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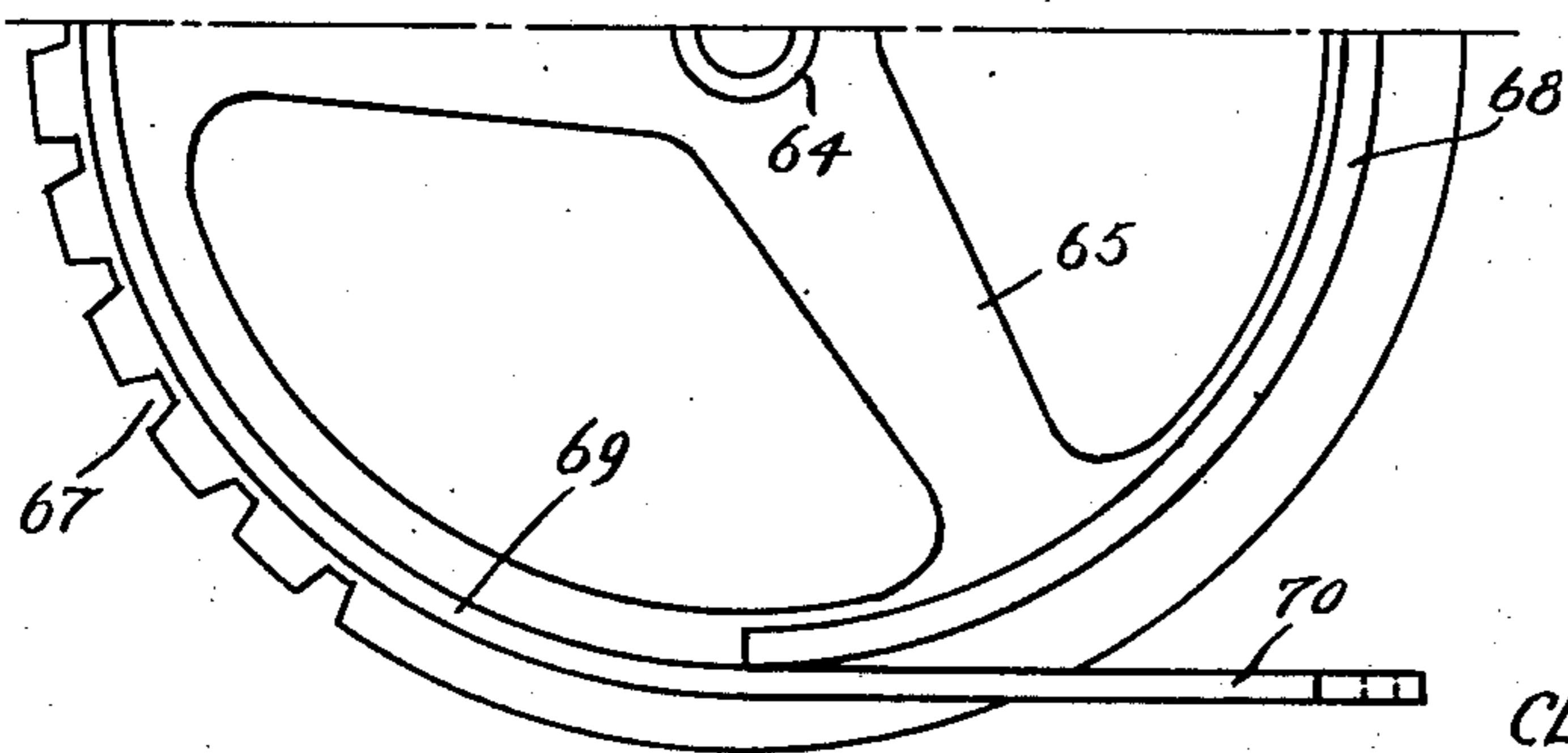
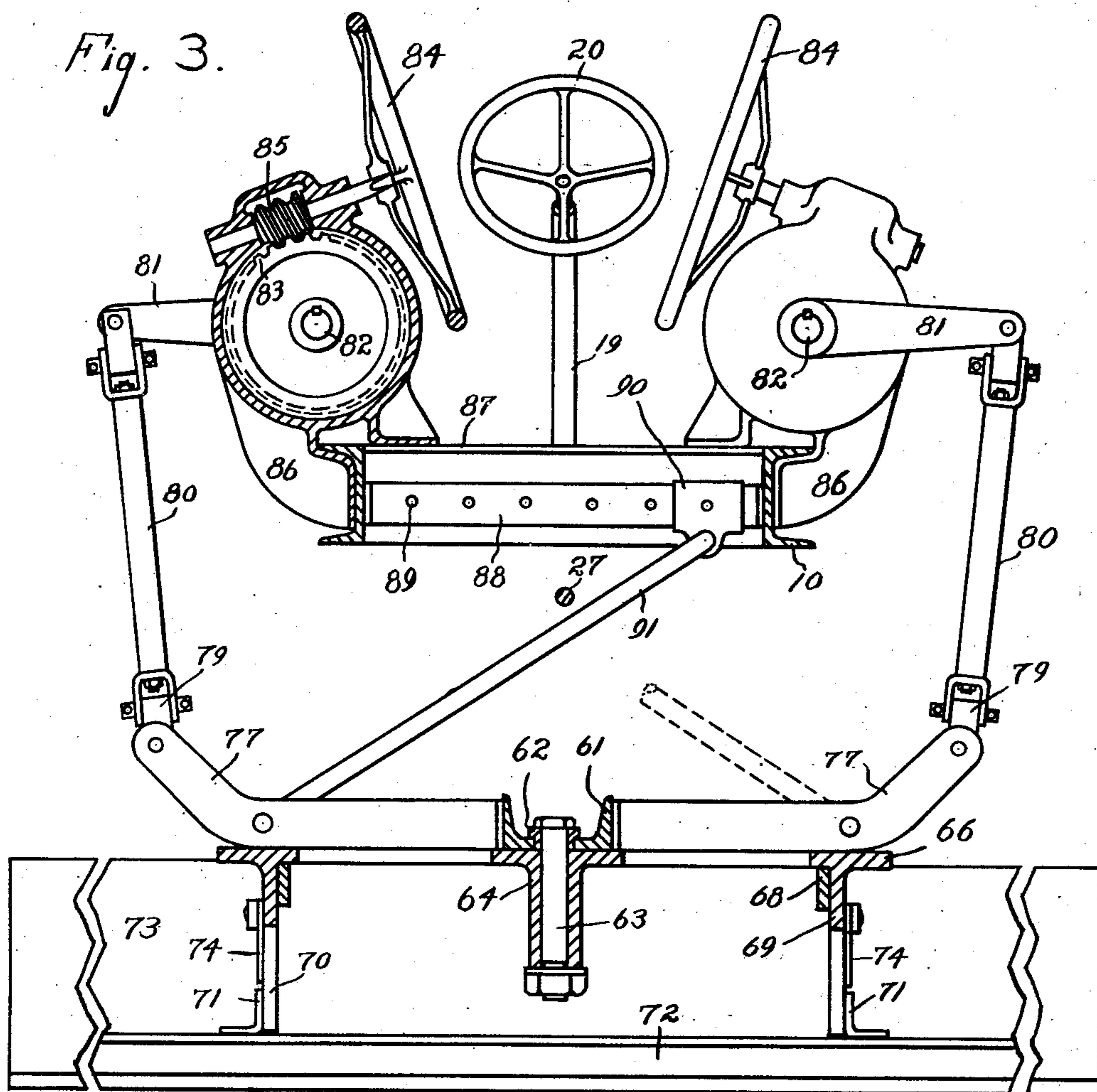
C. A. HENNEUSE

1,907,807

EARTH WORKING TOOL

Filed July 7, 1931

4 Sheets-Sheet 2



Inventor

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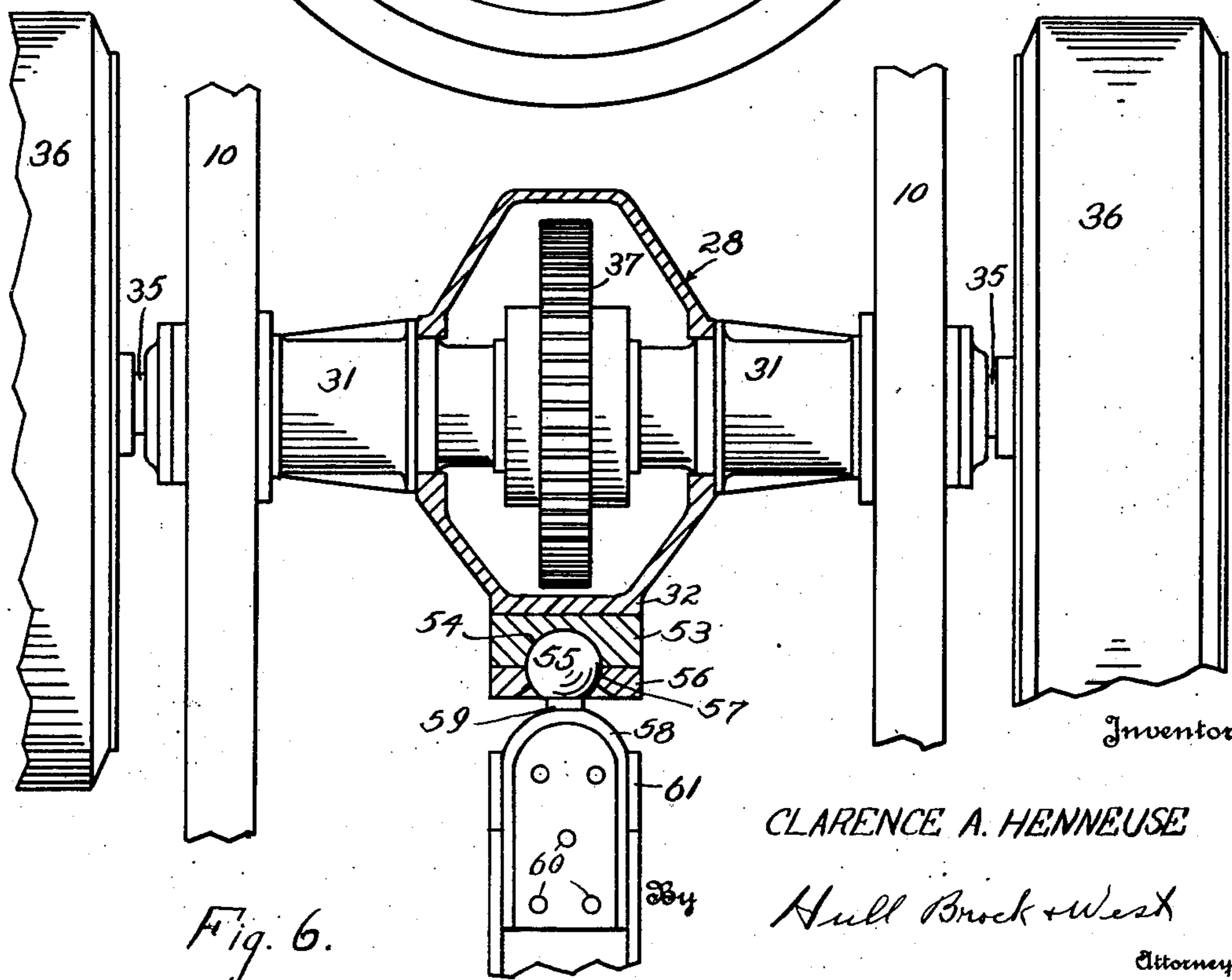
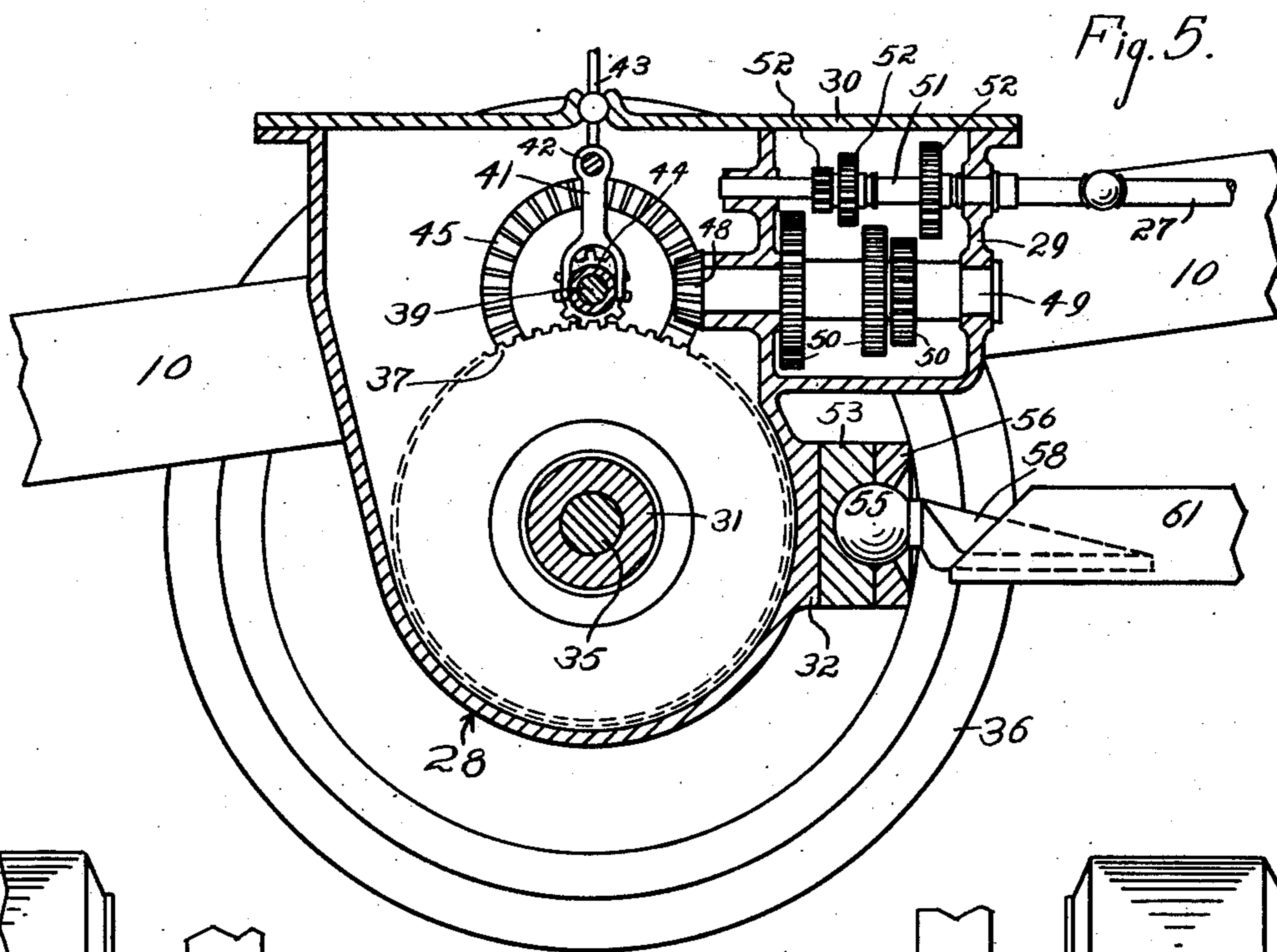
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## EARTH WORKING TOOL

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4 Sheets-Sheet 3



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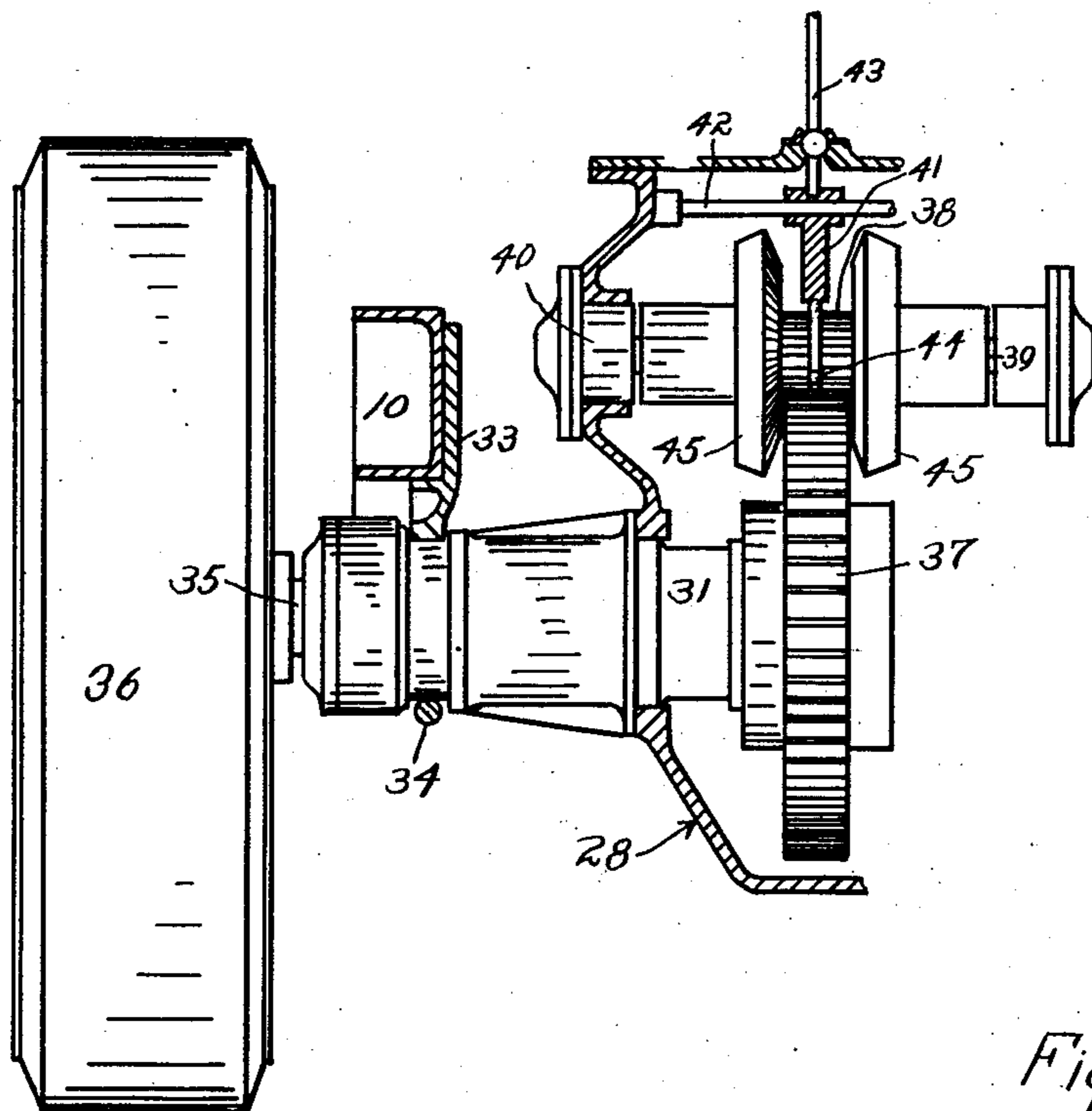


Fig. 7.

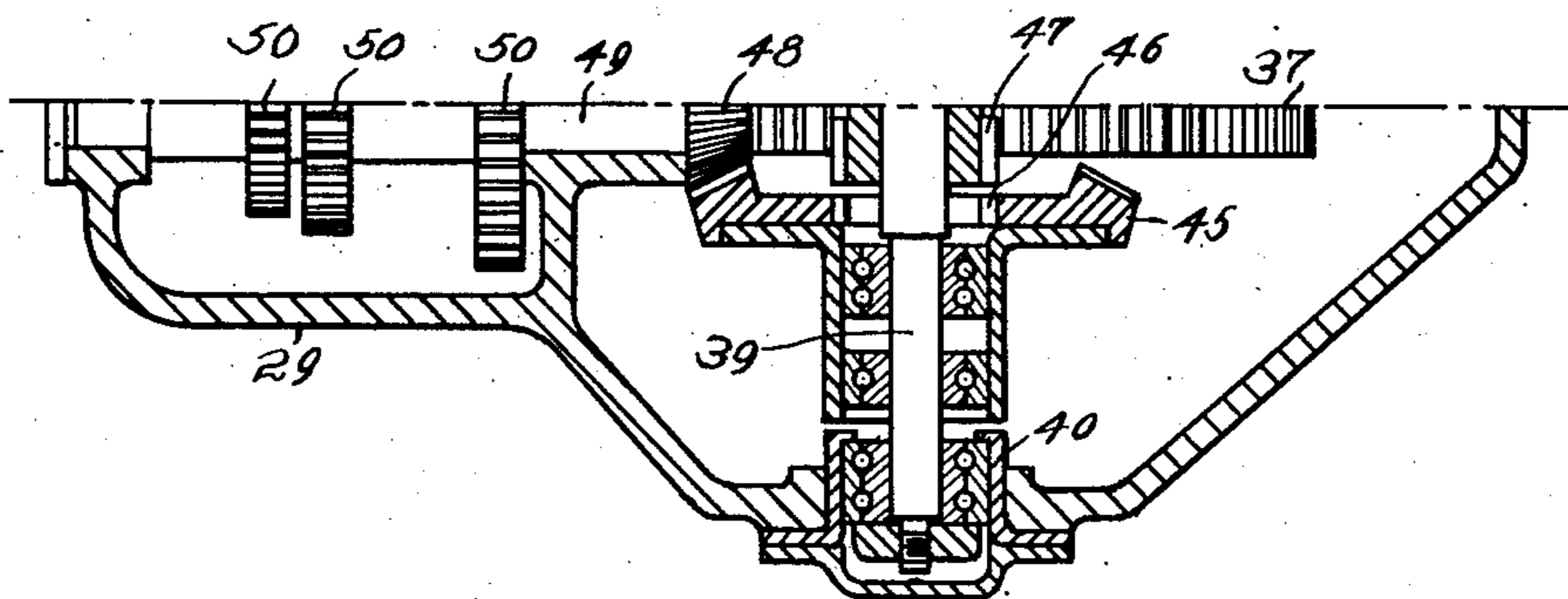


Fig. 8.

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## UNITED STATES PATENT OFFICE

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## EARTH WORKING TOOL

Application filed July 7, 1931. Serial No. 549,211.

This invention relates to a power operated earth working tool especially designed for use in road building and maintenance.

An object of the invention is to provide an improved means for imparting power to the earth-working element. A further object is to provide a simple and effective means for pushing the earth-working element, such means being adapted to relieve unnecessary stresses in the frame. A further object is to provide a more direct driving connection between the traction elements and the earth-working element. A further object is to provide a mounting and controlling means for the earth-working element including a "circle" and to mount said earth-working element at the front of such circle whereby to provide greater working clearance in front of said earth-working element. A further object is to provide a push bar for driving the earth-working element which will be rigidly connected to said circle and universally connected with the rear portion of the vehicle on the housing means associated with the rear axle means. A further object is to provide a connection between a rear traction element and the earth-working element whereby the axle of said traction element shall be in "line of thrust" from said earth-working element. A further object is to provide an improved disposition of the power plant, earth-working element, control means and drive for the earth-working element, whereby the latter will be clearly visible to the operator. A further object is to provide an improved power transmission means adapted for cooperation with the other improved features for rendering the entire tool more flexible and easily controllable and for securing a better positioning of the parts to avoid undesirable proximity of the moving parts to the work.

Other and more limited objects will become apparent from the following description taken in connection with the accompanying drawings in which Fig. 1 is a side elevation of the present preferred embodiment of my invention omitting certain parts; Fig. 2 is a plan view thereof; Fig. 3 corresponds substantially to a section in the central re-

gion looking forward and omitting the front of the frame and the power plant; Fig. 4 is a bottom plan view of one-half the mounting and controlling circle; Fig. 5 is an enlarged vertical sectional view taken through the transmission and rear axle means; Fig. 6 is a top plan view of the portion of the device shown in Fig. 5 showing the central part in section at substantially the level of the rear axle means; Fig. 7 is a fragmentary vertical section taken through the transmission and rear axle means at substantially right angles to the showing of Fig. 5; and Fig. 8 is a detail sectional view on an enlarged scale, at the level of the secondary drive shaft.

Referring now to the drawings wherein similar numerals indicate similar parts in the various views, the numeral 10 indicates an upwardly arched frame of a power vehicle. This frame may consist of a pair of channel members as indicated or any other equivalent construction such as a single tube or the like. Mounted in any suitable manner at the front of the frame is a power plant indicated generally by the numeral 11, including the usual internal combustion or other suitable motor and conventional associated mechanism. Also secured to the frame 10 at the front thereof is an axle 12 carrying a pair of wheels 13 or equivalent mechanism provided with steering mechanism of the conventional type including steering knuckles 14, tie rod 15, drag link 16, together with the usual steering worm construction 17 carrying an arm 18 and being connected in the usual manner with a steering post 19 which carries at its upper end a steering wheel 20. It will be understood that the steering post and worm 17 are secured to the frame in any suitable manner.

The fuel tank 21 may be disposed adjacent the power plant as indicated, being braced by a member 22 secured to the frame of the vehicle. Secured to the motor housing and to the vehicle frame is a clutch assembly schematically indicated at 23 and controlled by means of lever 24, link 25 and bell crank foot control lever 26. Extend-

ing backwardly from the motor is a drive shaft 27.

Secured to the frame 10 at the rear portion thereof is a transmission and axle housing indicated generally by the numeral 28 and comprising as best seen in Figs. 5 to 8 inclusive, a principal housing element including a portion adapted to house the gearing assembly which is connected to the axles, a transmission housing 29, a cover plate 30, axle housings 31 and a earth-working element driving boss 32. As best indicated in Fig. 7, the frame 10 is secured to the axle housings 31 by means of fixtures 33 which include U bolts 34 extending around such axle housing members. It is to be understood that the frame may, within the contemplation of my invention, be secured in any other suitable manner. Additional connection may also be made between the transmission housing and the frame as by means of an angle iron 30<sup>a</sup> extending across the frame and secured to said housing.

Extending through the axle housing 31 are axles 35 mounted in any suitable kind of bearings and connected to traction elements 36 which in the drawings annexed hereto are represented by wheels but which may consist of crawlers of the endless chain type or any other suitable traction means. The axle means 35 may be in two parts and driven through a differential mechanism or in one part and driven by a gear fixedly attached thereto.

In the drawings, I have illustrated a bull gear 37 which may be connected rigidly to a single axle means extending through and connecting both traction elements 36 or may be the ring gear of a differential drive or transmission which will allow different speeds of rotation for the two traction elements.

Mounted directly above the axle means 35 is a slidable pinion 38 meshing with the bull gear 37 and slidable on a shaft 39 which is mounted in suitable bearings 40 carried by the transmission housing 28. The pinion 38 is reciprocated by a member 41 slidably mounted on a bar 42 and controlled by a lever 43. The member 41 is provided with a bifurcated terminal portion which engages in a groove 44 in the sliding pinion 38. Rotatably mounted on the shaft 39 are a pair of beveled gears 45 which are firmly held against sliding motion with respect to the shaft 39. The ends of the sliding pinion 38 are provided with clutch elements while the gears 45 are provided with corresponding clutch elements.

I have illustrated the clutch elements in the present case as consisting simply of means 46 formed in the bevel gears 45 adapted to receive the ends of the teeth 47 of the sliding pinion 38. It is to be understood that any other suitable clutch means may

be employed. Meshing with both the beveled gears 45 is a beveled pinion 48 non-rotatably carried by a secondary drive shaft 49 upon which are also mounted a plurality of different sized speed change transmission gears 50. It is to be understood that the bevel gears 45 are spaced apart such a distance that the sliding pinion 38 can be connected by the clutch means 46, 47, with only one thereof at a time. The direction of rotation of traction elements 36 will depend upon which of the gears 45 is engaged by the sliding pinion 38.

Mounted directly above the secondary drive shaft 49 is a shaft 51 constituting with the shaft 27 a primary drive shaft. Slidably but non-rotatably mounted on the shaft 51 are corresponding change speed gears 52, which are adapted to be controlled by any suitable mechanism, for engagement with the gears 50 to secure a change in speed.

As indicated in Figs. 5 and 6, the central portion of the housing 28 which receives and secures the housing members 31 is provided at the front with a boss 32. A plate 53 contacting the boss 32 is provided with a hemispherical concavity 54 adapted to receive a ball 55 which is held in position by a securing plate 56 having a part spherical portion 57 and allowing a universal movement of the ball 55 and the member 58 to which it is connected by a neck 59. The plates 53 and 56 are secured to the boss 32 by suitable bolts (not shown).

Attached to the member 58, as by rivets 60, is a channeled push member 61 which extends forwardly. The member 61 is provided near its front end with an opening as indicated in Figs. 2 and 3 through which extends a bushing 62 which receives a bolt 63 and abuts the head of said bolt and a hub 64 of a circle 65. The circle 65 includes, in addition to the hub 64, a flat circular portion 66, provided with notches 67 adapted to receive a latch member, and reinforcing bands or ribs 68 and 69 either welded or otherwise secured thereto or integral therewith. The member 69 is provided with a pair of forwardly projecting arms 70 in direct continuation of the circular portion 66 and extending downwardly as best seen in Fig. 1.

Pivotally connected to the ends of the arms 70 are brackets 71 which in turn are rigidly secured to an angle member 72 which carries a curved earth-working element 73. Pivotally secured to the arms 70 are links 74 which are in turn pivoted to lugs 75 on the curved earth-working element 73. The earth-working element 73 may also include a separable blade 76. It is to be understood that other earth-working elements may be substituted for the curved blade and mold board constructions shown and that such tools as the conventional scarifier or the like

may be substituted. In the event such substitution is made, the mounting construction may be suitably modified.

Slidably mounted with respect to the channel member 61 and resiliently urged forwardly by a spring (not shown) is a latch element 98 which is adapted to engage in the notches 67 for the purpose of constraining the circle against rotation. The latch 98 is controlled by a member 92 through the medium of a lever 99 and link 100 connected to a projection 101 on the member 98 which extends through a slot 102 in the channel member 61.

Secured to the channel member 61 as best seen in Figs. 2 and 3 are pairs of straps 77 and 78 which approach each other at their outer ends and are secured in spaced relation and adapted to receive pivotally blocks 79 to which are pivoted connectors 80 which are universally connected to arms 81. The arms 81 are non-rotatably carried by shafts 82 upon which are mounted gears 83 controlled by hand wheels 84 through the medium of worms 85 all of which are carried by castings 86 mounted on the frame 10. A transverse bracing member 87 may be provided extending between the two frame members 10 and connected thereto. Extending between the frame members 10 is a bar 88 provided with a series of openings 89 and adapted to receive a slider 90 between which and the straps 77 and 78 extends a link 91 adapted to absorb side thrust on the earth-working tillage element.

It will be noted that the steering wheel 20, the hand wheels 84, the clutch control 26, the latch control 92, the gear shift 93 and the reversing shift 94 are brought to the same region whereby to be in convenient reach of the operator standing on the platform 95 which is pivoted to the frame members 96 and resiliently supported thereby at 97.

It should be noted that the control station, by which term is to be understood the operator's platform 95 and the control element positioned within his reach when standing there, is positioned somewhat back of the earth-working element whereby the latter is in position for most convenient observation by the operator.

From the foregoing, it will be clear that I have provided a power operated earth working tool which is well adapted for its intended purpose. It is believed that the operation will be clear from the foregoing and need not be further elaborated. While I have shown and described an illustrative embodiment, I do not wish to be limited to the details thereof except in accordance with the scope of the appended claims.

Having thus described my invention, what I claim is:

1. A motor grader comprising: a frame,

a power plant and steerable wheels connected to said frame and located at the front end thereof, traction means connected with said frame at the rear thereof, earth working means connected with said frame and located behind said power plant and in front of said traction means, an operator's station behind said earth working means, and means adapted to be controlled from said operator's station for connecting said power plant in driving relation to said traction means.

2. A motor grader comprising: a frame, a power plant and steerable wheels connected to said frame and located at the front end thereof, traction means connected with said frame at the rear thereof, earth working means connected with said frame and located behind said power plant and in front of said traction means, an operator's station behind said earth working means, and means adapted to be controlled from said operator's station for connecting said power plant in driving relation to said traction means, said last means including a transmission located behind said earth working means.

3. A motor grader comprising: a frame, a power plant and steerable wheels connected to said frame and located at the front end thereof, traction means connected with said frame at the rear thereof, earth working means connected with said frame and located behind said power plant and in front of said traction means, an operator's station behind said earth working means, and means adapted to be controlled from said operator's station for connecting said power plant in driving relation to said traction means, said last means including a transmission located in close juxtaposition with said traction means.

4. A motor grader comprising: a frame, a power plant and steerable wheels connected to said frame and located at the front end thereof, traction means connected with said frame at the rear thereof, earth working means connected with said frame and located behind said power plant and in front of said traction means, an operator's station behind said earth working means, and means adapted to be controlled from said operator's station for connecting said power plant in driving relation to said traction means, said traction means including an axle and a housing surrounding a portion thereof, and thrust means extending between said housing and said earth working means for pushing the latter.

5. A motor grader comprising: a frame, a power plant and steerable wheels connected to said frame and located at the front end thereof, traction means connected with said frame at the rear thereof, earth working means connected with said frame and located behind said power plant and in

front of said traction means, an operator's station behind said earth working means, and means adapted to be controlled from said operator's station for connecting said power plant in driving relation to said traction means, said last means including a transmission located behind said earth working means and said frame being curved upwardly in the region of said earth working means whereby to provide space for piling up of earth in front thereof.

6. A motor grader comprising: a frame, a power plant and steerable wheels connected to said frame and located at the front end thereof, traction means connected with said frame at the rear thereof, earth working means connected with said frame and located behind said power plant and in front of said traction means, an operator's station behind said earth working means, and means adapted to be controlled from said operator's station for connecting said power plant in driving relation to said traction means, said earth working means including a blade and blade mounting means and said blade being in front of said mounting means.

7. A motor grader comprising: a frame, a power plant and steerable wheels connected to said frame and located at the front end thereof, traction means connected with said frame at the rear thereof, earth working means connected with said frame and located behind said power plant and in front of said traction means, an operator's station behind said earth working means, and means adapted to be controlled from said operator's station for connecting said power plant in driving relation to said traction means, said last means including a transmission located behind said earth working means, said earth working means including a blade and a blade mounting means and said blade being in front of said mounting means.

In testimony whereof, I hereunto affix my signature.

CLARENCE A. HENNEUSE.