F. E. BAGER.

MULTIPLE WHEEL TRENCH MACHINE.

APPLICATION FILED DEC. 31, 1915.

1,246,524.

Patented Nov. 13, 1917.

4 SHEETS—SHEET 1.

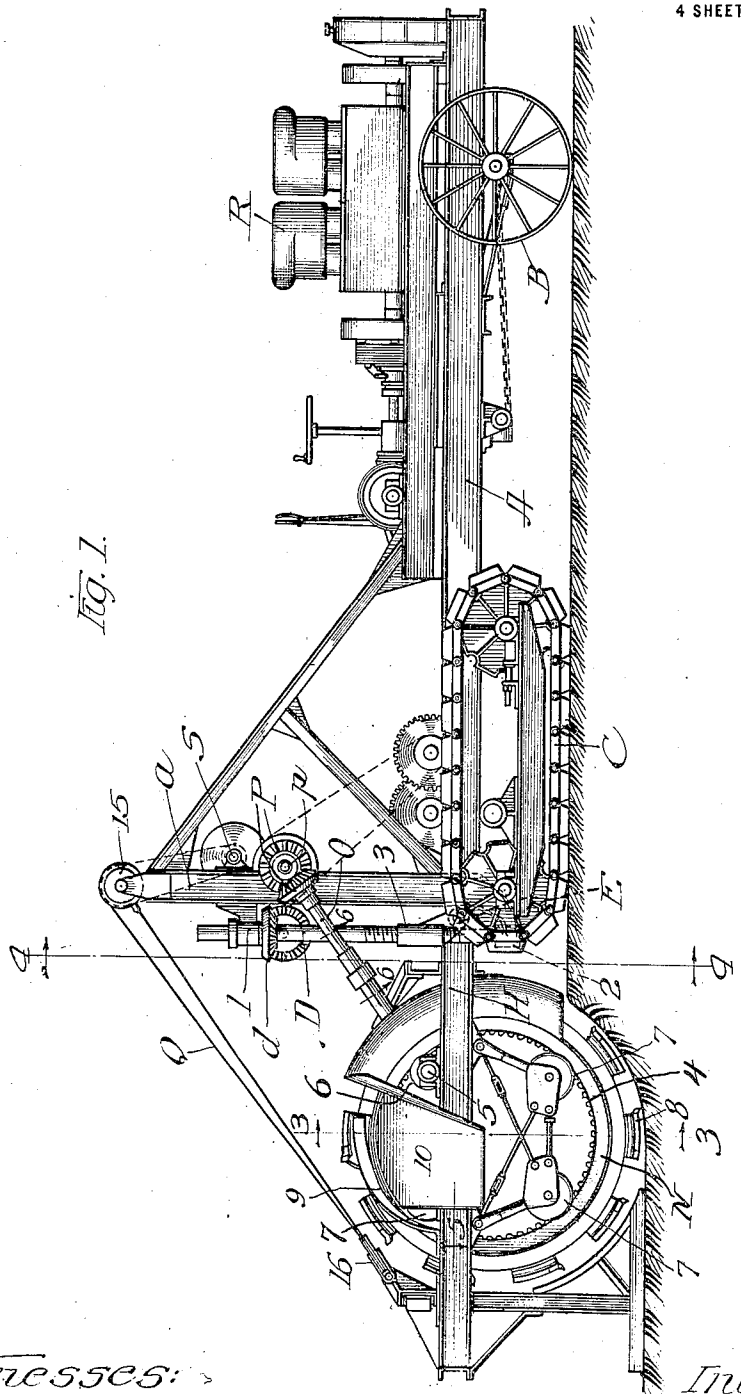


Fig. 1.

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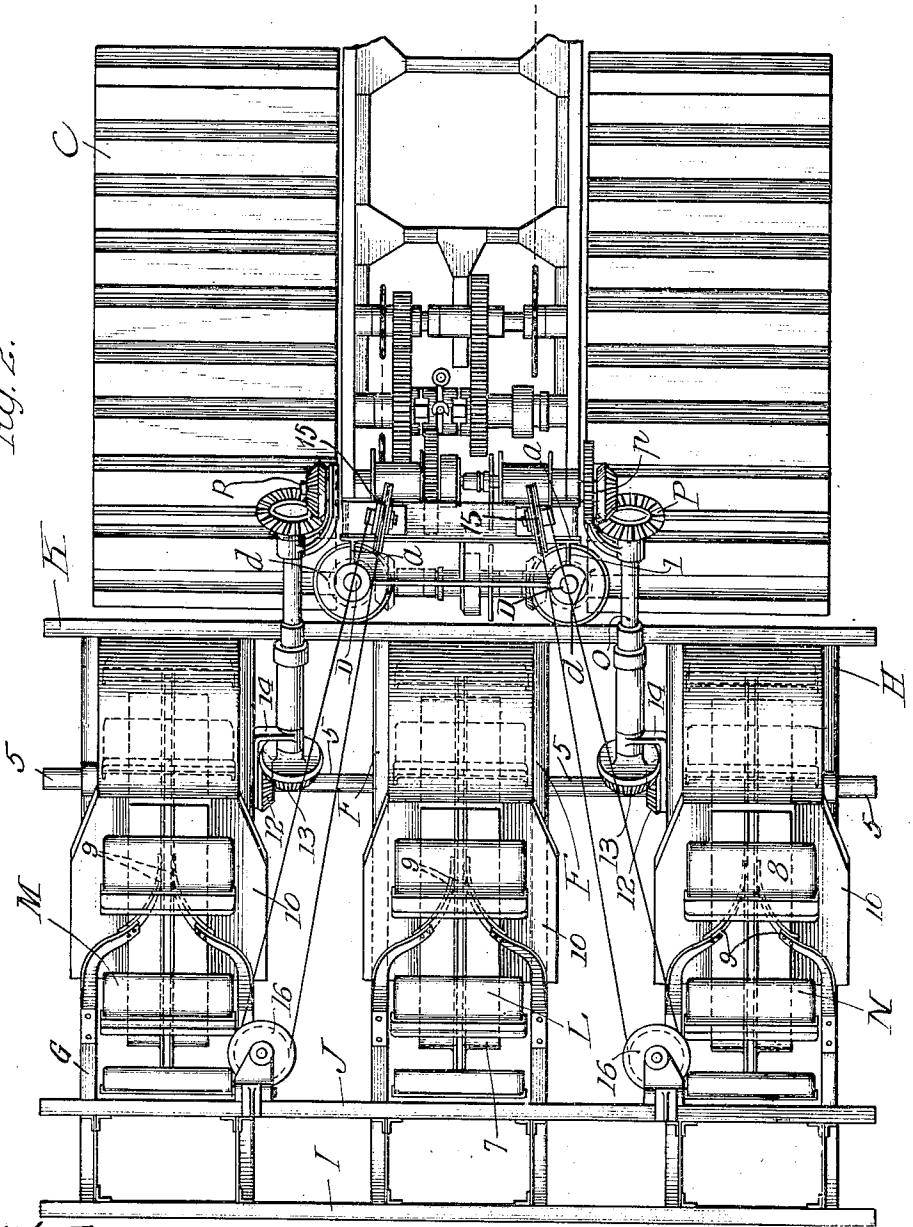
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

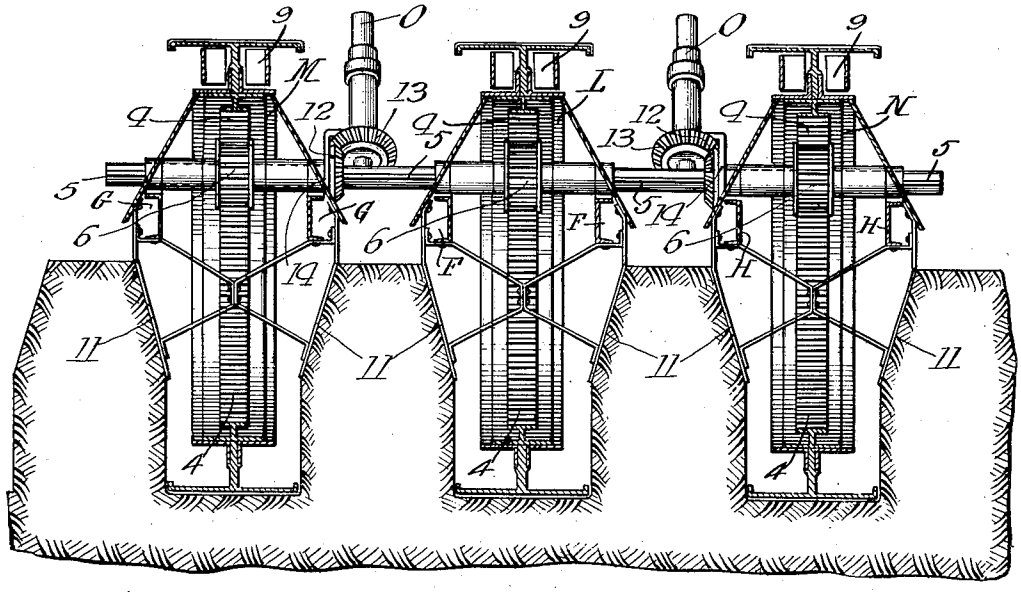
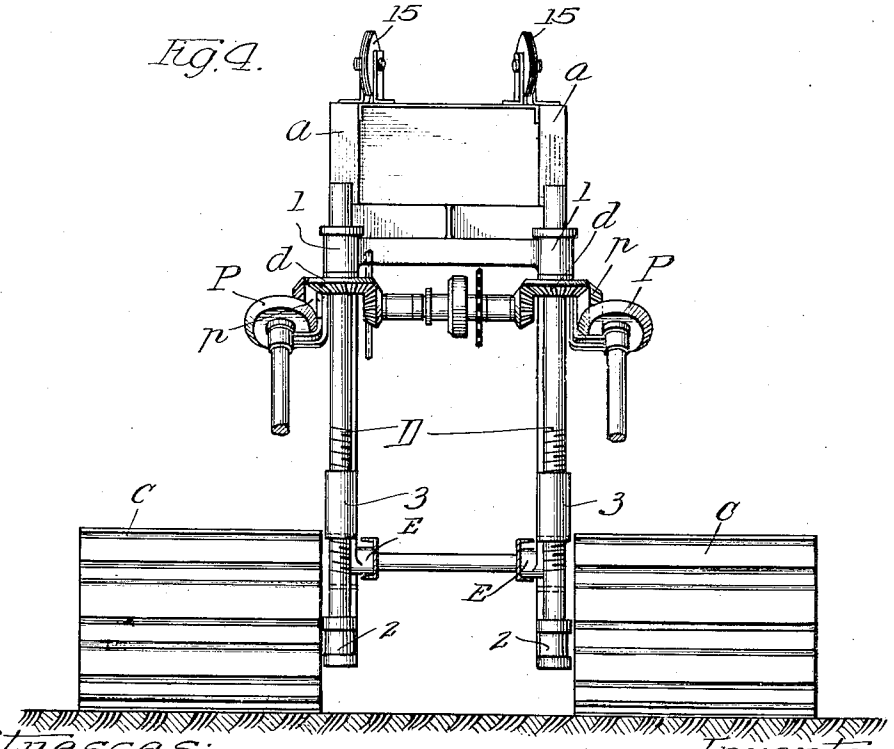


Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 5.

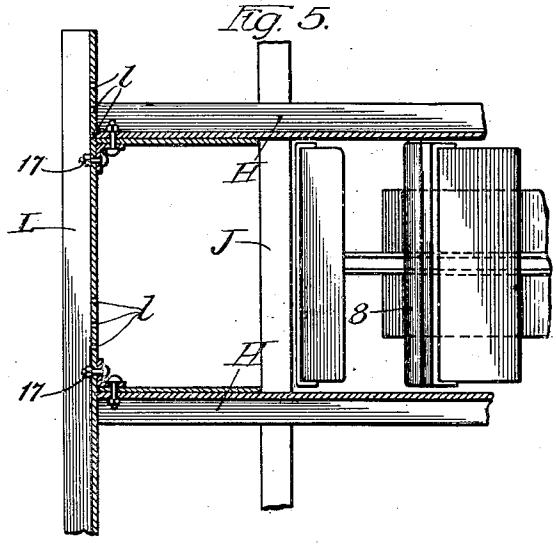


Fig. 6.

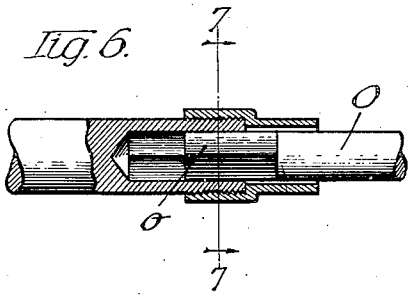


Fig. 7

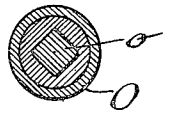
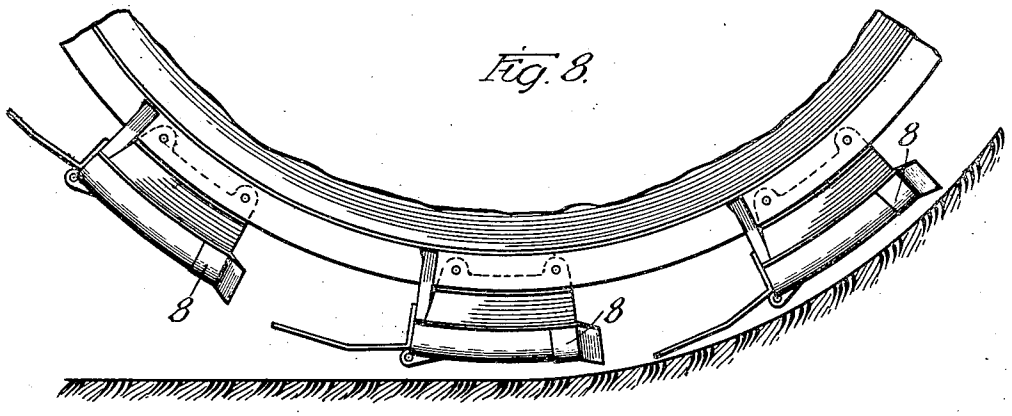


Fig. 8.



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UNITED STATES PATENT OFFICE.

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MULTIPLE-WHEEL TRENCH-MACHINE.

1,246,524. Specification of Letters Patent. Patented Nov. 13, 1917.

Application filed December 31, 1915. Serial No. 69,548.

To all whom it may concern:

Be it known that I, FREDERIC E. BAGER, a citizen of the United States of America, and resident of Kenosha, Kenosha county, Wisconsin, have invented a certain new and useful Improvement in Multiple-Wheel Trench-Machines, of which the following is a specification.

My invention relates to machines for cutting trenches or ditches, and particularly to machines of this kind in which the excavating apparatus comprises a ring or spokeless wheel upon the periphery of which are mounted the excavating buckets to cut the trench or ditch while the entire machine is moving slowly forward.

Broadly considered, my invention contemplates a machine of this kind in which a plurality of such wheels are arranged to operate side by side, whereby two or more parallel trenches or ditches are made by the same machine, thus making it possible for one machine to cut several trenches or ditches at the same time.

It is also an object of my invention to provide certain details and features of construction and combinations tending to increase the general efficiency and desirability of a multiple wheel excavator of this particular character.

To the foregoing and other useful ends, my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a multiple wheel excavator embodying the principles of my invention.

Fig. 2 is a plan of the said machine.

Fig. 3 is an enlarged vertical section on line 3—3 in Fig. 1.

Fig. 4 is an enlarged vertical section on line 4—4 in Fig. 1.

Fig. 5 is an enlarged detail section on line 5—5 in Fig. 1.

Fig. 6 is a detail section of one of the telescoping joints of the transmission connections by which the rotary excavating wheels are driven.

Fig. 7 is a section on line 7—7 in Fig. 6.

Fig. 8 is an enlarged fragmentary side elevation of the lower portion of one of the rotary excavator wheels.

As thus illustrated, my invention comprises an excavator frame or body A mounted on front wheels B and rear caterpillars C, the latter being of any suitable, known or improved construction. At the rear end of the said body, an upright frame *a* is provided, of any suitable construction, having upper and lower bearings 1 and 2 which are arranged in vertical alinement at opposite sides of the machine, as shown more clearly in Fig. 4. Vertical screws D are supported for rotation in these bearings, by means of bevel gearing *d* arranged in any suitable manner, and each screw is provided with a threaded sleeve 3 which travels up and down when the screw is rotated one way or the other. These sleeves 3 are provided with pivots E, of any suitable character, for the rear ends of the parallel beams F, whereby the latter may swing up and down about a horizontal axis. As shown, three excavator wheels are employed, and, consequently, two parallel beams G are arranged at one side of the central beams F, and two parallel beams H are disposed at the other side of the said centrally located beams, all of said beams being rigidly connected together by transverse beams I, J and K, thereby providing a rectangular frame with spaces therein for the excavator wheels. The ring or spokeless wheel L is disposed between the beams F, and a similar wheel M is disposed between the beams G, while a third wheel N is disposed between the beams H, the three wheels being suitably spaced apart. Each of these wheels is provided with an inner ring having cog teeth 4, and a transverse shaft 5 is provided with pinions 6 for engaging said teeth, these pinions being splined on said shaft, whereby they can be adjusted toward and away from each other. The said shaft 5 is supported by suitable bearings on the frame composed of the beams F, G and H, and rollers 7 (these rollers are shown in Fig. 1, but are omitted in Fig. 3 for convenience of illustration) are also suitably supported on this frame, in the usual and well known manner, for the purpose of engaging the teeth 4 and thereby supporting the three wheels for rotation. These wheels are provided with buckets 8, of any suitable character, and also with stationary cleaners 9, of any suitable form, whereby the excavated dirt is discharged at the top of each wheel onto inclined plates or chutes 10 which direct the dirt into the spaces between the wheels, and also upon the outer banks of the two outer ditches. Dirt shields

or guards 11 (these shields are shown in Fig. 3, but are omitted in Fig. 1 for convenience of illustration) are disposed at opposite sides of each wheel, being suitably supported upon the frame which supports the wheels, whereby the loose dirt discharged by the buckets is held against falling into the trenches or ditches, the said guards being preferably inclined to insure sloping sides for the spoil banks thus formed above ground along the sides of each trench or ditch.

For operating the shaft 5, any suitable power or transmitting connection can be employed. For example, this shaft can be provided with bevel pinions 12 which engage similar pinions 13 on the lower ends of telescoping shafts O, the latter being driven at their upper ends by bevel gearing P of any suitable character. The lower ends of these shafts O are supported by brackets 14 on the shaft 5, and in a similar manner at their upper ends, it being observed that the gearing P involves a horizontal shaft *p*, and it being understood that the shafts O are thus mounted to swing up and down upon the said transverse shaft at their upper ends. When the three wheels and their supporting frame are thus moved up and down about the axis E, the shafts O have a telescoping action, each shaft having a telescoping joint *o* of the kind shown in Figs. 6 and 7, or of any other suitable character, as will be readily understood. To raise and lower the wheels and their frame, cables Q are provided and arranged to travel over sheaves 15 and 16, mounted respectively upon the frame *a* and the supporting frame of the wheels. These raising and lowering cables Q are then operated in any suitable or well known manner to swing the wheels and their frame up and down about the axis E, in a manner that will be readily understood. When necessary, however, the wheels and their frame can be raised and lowered bodily by the rotation of the screws D, and by accompanying this operation by the proper adjustment of the cables Q, thereby raising and lowering the wheels in a manner to keep the supporting frame thereof exactly level, if such is desired.

The wheels M and N can be moved outward from the positions shown in the drawings, should it be desired to construct the three trenches or ditches a greater distance apart. For this purpose, the transverse beams I, J and K may be provided with bolt holes for permitting adjustment thereon of the end portions of the beams G and H in a manner that will be readily understood. For example, and as shown in Fig. 5, the beam I may be provided with holes I to receive the bolts 17 by which the beams H are held in place thereon. The other transverse beams may have similar bolts and holes, and thus the wheels M and N can be moved farther away from the center wheel L, it being remembered that the pinions 6 slide in splines on the shaft 5, whereby this relative adjustment of the wheels does not interfere with the proper working of the transmission connections by which they are driven.

It will be understood that the engine R may be of any suitable or desired character and is connected in any suitable manner with the traction devices C, with the shaft *p*, with the bevel gearing *d*, and also with the shaft S by which the hoisting cables Q are operated, whereby all of the various instrumentalities are operated by power. It will be understood, of course, that the various transmission connections may include, wherever necessary, suitable clutches for controlling the transmission of power in the desired manner.

From the foregoing, it will be seen that by my invention I provide a machine capable of cutting a plurality of trenches or ditches at the same time, whereby a single forward movement of the machine across a field will produce two or more ditches of the required character. In this way, a separate operation of the machine is not required for each ditch or trench, and, consequently, much time and work are saved in constructing the trenches, as the number of men required to handle a machine of this kind is no greater than that required for the ordinary machine in which one wheel or other form of trench cutter is employed. Also, with the arrangement shown, the excavated dirt is dumped at the sides of the wheels and automatically shaped into spoil banks having sloping sides, whereby the resulting ditches or trenches extend above the level of the ground for about half their depth, or for any other desired distance. Obviously, a machine which will thus cut a plurality of trenches and at the same time automatically convert the excavated dirt into neat and well formed spoil banks between the trenches, as well as at the outer sides of the outermost ditches, can be employed for various purposes where parallel trenches or ditches are required, and I do not limit myself to any particular use, nor to the exact construction shown and described.

What I claim as my invention is:

1. An excavator for making ditches, comprising apparatus for simultaneously cutting a plurality of ditches which are spaced apart, a traveling body, means to discharge the excavated dirt on the ground behind the body and between the ditches, and instrumentalities on said body to drive said apparatus during the forward movement of the excavator.

2. An excavator for making ditches, comprising apparatus for simultaneously cut-

ting a plurality of ditches which are spaced apart, a traveling body, and instrumentalities on said body to drive said apparatus during the forward movement of the excavator, said apparatus having means to form spoil banks with smooth inclined sides between the ditches and at the outermost sides thereof.

3. The structure specified in claim 1, said apparatus comprising a plurality of annular members spaced apart to accommodate said means between them and having a common horizontal axis of rotation, buckets on the periphery of said members, and a frame having means to support said members in position for operation in the ground.

4. An excavator for making ditches, comprising apparatus for simultaneously cutting a plurality of ditches, which are spaced apart, a traveling body, and instrumentalities on said body to drive said apparatus during the forward movement of the excavator, said apparatus having means to form spoil banks with smooth inclined sides between the ditches and at the outermost sides thereof, said apparatus comprising a plurality of annular members spaced apart to accommodate both of said means between them and having a common horizontal axis of rotation, buckets on the periphery of said members, and a frame having means to support said members in position for operation in the ground.

5. An excavator for making ditches, comprising apparatus for simultaneously cutting a plurality of ditches which are spaced apart, a traveling body, and instrumentalities on said body to drive said apparatus during the forward movement of the excavator, said apparatus comprising a rotary cutting wheel and two similar wheels at opposite sides thereof, the middle wheel being disposed centrally of said body, and the two outer wheels being adjustable to change the distance between the three wheels.

6. An excavator for making ditches, comprising apparatus for simultaneously cutting a plurality of ditches, which are spaced apart, a traveling body, and instrumentalities on said body to drive said apparatus during the forward movement of the excavator, said apparatus having means to form spoil banks between the ditches and at the outermost sides thereof, and said apparatus comprising a rotary cutting wheel and two similar wheels at opposite sides thereof, the middle wheel being disposed centrally of said body, and the two outer wheels being adjustable to change the distance between the three wheels.

7. An excavator for making ditches, comprising apparatus for simultaneously cutting a plurality of ditches which are spaced apart, a traveling body, instrumentalities on said body to drive said apparatus during the forward movement of the excavator, vertically disposed screws mounted on the rear end of said body, threaded members on said screws, means on said members to provide pivot bearings for said apparatus, means above said members for rotating said screws to raise and lower said members and bearings, and devices to swing said apparatus up and down on said bearings.

8. An excavator for making ditches, comprising apparatus for simultaneously cutting a plurality of ditches which are spaced apart, a traveling body, instrumentalities on said body to drive said apparatus during the forward movement of the excavator, vertically disposed screws at the rear end of said body, threaded members on said screws, bearings for said screws above said members, means on said members to provide pivot bearings for said apparatus, bearings below said members for the lower ends of said screws, means comprising bevel-gearing for rotating said screws to raise and lower said members and bearings, and devices to swing said apparatus up and down on said bearings.

9. An excavator for making ditches, comprising apparatus for simultaneously cutting a plurality of ditches which are spaced apart, a traveling body, and instrumentalities on said body to drive said apparatus during the forward movement of the excavator, including shafts extending downward and rearward to said apparatus, and means to swing said apparatus up and down, said shafts having telescoping joints to permit said swinging movement.

10. An excavator for making ditches, comprising apparatus for simultaneously cutting a plurality of ditches which are spaced apart, a traveling body, and instrumentalities on said body to drive said apparatus during the forward movement of the excavator, including shafts extending downward and rearward to said apparatus, said apparatus having means to form spoil banks between the ditches and at the outermost sides thereof, and means to swing said apparatus up and down; said shafts having telescoping joints to permit said swinging movement.

11. The structure specified in claim 1, said apparatus including a plurality of cutting wheels which are uniformly spaced apart and arranged to rotate about a common axis, a drive shaft extending through said wheels eccentrically thereof, said shaft being disposed in front of said means and transversely of the ditches, and pinions on said shaft to engage said wheels.

12. An excavator for making ditches, comprising apparatus for simultaneously cutting a plurality of ditches which are spaced apart, a traveling body, and instrumentalities on said body to drive said apparatus

during the forward movement of the excavator, said apparatus having means to form spoil banks with smooth inclined sides between the ditches and at the outermost sides thereof, and said apparatus including a plurality of cutting wheels arranged to rotate about a common axis, a drive shaft extending through said wheels eccentrically thereof, pinions on said shaft to engage said wheels and means engaging said shaft at a plurality of points therein to rotate the shaft and pinions.

13. An excavator for making ditches, comprising a traveling body, a frame having pivot bearings at the rear end of said body, excavating means on said frame, mechanism to raise and lower and hold said pivot bearings against up-and-down movement, devices to swing said frame up and down on said bearings, connections to operate said apparatus and winding drum-devices to raise and lower the rear end of said frame in any position of said bearings, said mechanism including vertically disposed screws and threaded sleeves on said screws to support said pivot bearings, and bearings to support the lower ends of said screws.

14. An excavator for making ditches, comprising digging means to simultaneously form a plurality of parallel ditches, mechanism to operate said means in the ground, devices to slowly move said excavator forward during the operation of said means by said mechanism, means to deliver the excavated dirt from said digging-means onto the ground between the ditches, and means to prevent said dirt from falling back into the ditches.

Signed my me at Chicago, Illinois, this 11th day of December, 1915.

FREDERIC E. BAGER.