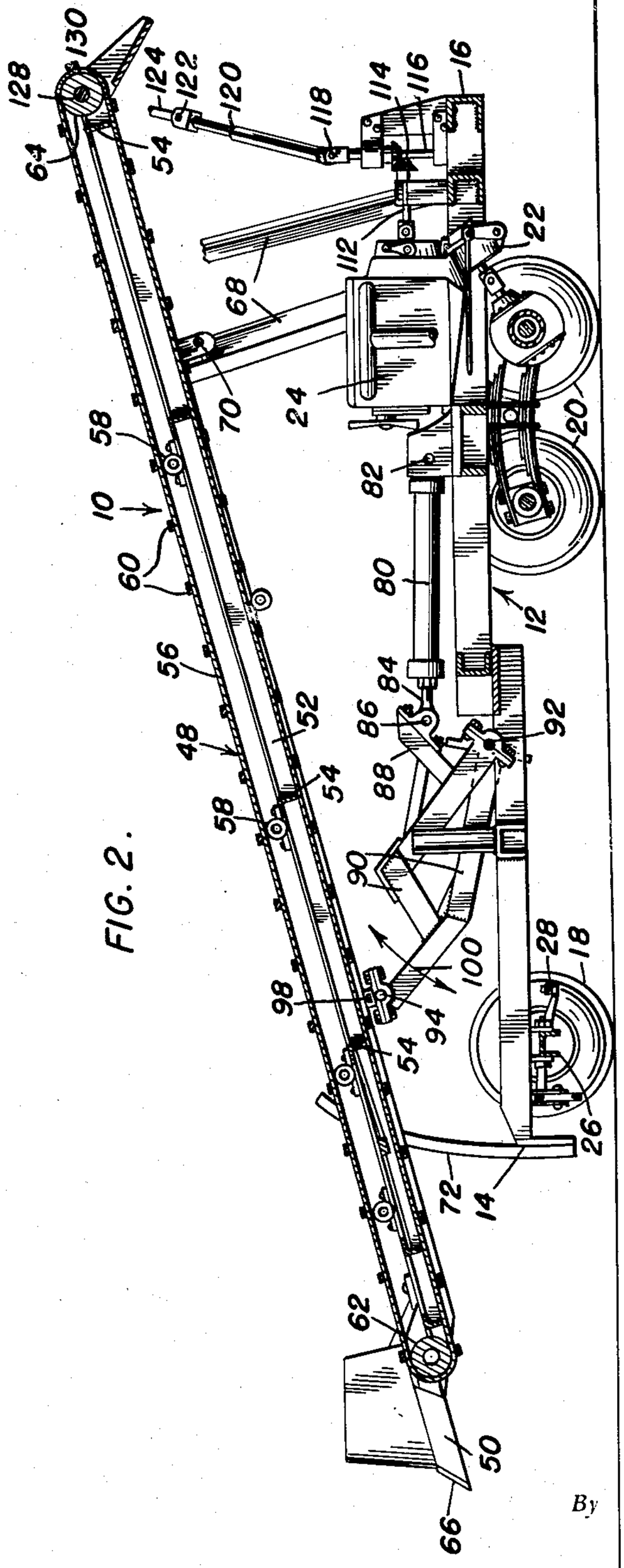

FIG. 4.

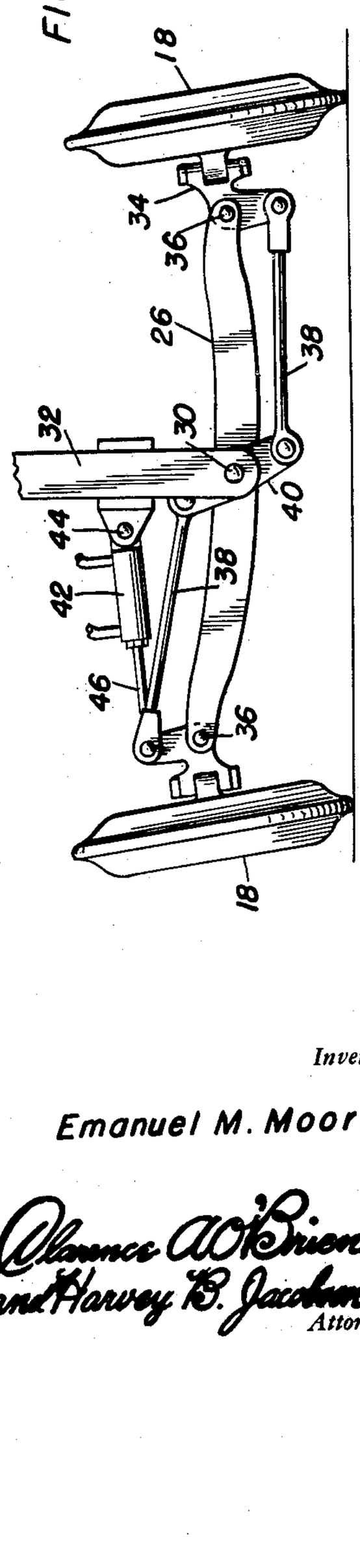

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FIG. 3.

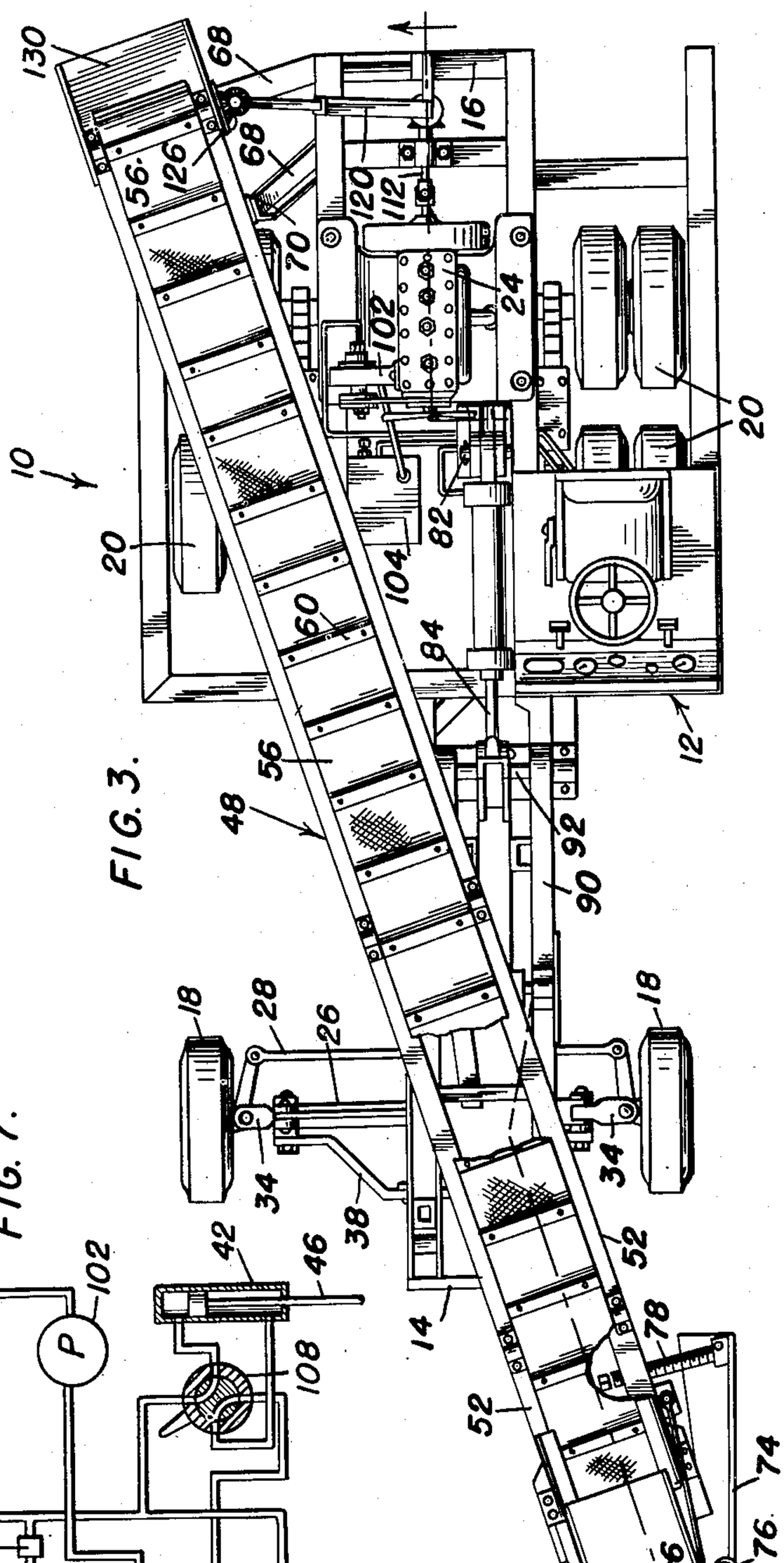
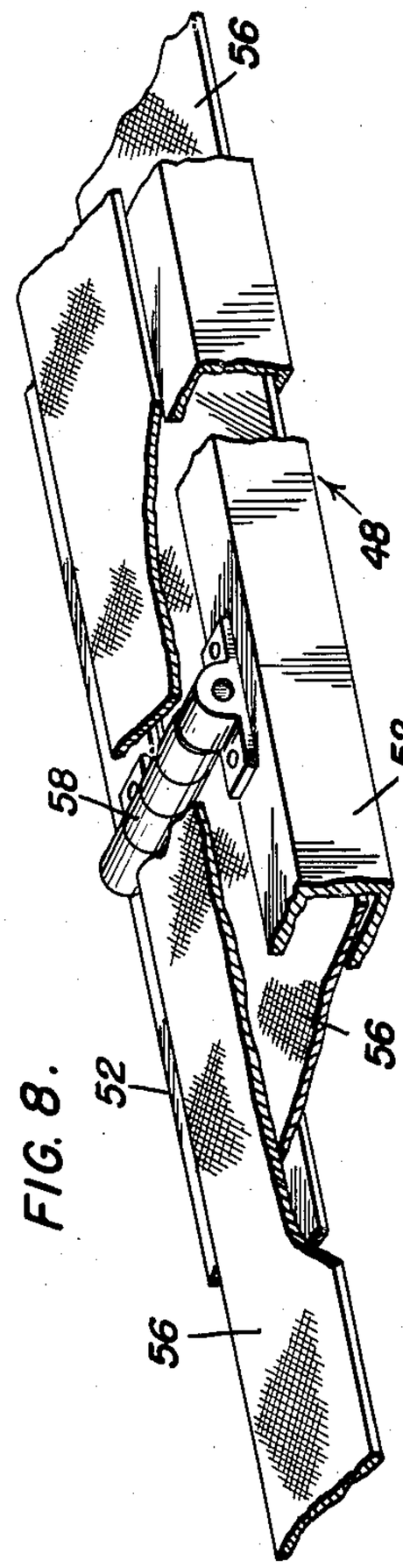


FIG. 7.

FIG. 8.



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UNITED STATES PATENT OFFICE

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EARTH MOVING APPARATUS

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Application June 7, 1949, Serial No. 97,556

1 Claim. (Cl. 180—1)

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This invention relates to new and useful improvements and structural refinements in machines for moving earth, and the principal object of the invention is to provide a device of the character herein described, such as may be conveniently and effectively employed for levelling the ground, or for digging a trench, and at the same time, delivering the soil which has been scraped up to a truck or wagon alongside the apparatus.

The provision of the instant machine embodies in its construction a power propelled chassis carrying a conveyor extending diagonally from the front to the rear of the chassis and provided at its forward end with a ground-engaging scoop, this scoop being disposed at one side of the chassis while the conveyor transmits the earth picked up by the scoop to the relatively opposite side and end of the chassis, so that the scooped material may be conveniently discharged into a truck or wagon travelling alongside the discharge end of the conveyor.

The primary feature of the invention, therefore, resides in the mounting of the conveyor on the chassis, while another feature of the invention involves the provision of means for raising and lowering the conveyor relative to the chassis, so that the position of the scoop on the conveyor may be adjusted relative to the ground, in accordance with the depth of cut desired.

A further feature of the invention resides in the provision of means on the chassis for driving the conveyor notwithstanding the raising or lowering of the latter, and another feature of the invention involves the provision of means for tilting the front wheels of the chassis so as to counteract the force created by the contact of the scoop on the diagonal conveyor with the ground, thus materially assisting the apparatus in maintaining a straight course.

A still further feature of the invention resides in the provision of a ground-engaging guide which is adjustably mounted at one side of the scoop, thus further assisting the apparatus in maintaining an even course.

Some of the advantages of the invention lie in its simplicity of construction, in its durability, and in its adaptability to economical manufacture.

With the above more important objects and features in view and such other objects and features as may become apparent as this specification proceeds, the invention consists essentially in the arrangement and construction of parts as illustrated in the accompanying drawings, in which:

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Figure 1 is a side elevational view of the invention;

Figure 2 is a longitudinal cross-sectional view thereof, showing the conveyor and scoop in a somewhat raised position;

Figure 3 is a top plan view of the apparatus;

Figure 4 is a front elevational view of the chassis front axle and wheels;

Figure 5 is a fragmentary group perspective view illustrating the pivotal attachment of the beam, used in the invention, to the conveyor;

Figure 6 is a fragmentary side elevational view of the subject shown in Figure 5, but in the assembled position;

Figure 7 is a diagrammatic illustration of the hydraulic system used in the invention; and

Figure 8 is a fragmentary perspective view, partially broken away, and showing the construction of the conveyor.

Like characters of reference are employed to designate like parts in the specification and throughout the several views.

Referring now to the accompanying drawings in detail, the invention consists of an earth-moving apparatus designated generally by the reference character **10**, the same embodying in its construction an elongated chassis **12** having a front end **14** and a rear end **16**, and including a set of front wheels **18** and pairs of dual rear wheels **20**, as will be clearly apparent.

At least a pair of the dual rear wheels **20** are driven through the medium of a gear box **22** by an internal combustion engine **24** with which the chassis **12** is provided, while the front wheels **18** are mounted at the ends of a transverse, stationary axle **26** and are provided with the conventional steering mechanism **28**.

However, it is to be noted that the axle **26** is pivotally connected at the center thereof, as at **30**, to a frame member **23** of the chassis **12**, whereby the front wheels may follow irregularities of the ground. Moreover, the front wheels **18** are attached to the axle **26** by knuckles **34** supported by horizontal pivots **36** with which the axle **26** is provided, so that the wheels **18** may be tilted away from substantially vertical planes, as is best shown in Figure 4. The tilting of the wheels **18** is effected by means of a pair of connecting rods **38** which are pivoted to the knuckles **34** and are also pivotally connected to a bell-crank **40** which is preferably mounted on the aforementioned pivot **30** connecting the axle **26** to the frame member **32**. By virtue of this arrangement, the wheels **18** are tilted in the same direction and the actual tilting operation is performed by means of a hydraulic cylinder **42** which

is attached to the frame member 32, as at 44, and is pivotally connected to one of the knuckles 34 by its piston rod 46.

A conveyor assembly 48 is provided on the chassis 12 and extends diagonally from one side at the front end of the chassis to the relatively opposite side at the rear end of the chassis, as is best shown in Figure 3.

The front end of the conveyor 48 projects substantially beyond the front end 14 of the chassis and carries what may be generally referred to as an earth-scraping and receiving scoop 50.

The conveyor 48 simply consists of a pair of spaced parallel channels 52, connected together by a plurality of cross members 54 (see Figure 2), and an endless conveyor belt 56 passes over a plurality of rollers 58 which are rotatably mounted on the upper flanges of the channels 52, as shown in Figure 8.

The belt 56 may be provided, if desired, with transverse slats 60, and it is to be noted that the belt also passes around a pair of relatively large rollers 62, 64 provided at the ends of the conveyor assembly, substantially as shown.

The bottom "run" of the belt 56 simply slides along the bottom flanges of the channels 52, as is shown in Figure 8, and finally, concerning the conveyor structure, it may be stated that the aforementioned scoop 50 is provided at its forward edge with a scraping blade 66.

The conveyor assembly 48 is mounted on the chassis 12 in an inclined position so that the front end of the conveyor carrying the scoop 50 is disposed adjacent the ground and at one side of the chassis, as illustrated in Figures 1 and 3. The rear end portion of the conveyor assembly is mounted on the chassis by means of a pair of support members 68 which are pivotally connected to the conveyor channels 52, as at 70, and are pivoted to the chassis, as at 72 (see Figure 1).

By virtue of this arrangement, the entire conveyor assembly may be raised and lowered relative to the chassis, and a pair of upwardly extending guide members 72 are provided at the front end 14 of the chassis, at the sides of the conveyor channels 52, so that the conveyor is free to move in a vertical plane but is prevented from shifting laterally.

Before proceeding to discuss the means for raising and lowering the conveyor 48, it may be explained that the purpose of the means for tilting the front wheels of the chassis as shown in Figure 4 is to counteract the force created by the engagement of the blade 66 of the scoop 50 with the ground. That is to say, the scoop, being disposed at the forward end of a conveyor which extends diagonally of the chassis, creates a tendency for the chassis to shift laterally, to the side at which the scoop is disposed. However, by tilting the front wheels 18 to the relatively opposite side of the chassis, that tendency is counteracted, and as a result the chassis is better able to travel in a straight line.

In order to further assist in guiding the chassis along a straight line of travel, an elongated ground-engaging guide in the form of a plate 74 is pivotally connected by means of a vertical pivot 76 to the outer side of the scoop 50 and extends in a plane which is substantially parallel to the longitudinal axis of the chassis, as is best shown in Figure 3. A suitable adjusting screw 78 is provided on the conveyor 48 and engages the guiding plate 74, whereby the position of the latter relative to the conveyor and chassis may be set. As the apparatus travels along the ground and the scoop 50 forms a trench in the ground, the plate 74 slides along or against the outer side wall of such trench and thereby assists in maintaining the apparatus on a straight course.

The conveyor 48 is raised and lowered by hydraulic means, involving the provision of a hydraulic cylinder 80 which is pivoted to the frame of the chassis, as at 82, and includes a reciprocable piston rod 84 which, in turn, is pivotally connected as at 86 to an upwardly projecting portion 88 of a beam 90. This beam is of substantially rigid construction and is swingable as a unit about a horizontal pivot assuming the form of a shaft 92 mounted in a transverse position on the frame of the chassis 12.

The beam 90 is provided at its free end with a transverse shaft 94 which, in turn, is rotatable in suitable bearings 96 secured to a cross member 98 provided on the under side of the channels 52 of the conveyor 48, and it will be apparent from the foregoing that reciprocation of the cylinder rod 84 will oscillate the beam 90, as shown at 100 in Figure 2 (about the axis 92), thus raising and lowering the entire conveyor about the pivots 72 on the chassis.

The arrangement of the hydraulic system in the invention is illustrated in the diagram of Figure 7, wherein 102 designates a hydraulic pump, 104 designates a reservoir, and 106 indicates a pressure relief valve, all these components being of conventional types and being connected in a conventional manner to the hydraulic cylinders 42, 80, through the medium of respective control valves 108, 110.

If desired, the pump 102 may be driven by the same engine 24 which is used for propelling the apparatus along the ground, and moreover, the same engine may be used for driving the conveyor 48.

This may be achieved by connecting the engine 24 by means of a countershaft 112 and suitable gearing 114 to an upright shaft 116 rotatably mounted on the frame of the chassis, which shaft, in turn, is connected by a universal joint 118 to a telescopic shaft assembly 120 consisting of two slidably telescoped members of polygonal cross-section.

The telescopic shaft assembly 120 is, in turn, operatively connected by an additional universal joint 122 to a stub shaft 124 and the latter, being rotatably mounted on the conveyor 48, is connected by suitable gearing 126 to the shaft 128 on which the conveyor roller 64 is secured.

By means of this arrangement, drive from the engine 24 will be transmitted to the conveyor belt 56, and it is to be noted that the provision of the telescopic shaft assembly 120 and the universal joints 118, 122 will facilitate transmission of the drive to the conveyor regardless of the raising and lowering movement to which the conveyor may be subjected.

Finally, it is to be noted that a discharge chute 130 may be provided at the upper end of the conveyor 48, so as to facilitate delivery of material from the conveyor directly into a truck or wagon which may be travelling alongside the apparatus when the latter is used.

It is believed that the advantages and use of the invention will be clearly apparent from the foregoing disclosure, and accordingly further description thereof at this point is deemed unnecessary.

Having described the invention, what is claimed as new is:

In an earth moving apparatus, the combina-

tion of an elongated chassis having front and rear ends and including a pair of front wheels, motor driven means on said chassis for propelling the same and means for tilting said front wheels about substantially horizontal axes, said means including an axle for said front wheels, knuckles connecting said front wheels to said axle, a pair of connecting rods pivotally connected to said knuckles and to a bellcrank, said bellcrank being pivotally mounted on said axle, and means connected to one of said knuckles for tilting the wheel mounted thereon and for tilting the other of said front wheels through said connecting rods and bellcrank connection.

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