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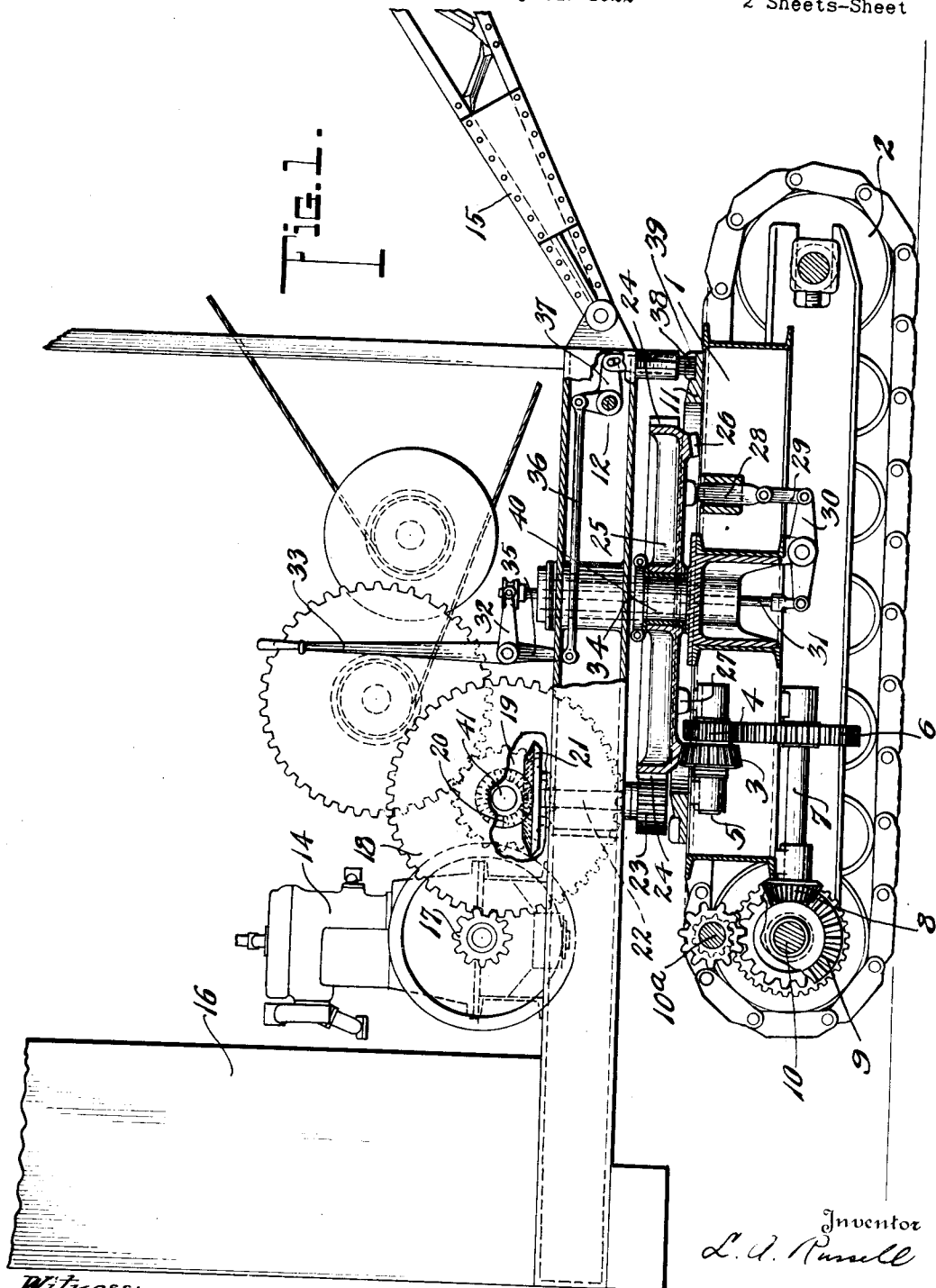
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1,710,322

CRANE

Filed May 31, 1922

2 Sheets-Sheet 1



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FIG. 2.

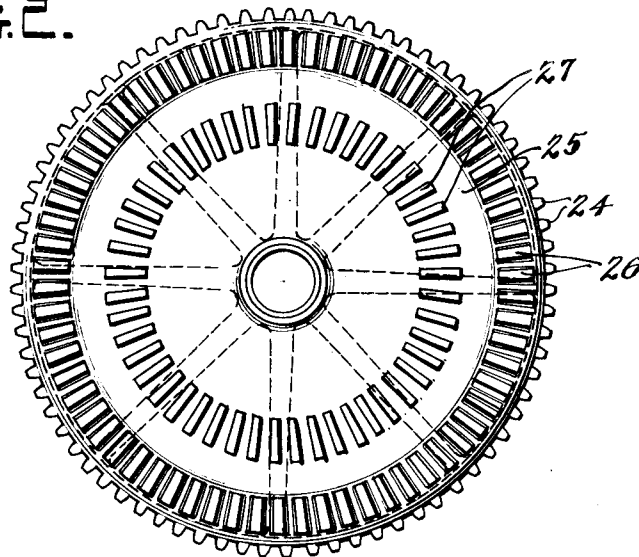
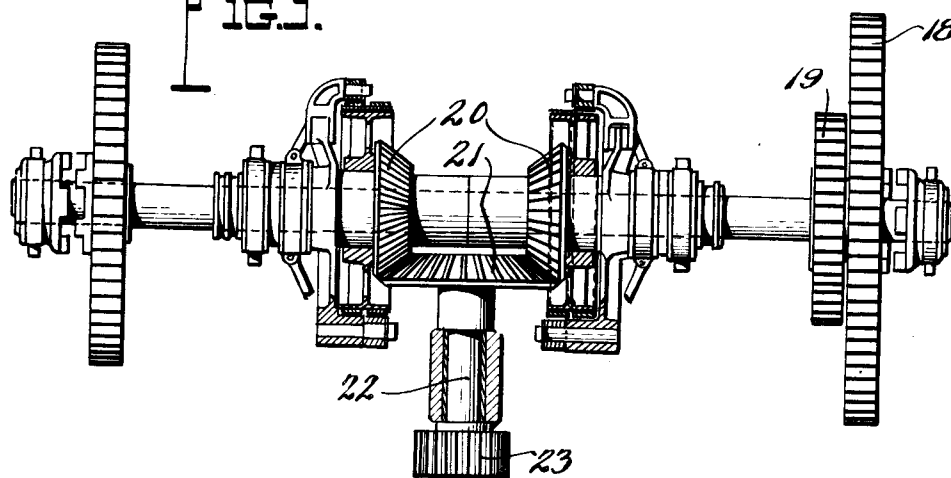


FIG. 3.



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CRANE.

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In the art of excavating machinery, the common type of excavating crane for clam-shell, orangepeel, drag-line, and other work, is in large degree comprised of rather complicated machinery including primarily central propelling shaft mechanism, and separate operating mechanism for the cab or turntable in and on which are carried the crane devices and motor. Likewise there are commonly used a large amount of shafting and gearing, and many clutches and propelling parts which render the cost of manufacture of these cranes very heavy.

My primary object in this invention has been the development of a simplified type of excavating crane, one which does away with many of the complicated systems of gearing, clutch controls, and separate main operating instrumentalities for the traction devices of the crane, and the turntable itself. In fact, I have so designed my present crane that I utilize, generally speaking, a single controlling unit intermediate the car body and the turntable, for causing operation of the turntable to swing the boom of the crane, and for causing operation of the traction devices of the car body to obtain the necessary propulsion effects. The said unit to which I have referred is adapted under simple control to be actuated reversibly, and I obtain corresponding effects on this account in respect to the driving or turning operations of the turntable, and the propelling actions of the traction devices forming a part of the car body.

I utilize a common axis for my turntable and for my special operating unit for said turntable and the traction devices, comprising a combined rotator and driving gear. As a rotator said unit may be fixed or locked in its relation to the car body so that it forms a ring gear engaged by a main driving pinion on the turntable, operation of which pinion will revolve the turntable on the car body. Again the said rotator and ring gear unit may be released so that it becomes a freely revolving gear, and if at this time the turntable is locked in its relation to the car body, the rotator and gear unit forms a driving gear which acts to transmit motion from the main driving pinion on the turntable to the driven gearing of the traction devices of the car body of the crane. In this way the propulsion of the crane is provided for, either

rearwardly or forwardly, and the turning of the turntable in either direction is likewise controlled, since the main driving pinion above mentioned is susceptible of operation in reverse directions.

A further feature of my invention is the utilization of common control means for the locking means for the turntable and the locking means for the rotator and my ring gear unit, this control means being mounted upon the machine in a unique and advantageous manner to be later made more apparent.

In the accompanying drawings;

Figure 1 is a side elevation with certain parts shown in section, of a crane embodying the essential features of this invention.

Figure 2 is a bottom plan view of the combined rotator and ring gear unit.

Figure 3 is a view showing more clearly the clutches and bevel gears operating the main driving pinion shaft.

The construction of my crane is exceedingly simple, as before premised, in that it comprises the car body 1, equipped with the traction devices 2, which may be multiplanes of a conventional type well known today, the latter being driven by the driven gearing which comprises the bevel gear 3 and spur gear 4 on the shaft 5; another gear 6 meshing with the gear 4 and carried by the shaft 7; and a bevel gear 8 on the shaft 7 meshing with a corresponding gear 9 on the rear driving shaft 10 of the multiplanes 2, two of which are preferably provided at opposite sides of the crane. On the car body 1 is mounted the roller track 11, and the turntable 12 is equipped with rollers to operate on said track in a well known manner, of general design of excavating cranes. Upon the turntable 12 is carried the customary main mechanism including the motor 14, the boom 15, and operating gearing for jibbing the boom in and out and for accomplishing other crane operations as respects the type of bucket which may be carried by the said boom 15. Furthermore, the gearing on the turntable 12, and in the cab 16 of which the turntable forms a part, includes gears 17, 18, 19, and the bevel gears 20 and 21 for transmitting driving effects from the motor 14 to the vertical drive shaft 22. The vertical shaft 22 carries at its lower end main drive shaft pinion 23, the teeth of which mesh with peripheral teeth 24 on my special unit, which I shall call a rotator

and gear 25. This rotator and gear 25 has other bottom and inclined teeth 26 adapted to mesh with the bevel gear 3 of the gearing previously described, as being provided for the traction devices 2. On the bottom of the rotator gear 25 are locking lugs 27 adapted to be engaged by a locking member 28, vertically slidable on the frame of the car body 1. The locking member 28 is connected by a link 29, lever 30 and reach rod 31, with the crank 32 of a main control lever 33. The reach rod 31 passes through a hollow center axis 34 upon which the turntable and unit 25 are mounted in common. The lever 33 also has an arm 35 connected by reach rod 36 of a bell crank 37, adapted to enter locking member 38, capable of engaging with a series of locking lugs 39 formed with the roller track 11.

From the foregoing, it will be clear that assuming the rotator and gear unit 25 to be rotatable upon the hollow trunnion 40 projecting upwardly from the car body 1 and through which the axis 34 passes, when the parts are in the positions shown in Figure 1, the unit 25 is free to rotate, the lever 33 stands adjusted to render the locking member 38 operative to engage between certain lugs 39 on the car body. The turntable 12 is thereafter fixed in its relation to the car body 1, whereupon driving of the shaft 22 will transmit motion through the main drive pinion 23 to the unit 25, and the latter's rotation will be imparted to the gearing 3, 4, 6, 8, and 9. The traction devices 2 will therefore be driven in a suitable direction.

If now the lever 33 is pushed forwardly, the locking member 38 will be lifted from its engagement with the lugs 39, and the locking member 28 will be moved into engagement with the predetermined ones of the lugs 27. In this way the turntable is released to rotate freely under suitable driving action, and the rotator and gear 25 become locked relatively to the car body 1. Thereupon the gear unit 25 will cooperate as a fixed member, on operation of the shaft 22, and pinion 23 to cause the pinion 23 to travel around the gear unit 25. This causes a turning of the turntable obviously, and a swinging of the boom and other crane instrumentalities which it may be desired to move by said turning action.

On the shaft 41 which carries the gearing 19, and 18, there will be two of the bevel gears 20 loose on the shaft and engaging the bevel gear 21. Suitable clutches adjacent the bevel gears 20 will be adapted to connect either of these gears to the shaft, and as the gears 20 will be on opposite sides of the gear 21, a reverse operation of the gear 21 and the shaft 22 will be obtainable. According to the direction of rotation of the shaft 22 and its pinion 23, depends the direction of turning of the turntable 12, and operation of the traction devices 2. If any differential movement of

the traction devices 2 is required, I may utilize special gearing in cooperation with the shaft 10 and a superposed shaft 10^a, see Fig. 1, which gearing is well known in the art as capable of controlling variable speeds of two-wheel or multiplane traction devices, as well as differential speeds that might be useful for steering purposes. Under such conditions, control connections could be used from a lever near the lever 33, connected through the axis 34 to certain shifting parts at the shafts 10 and 10^a, for clutches on said shafts.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:

1. In crane construction, the combination, with traction mechanism and a crane body pivotally mounted thereon, of a gear wheel revolvably mounted and disposed coaxial with the pivot of the crane body, the gear wheel having a series of detent teeth spaced apart and arranged in a circle described about said axis, the traction mechanism also carrying a series of detent teeth spaced apart and arranged in a circle described about said axis, a reciprocating detent for each set of detent teeth, a controlling lever for said reciprocating detents, link and lever connections between said controlling lever and said reciprocating detents for alternately causing the projection of one of the reciprocating detents into the path of one of the sets of detent teeth and the retraction of the other reciprocating detent from such path of the other detent teeth whereby said gear and said crane body may be alternately locked against rotation and alternately released for rotation, power means on the crane body and a gear actuated thereby in mesh with the first mentioned gear to have planetary motion thereon when the first mentioned gear is locked and the crane body released, and means actuated by the first mentioned gear for driving the traction means when the first mentioned gear is released and the crane body locked.

2. Mechanism as claimed in claim 1 wherein the actuating link extends along the axis of the crane body pivot through the first mentioned gear to actuate the reciprocating detent cooperating with the detent teeth of said gear.

3. Mechanism as defined in claim 1, wherein the actuating ring extends along the axis of the crane body pivoted through the first mentioned gear to actuate the reciprocating detent cooperating with the detent teeth of said gear, the last named reciprocating detent being mounted to slide vertically and to move upward into interlocking relation with the detent teeth of said gear.

4. Mechanism as claimed in claim 1, wherein the reciprocating detents are movably mounted and one mounted to move upward to engage the detent teeth of the first men-

tioned gear and the other downward to engage the detent teeth carried by the traction mechanism.

5 5. In a crane, in combination, a car body
and traction means thereon, a turntable
mounted on the body, crane mechanism on
the car body including motor and boom
mechanisms, a driving pinion on the turn-
table operable from the motor, a combined
10 rotator and ring gear between the turntable
and car body having teeth to engage said
driving pinion, and a second set of teeth for
cooperation with driven traction gearing,
driven traction gearing to coact with the ro-
15 tator and ring gear, means upon the car body
beneath the turntable projectible to engage
and lock said rotator and ring gear from
movement whereby the driving pinion will
rotate around the same for turntable turn-
20 ing purposes, and means depending from
the turntable to engage the car body for
locking the turntable against rotation per-
mitting the ring gear to act as a gear member
for driving the engaged driven traction
25 gearing.

6. Means substantially as claimed in claim
5 with lever and rod connections between the

two locking instrumentalities specified and
an operating handle for compelling alternate
effective operation thereof.

30 7. In a power controlling means, a crane
turntable, a car body upon which the turn-
table is supported, a combined rotator and
traction gear intermediate the car body and
turntable, a motor driven pinion upon the 35
turntable engaging said rotator and gear,
traction driving gearing upon the car body
engaged with said rotator and gear, lock-
ing means upon the turntable disposed at a
distance from the axis thereof and depend- 40
ent to engage said car body, locking means
disposed beneath the rotator and acting
thereon at a point removed from its axis, an
operating lever disposed upon the turntable
and connected to the locking mechanism 45
therefor, a rod extending from said lever, a
control handle connected to said rod, an op-
erating rod extending from said handle
through the axis of the turntable and rotor,
a lever connected to said last mentioned rod, 50
and means on said lever to effect a sliding
movement of the locking means for the rotor.

In testimony whereof I affix my signature.

LESLIE A. RUSSELL.