

April 28, 1931.

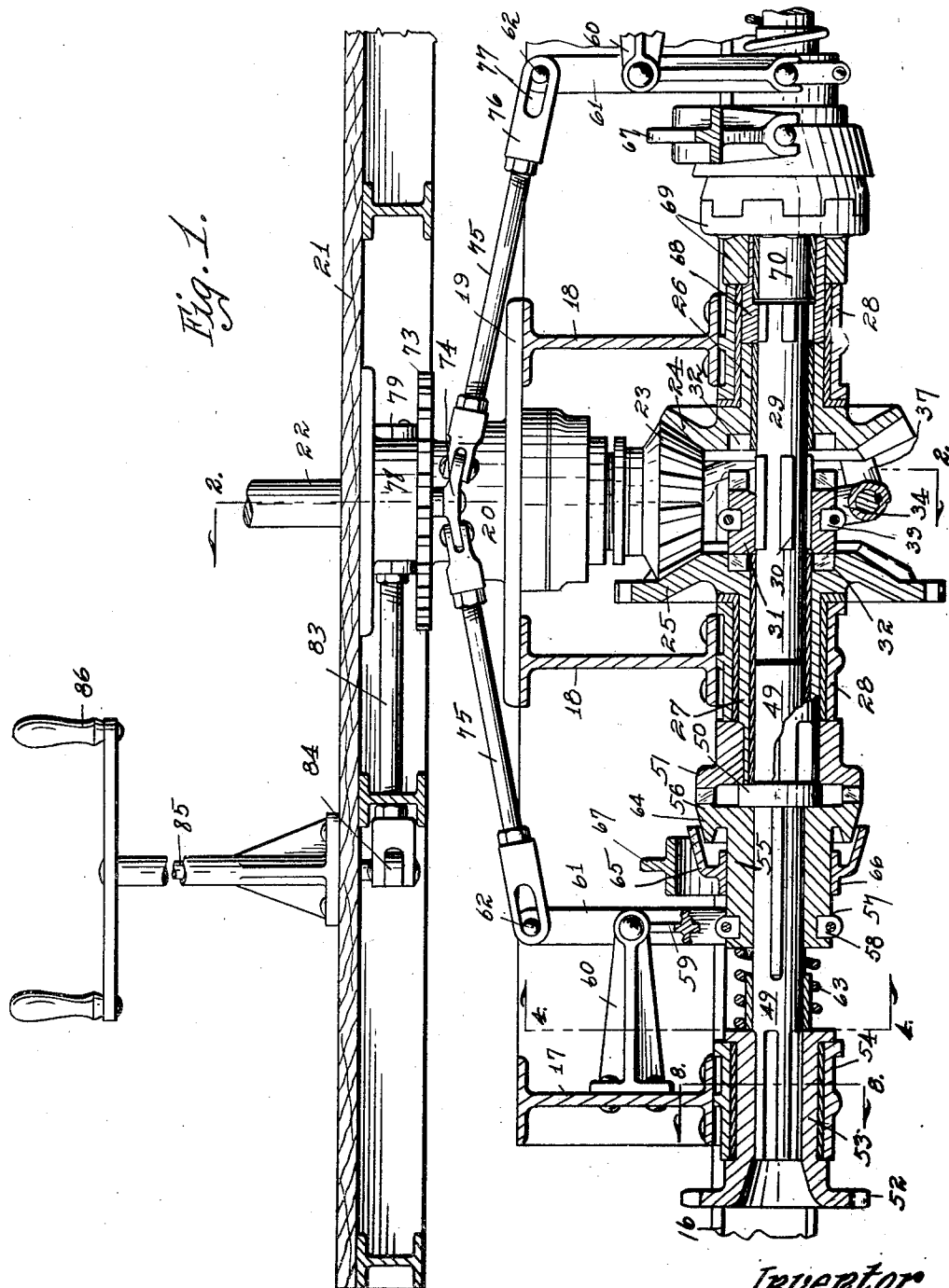
G. T. RONK

1,802,576

TRACTION MECHANISM FOR EXCAVATORS

Filed Jan. 27, 1926

5 Sheets-Sheet 1



Inventor
George T. Ronk.
by Oving & Hyman, attys.

April 28, 1931.

G. T. RONK

1,802,576

TRACTION MECHANISM FOR EXCAVATORS

Filed Jan. 27, 1926

5 Sheets-Sheet 2

Inventor
George T. Runk
Dwight & Hogue, Attys.

April 28, 1931.

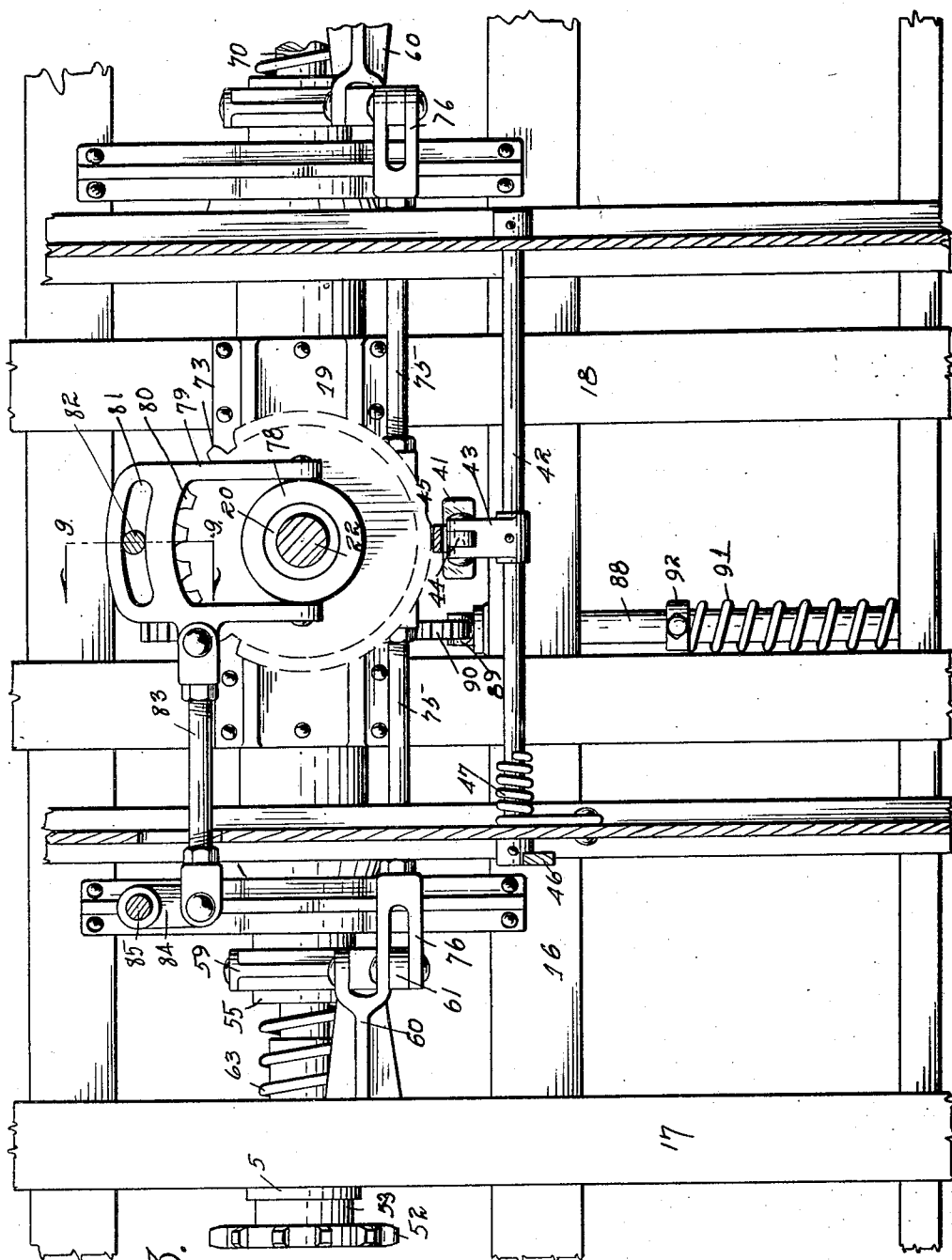
G. T. RONK

1,802,576

TRACTION MECHANISM FOR EXCAVATORS

Filed Jan. 27, 1926

5 Sheets-Sheet 3



Inventor
George T. Ronk
by Owig & Hogue, Attys.

April 28, 1931.

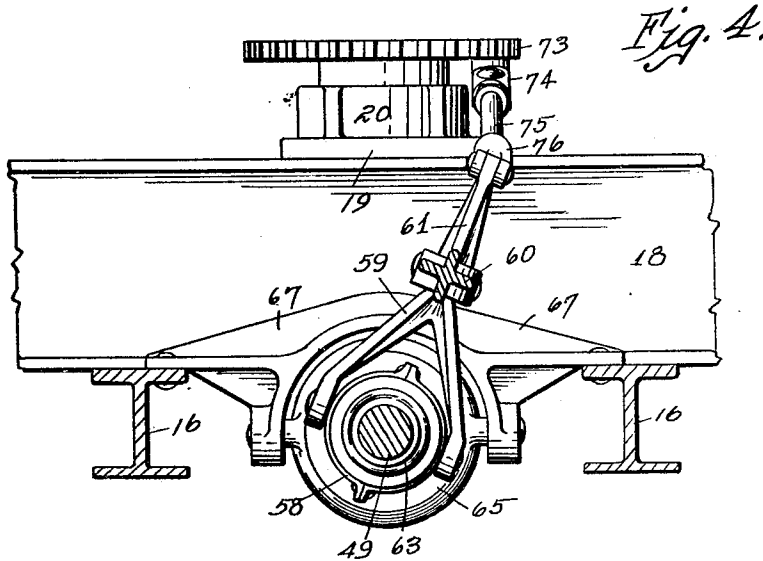
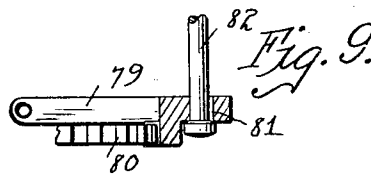
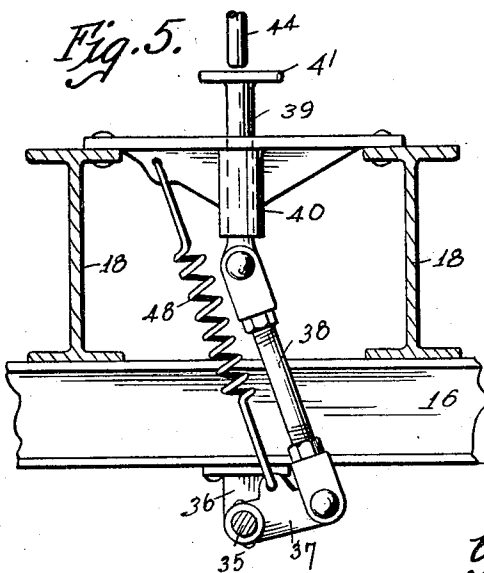
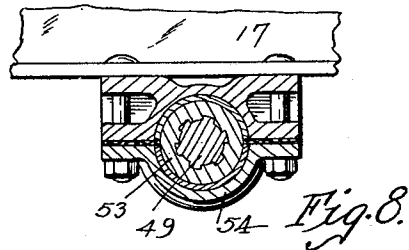
G. T. RONK

1,802,576

TRACTION MECHANISM FOR EXCAVATORS

Filed Jan. 27, 1926

5 Sheets-Sheet 4



Inventor
George T. Ronk
by Owig & Hogue, Attys.

April 28, 1931.

G. T. RONK

1,802,576

TRACTION MECHANISM FOR EXCAVATORS

Filed Jan. 27, 1926

5 Sheets-Sheet 5

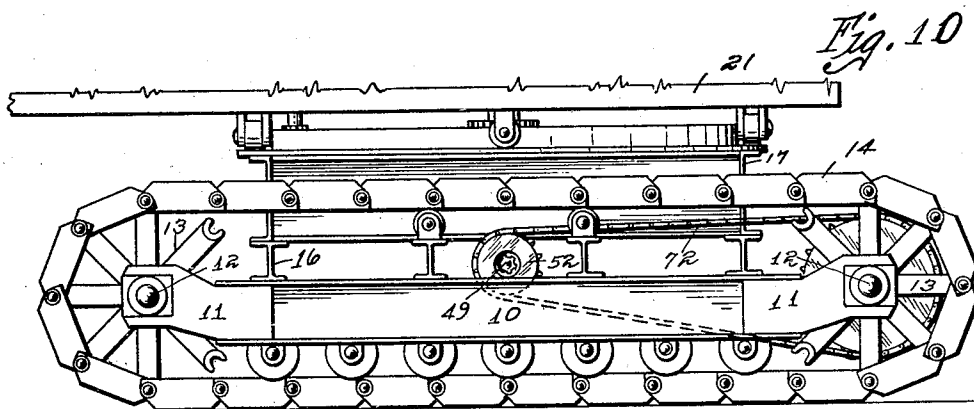
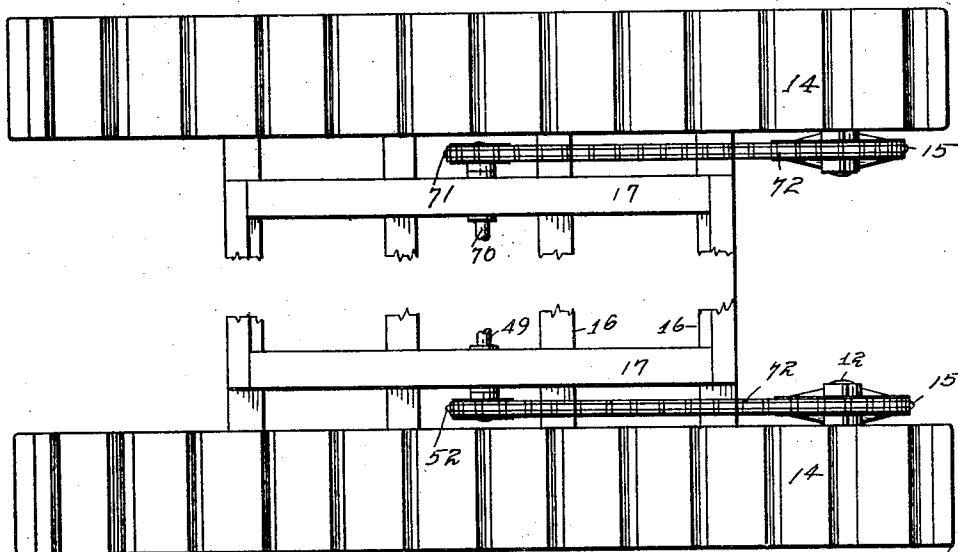


Fig. 11.

Inventor
George T. Ronk
by Owig & Hagues, Attys.

UNITED STATES PATENT OFFICE

GEORGE T. RONK, OF FAIRFIELD, IOWA, ASSIGNOR TO SPEEDER MACHINERY CORPORATION, OF CEDAR RAPIDS, IOWA, A CORPORATION OF IOWA

TRACTION MECHANISM FOR EXCAVATORS

Application filed January 27, 1926. Serial No. 84,257.

This invention relates to improvements in excavator traction mechanisms of that type which employ a linked tread, and pertains more particularly to the mechanism for driving the tread.

The object of my invention is to provide a gearing mechanism for driving the tread members of an excavator, said gearing mechanism being assembled in a number of units, which may be easily and quickly assembled and attached to the excavator frame, the units being of such size as may be easily handled by two men.

A further object is to provide in a mechanism for driving excavator tread members improved means for driving two tread members in unison or for driving either of them independently; to cause the excavator to be turned in a circular path about one of the tread members as a center or to drive both of said tread members simultaneously, one being driven in a forward direction while the other is driven in a rearward direction to cause the excavator to be turned about a pivot center extending vertically through the center of the excavator.

A further object is to provide means for permitting the excavator to be advanced in one direction and to be automatically locked against movement in a reverse direction.

A further object is to provide in an excavator of that type having a rotatable platform carried on a truck supported by a pair of linked tread members improved means for steering the tractor by mechanism supported on said platform, said mechanism being designed to be actuated when the platform is in any of its various pivoted positions of movement relative to said supporting truck.

My invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is an enlarged detail longitudinal sectional view of a segmental portion of my improved steering and driving mechanism.

Figure 2 is a detail sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a detail sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a detail sectional view taken on the line 4—4 of Figure 1.

Figure 5 is a detail sectional view taken on the line 5—5 of Figure 2.

Figure 6 is a detail sectional view taken on the line 6—6 of Figure 2.

Figure 7 is an end elevation of the automatic locking mechanism.

Figure 8 is a detail sectional view taken on the line 8—8 of Figure 1.

Figure 9 is a detail sectional view taken on the line 9—9 of Figure 3.

Figure 10 is a side elevation of a tractor truck showing the manner in which my improved mechanism is applied thereto.

Figure 11 is a segmental detail view of the excavator truck showing the manner in which my improved driving mechanism is connected with the tread members.

My improved device comprises a truck formed of channel members 10 having at each end brackets 11, each of said brackets being provided with a shaft 12 designed to support sprocket wheels 13, said sprockets being designed to carry linked tread members 14. Each of the shafts 12 at one end of the frame members 10 is provided with a sprocket wheel 15. The frame members 10 are provided with a series of transversely arranged members 16 which are in turn designed to carry longitudinally extending members 17 and 18. The members 18 are designed to carry at their central portions a plate 19 on which is mounted a sleeve 20 designed to have pivotally connected with it a platform 21 designed to carry the excavator operating mechanism which is not herein illustrated for the reason that it forms no part of my present invention.

The sleeve 20 is provided with a vertically arranged shaft 22 rotated by means of a power mechanism on the platform 21, and is termed the drive shaft. The lower end of said drive shaft is provided with a pinion 23 in mesh with gears 24 and 25. The gear 24 is provided with a hub or sleeve 26 while the gear 25 is provided with a hub or sleeve 27.

The said members 26 and 27 are carried by suitable bearing members 28 secured to the under surface of the members 18. The sleeves 26 and 27 are designed to receive a shaft 29 which is provided with a fluted portion 30 at its center, said fluted portion being provided with a slidably mounted clutch member 31 designed to coact and engage mating clutch members 32 on the inner face of each of the gears 24 and 25, so that either of the gears 24 or 25 may be locked to the shaft 29, or if the said clutch member 31 is moved to a central position of its movement, both of said gears may be free to rotate on said shaft. The clutch member 31 is provided with an actuating band 33 to which is connected a yoke 34, said yoke being mounted on a shaft 35 pivotally mounted in bearings 36.

The shaft 35 is provided with a pair of rock arms 37 each of which is provided with an upwardly extending link 38 pivotally connected to a push rod 39, said push rod being slidably mounted in a vertical bearing 40 and having at its upper end a contact plate 41 located a slight distance below the platform 21. Mounted in the platform 21 is a rock shaft 42 having at its central portion a rock arm 43 said rock arm being provided with a downwardly extending pin 44 which passes through a guide plate 45. Said guide plate is so located that the pin 44 will rest above one of the push rods 39 when the platform is in one position of its movement and above the other push rod 39 when the platform has been swung through an angle of 180°. The shaft 42 is provided with an upwardly extending lever 46. The shaft 42 is also provided with a spring 47 which causes the pin 44 to be yieldingly supported in an elevated position.

It will be seen that if the lever 46 is moved in a clockwise direction as viewed in Figure 2, the pin 44 will be moved downwardly, which in turn will cause the push rod 39 to be moved downwardly and the shaft 35 to be rotated against the action of a spring 48 and the clutch member 31 to be disengaged from the gear 25, the purpose of which will hereinafter be made clear.

Rotatively mounted in the sleeve 27 is a shaft 49 having a collar 50 designed to rest against the end of the sleeve 27. The end of said sleeve 27 is also provided with a clutch member 51 rigidly secured to said sleeve. The outer end of the shaft 49 is provided with a sprocket 52 provided with a hub 53 splined on said shaft and designed to be rotatively mounted in a bearing 54, said bearing being secured to the under surface of one of the members 17.

Slidably and non-rotatively mounted on the shaft 49 is a sleeve 55, one end of which is provided with a clutch jaw 56 designed to coact with the clutch member 51, and also

provided with a circumferential groove 57 designed to receive a collar 58, said collar being pivotally connected with a yoke 59 pivotally connected to a bracket 60 secured to the web of the member 17. Said yoke 59 terminates in an upwardly extending lever 61 having a pin 62. A spring 63 is provided for yieldably supporting the jaw member 56 in contact with the jaw members of the clutch 51. The sleeve 55 is provided with one member 64 of a cone clutch. The other member 65 of said cone clutch is secured to a sleeve 66 through which the sleeve 55 is slidably and rotatively mounted. The sleeve 66 is rigidly secured to a bracket 67 mounted to the members 16. The member 65 is held against rotation by said bracket 67.

By this arrangement it will be seen that the sleeve 55 will be rotated through the clutch members 56 and 51 and in turn will impart rotation to said sprocket 52, when the said clutch members are in engagement with each other. It will further be seen that the said sleeve 55 may be moved longitudinally to cause the clutch members 64 and 65 to engage each other, at which time the clutch members 51 and 56 will be brought out of engagement with each other. The sprocket 52 may then be locked against rotary movement.

The outer end of the shaft 29 is provided with a sleeve 68 which is rigidly secured to said shaft and has on its outer end a clutch member 69 similar to the clutch member 51. Rotatively mounted in the sleeve 68 is a shaft 70 similar to the shaft 49. The shaft 70 has its outer end provided with a sprocket 71 similar to the sprocket 52. The manner of mounting the shaft 71 together with the clutch mechanism for operating the same is similar in all respects to those previously described for the said shaft 49. It is, therefore, deemed unnecessary to describe in detail this clutch mechanism which is simply a duplicate, and the same reference numerals being applied to these members.

The sprockets 52 and 71 are provided with chains 72 designed to operate the sprocket wheels 15 and thereby provide means whereby the tread members 14 may be driven. The levers 61 are actuated by means of a gear 73 rotatively mounted on the sleeve 20. Said gear 73 has a downwardly extending bracket 74 to which a pair of links 75 are pivotally connected to the lever 61 in the manner clearly shown in Figure 1. Each of the links 75 is provided with a yoke 76 having slots 77 designed to receive the pins 62 before described, so that a sliding connection is provided between the members 76 and 61. Above the gears 73 is a sleeve 78 rotatively mounted on the sleeve 20. The sleeve 20 has pivoted to it a yoke 79 in which is included an internal rack 80. The outer end of the yoke 79 is provided with a slot 81 concentric with the center of the sleeve 78. The rack

80 is adapted to be elevated and lowered, and when in its lower limit of movement to engage the teeth of the gear 73, so that rotary movement may be imparted to said gear by oscillating the yoke 79. This yoke is elevated and lowered by means of a rod 82 which extends upwardly through the platform 21. The rack 80 is oscillated by means of a link 83 which has one end pivoted to said yoke and its opposite end pivoted to a crank arm 84 connected to the lower end of the vertical shaft 85 which extends through the platform 21. The upper end of the shaft is provided with handles 86 by means of which rotary movement may be imparted to the shaft 85, and which in turn will cause the gear 73 to be oscillated, thus providing means whereby the excavator truck may be steered, which is accomplished as follows:

Assuming that the platform 21 is being held stationary relative to the truck frame, and in any one of its angular positions of movement about its vertical axis, and that the member 28 has been moved into mesh with the gear 73 by lowering the shaft 82, the operator may then impart limited rotary movement to the shaft 85 by the handle 86, causing the rack 80 to oscillate about the shaft 22 as a center. The rack 79 will then impart movement to the gear 73. Movement of the gear 73 will cause one of the levers 61 to be actuated while the other one of said levers rests in its normal position. The upper end of the lever 61 is actuated and will be moved inwardly, which will cause the sleeve 55 to be moved outwardly and the clutch members 56 and 51 to be disengaged. Assuming that this clutch member 56 is the one carried by the shaft 49, then the pinion 52 will be held inoperative, and power will then be transmitted through the gear 25 to the clutch 31 and the shaft 29, the sleeve 68 and the clutch member 69 to the shaft 70, which in turn will impart rotary movement to the pinion 71, causing the corresponding tread member 14 to be operated and the truck to be advanced through said tread members. A further slight outward movement of the sleeve 55 will cause the clutch member 64 to engage the clutch member 65 and the pinion 52 to be positively locked against rotation. This will cause the truck to travel in a circular path about the center of the stationary tread member, or a reverse turning movement may be imparted to the truck by moving the steering mechanism in a reverse direction from that above described.

Sometimes it is desirable to turn the truck through a circular path about the shaft 22 as a pivot center. This I accomplish by operating the lever 46 which will cause the pin 44 to be lowered together with the plunger 39 and the shaft 35 to be oscillated, which will throw the clutch 31 out of engagement with the gear 25 and places it into engagement

with the gear 24. The steering mechanism 86 is at this time left in its normal position with both sets of clutch members 51 and 56 in engagement. It will be seen that as the pinion 23 is rotated the gears 24 and 25 will be rotated in opposite directions, the shaft 29 being actuated through the gear 24 instead of the gear 25, as previously described. This will cause the sprockets 52 and 71 to rotate in opposite directions, causing the tread members 14 to rotate in the opposite direction, which will cause the truck to travel in a circular path about the shaft 22 as a center. The truck may be advanced forwardly in a straight line by simply permitting both sets of the clutches 51 and 56 to remain in engagement with each other and permit the clutch 31 to engage the gear 25, this being the normal position of the parts.

Excavators which are mounted on trucks have the objectionable feature of being capable of being moved either forwardly or backwardly, while the excavator is being operated. The tendency is usually for the excavator to move from the work as the excavator is being operated, and it is usually necessary to apply some kind of a block or similar device against the tread members to prevent this backward movement, and to reset the block every time the excavator is moved forwardly. To overcome this difficulty I have provided means whereby the excavator may be permitted to advance forwardly but will be automatically locked against rearward movement. This device comprises a shaft 88 rotatively and slidably mounted in two of the members 16. The inner end of said shaft is provided with a beveled portion 89 designed to enter notches 90 in the edge of the gear 25. The shaft 88 is provided with a spring 91 and a collar 92 which provides means for yieldably moving the shaft 88 inwardly. The outer end of the shaft 88 is provided with a handle member 93. The outer end of the shaft 88 is slidably mounted in a sleeve 94 having deep notches 95 and shallow notches 96, said notches being arranged at right angles to each other.

By this arrangement I have provided means whereby the operator may grasp the handle 93 and impart outward pressure which will cause the shaft 88 to be moved outwardly, after which it may be rotated through an angle of 90° and caused to enter the notch 96, thereby causing the member 89 to disengage the notches 90, or the shaft 88 may be moved through an angle of 180° and cause the inclined portion 89 to assume a reverse position to the one shown in Figure 2. It will be seen that if the shaft 88 is at its inner limit of movement, the member 89 will enter one of the notches 90 and permit the gear 25 to rotate in one direction, but will lock it against rotation in the opposite direction, thereby permitting the truck to be advanced

at will, but at all times being locked against rearward movement, or the member 89 may be placed in an inoperative position and the truck will then be free to travel in either direction.

Thus it will be seen that I have provided a steering mechanism for excavator trucks by means of which either of the linked tread members may be thrown into operation while the opposite one is locked against operation. These conditions are brought about when the platform is in any of its rotative positions of movement, or if so desired, the tread members may be reversed and the excavator caused to travel in a circular path about its vertical center, thereby enabling the excavator truck to be turned end to end in the smallest space possible, which is often very convenient in transporting the excavator from point to point, and especially where turns have to be made in crooked passageways or through narrow streets.

It will further be seen that I have provided means whereby the driving and steering mechanism is constructed in such a manner that the said mechanism may be divided into a number of units. For instance, the shaft 29, the gears 24 and 25, together with the clutch member 31 and the clutch members 51 and 69 together with their bearings may be considered as a unit, which may be placed in position beneath the members 18 and the bearings rigidly secured thereto. The shaft 49, the sleeve 55, the sprocket 52 and the bearings for supporting said sprocket form another unit which may be placed in position after the first one has been installed. The inner end of the shaft 49 is placed in the sleeve 27. Likewise the shaft 70 together with its bearings and clutch members will form a third unit. This provides means whereby the mechanism may be easily and quickly installed.

It will further be seen that I have provided automatic means for permitting the truck to be progressively advanced but will be automatically retained against rearward movement, which may be easily and quickly thrown into or out of operation.

I claim as my invention:

1. In combination, a truck having a pair of linked tread members, means for driving and controlling the movement of each of said tread members, each of said means including a jaw clutch and a friction clutch, said clutch members having a common movable member, a lever for operating each of said common movable members, means for actuating either of said levers, said means comprising a rotatable gear member, a pair of links pivotally connected with said gear member, one for each of said levers, said links being run in opposite directions, said links making slidable connection with said levers, a platform rotatively mounted above said gear, a rack

mounted and designed to be moved into and out of operative relation with said gear, means carried by said platform for imparting oscillatory movement to said rack, and means for imparting rotary movement to said clutch members.

2. In combination, a truck having a pair of linked tread members, means for driving and controlling the movement of each of said tread members, each of said means including a clutch having a slidable member, a lever for operating said slidable member, means for actuating either of said levers, said means comprising a rotatable gear member, a pair of links pivotally connected with said gear member, one for each of said levers, said links being run in opposite directions, said links making slidable connection with said levers, a platform rotatively mounted above said gear, a rack pivotally mounted and designed to be moved into and out of operative relation with said gear, means carried by said platform for imparting oscillatory movement to said rack, and means for imparting rotary movement to said clutch members.

3. In combination, a truck having a pair of linked tread members, means for driving and controlling the movement of each of said tread members, each of said means including a jaw clutch and a friction clutch, said clutch members having a common movable member, a lever for operating each of said common movable members, means for actuating either of said levers, said means comprising a pivoted gear member, a pair of links pivotally connected with said gear member, one for each of said levers, said links being run in opposite directions, said links making slidable connection with said levers, a platform rotatively mounted above said gear, a rack pivotally mounted and designed to be moved into and out of operative relation with said gear, means carried by said platform for imparting oscillatory movement to said rack, the oscillatory center of said rack being common to the center of said gear, and means for imparting rotary movement to said clutch members in opposite directions.

4. A truck for excavators comprising a supporting frame, a pair of tread members, means for imparting movement to said tread members, said means including a driving shaft for each of said tread members in alignment, a third shaft between each of said driving shafts and in alignment therewith, a fourth shaft perpendicular with the third shaft, a pinion gear for said fourth shaft, a pair of beveled gears in mesh with the said pinion and rotatively mounted on said third shaft, a clutch member for operatively connecting one of the first said shafts with one of said bevel gears, a clutch member for operatively connecting the other one of the first said shafts with said third shaft, a clutch

member for throwing either of said bevel gears into and out of operation with said third shaft, and means for actuating said clutch members.

5 5. A truck for excavators comprising a sup-
porting frame, a pair of tread members,
means for imparting movement to said tread
members, said means including a driving
10 shaft for each of said tread members in aline-
ment, a third shaft between each of said driv-
ing shafts and in alinement therewith, a
fourth shaft perpendicular with the third
shaft, a pinion gear for said third shaft, a
15 pair of bevel gears in mesh with the said pin-
ion and rotatively mounted on said third
shaft, a clutch member for operatively con-
necting one of the first said shafts with one
of said bevel gears, a clutch member for op-
20 eratively connecting the other one of the first
said shafts with said third shaft, a clutch
member for throwing either of said bevel
gears into and out of operation with said
third shaft, means for actuating said clutch
25 members, and means for locking either of the
first said shafts against rotary movement.

6. In combination, a truck member having
a pair of tread members, a platform rotatively
mounted on said truck, a drive shaft extended
30 through the pivot of said platform, the lower
end of said drive shaft being provided with
a pinion gear, means for imparting move-
ment to each of said tread members compris-
ing a shaft for each of said tread members,
means for operatively connecting said shafts
35 and their respective tread members, a fourth
shaft between the said pair of drive shafts
and in alinement therewith, a pair of bevel
gears rotatively mounted on said fourth shaft
in mesh with said pinion gear, a clutch device
40 for operatively connecting one of said tread
operating shafts with one of said bevel gears,
a clutch device for operatively connecting
said fourth shaft with the other one of said
tread operating shafts, means carried by said
45 platform for throwing either of said clutch
members into and out of gear, a clutch for
throwing either of said bevel gears into and
out of operative relation with said fourth
shaft, and means carried by said platform
50 for shifting the last said clutch member, the
last said means being adapted to be operated
when the platform is in a number of its posi-
tions of rotative movement.

7. In a device of the class described, a sup-
55 port, a platform rotatively mounted on said
support, a gear member pivotally mounted
on the pivot member of said platform, a pair
of oppositely arranged links having their in-
ner ends pivotally connected with said gear,
60 a rack pivotally mounted and designed to be
moved into and out of operative relation with
said gear having its pivot center in common
relation with the pivot center of said plat-
form, means for imparting oscillatory move-
65 ment to said rack when in engagement with

said gear member, said means comprising a
shaft rotatively supported perpendicular to
said platform, one end of said shaft having
a crank arm, a link connecting said crank
arm with said rack member, and an operat-
70 ing handle on the opposite end of said shaft.

8. A truck for excavators comprising a
supporting frame, a pair of tread members,
means for imparting movement to said tread
members, said means including a driving
75 shaft for each of said tread members in aline-
ment, a third shaft between said driving
shafts and in alinement therewith, a fourth
shaft perpendicular with the third shaft, a
pinion gear for said fourth shaft, a pair of
80 bevel gears in mesh with said pinion and
rotatively mounted on said third shaft, a
clutch member for operatively connecting
one of the first said shafts with one of said
bevel gears, a clutch member for operatively
85 connecting the other one of the first said
shafts with said third shaft, a clutch mem-
ber for throwing either of said bevel gears
into and out of operation with said third
shaft, and means for actuating said clutch
90 members.

9. In a device of the class described, a sup-
port, a platform rotatively mounted on said
support, a pair of tread members, means for
operating said tread members including
95 means for locking each tread member against
movement, a clutch device for imparting
movement to each of said tread members,
means for operatively connecting said clutch
devices and locking means with their respec-
100 tive tread members, whereby the locking
means will be moved into locking position
and the clutch mechanism simultaneously
moved out of operation, or vice versa, lost
motion connecting means for transmitting
105 movement to both of the last said means, a
spur gear pivotally mounted on the pivot
member of said platform to impart move-
ment to said lost motion connecting means,
an integral rack pivotally mounted and de-
110 signed to be moved into and out of operative
relation with said gear having its pivot cen-
ter in common relation with the pivot center
of said platform, and means for imparting
oscillatory movement to said rack when in
115 engagement with said spur gear and relative
to said platform.

Des Moines, Iowa, July 31, 1925.

GEORGE T. RONK.

120

125

130