(No Model.) 3 Sheets—Sheet 1.

# C. QUAST.

## TRACTION ENGINE.

No. 521,988. Patented June 26, 1894.

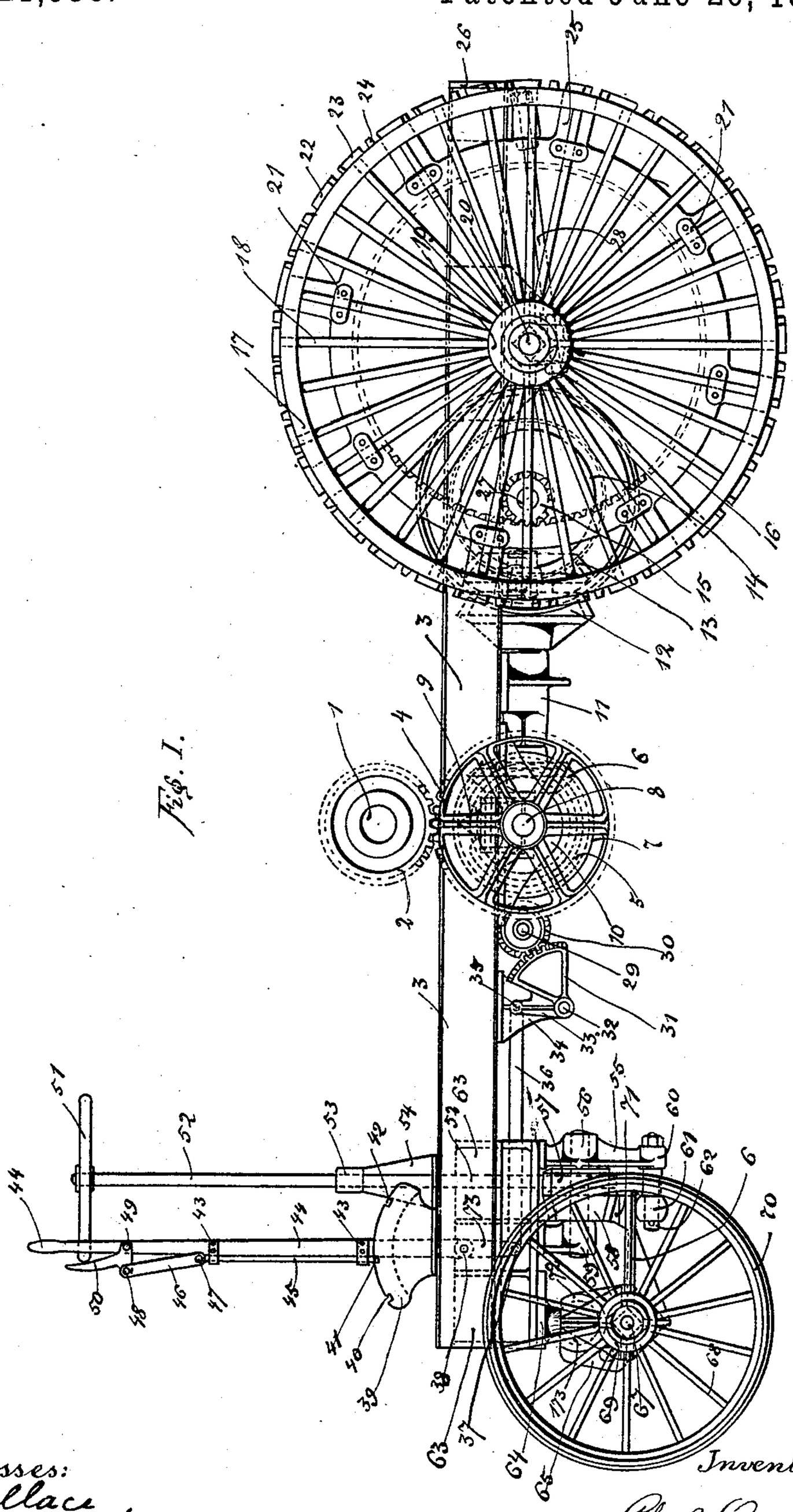

Fig. 1.

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Inventor:
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(No Model.) 3 Sheets—Sheet 2.

# C. QUAST.

## TRACTION ENGINE.

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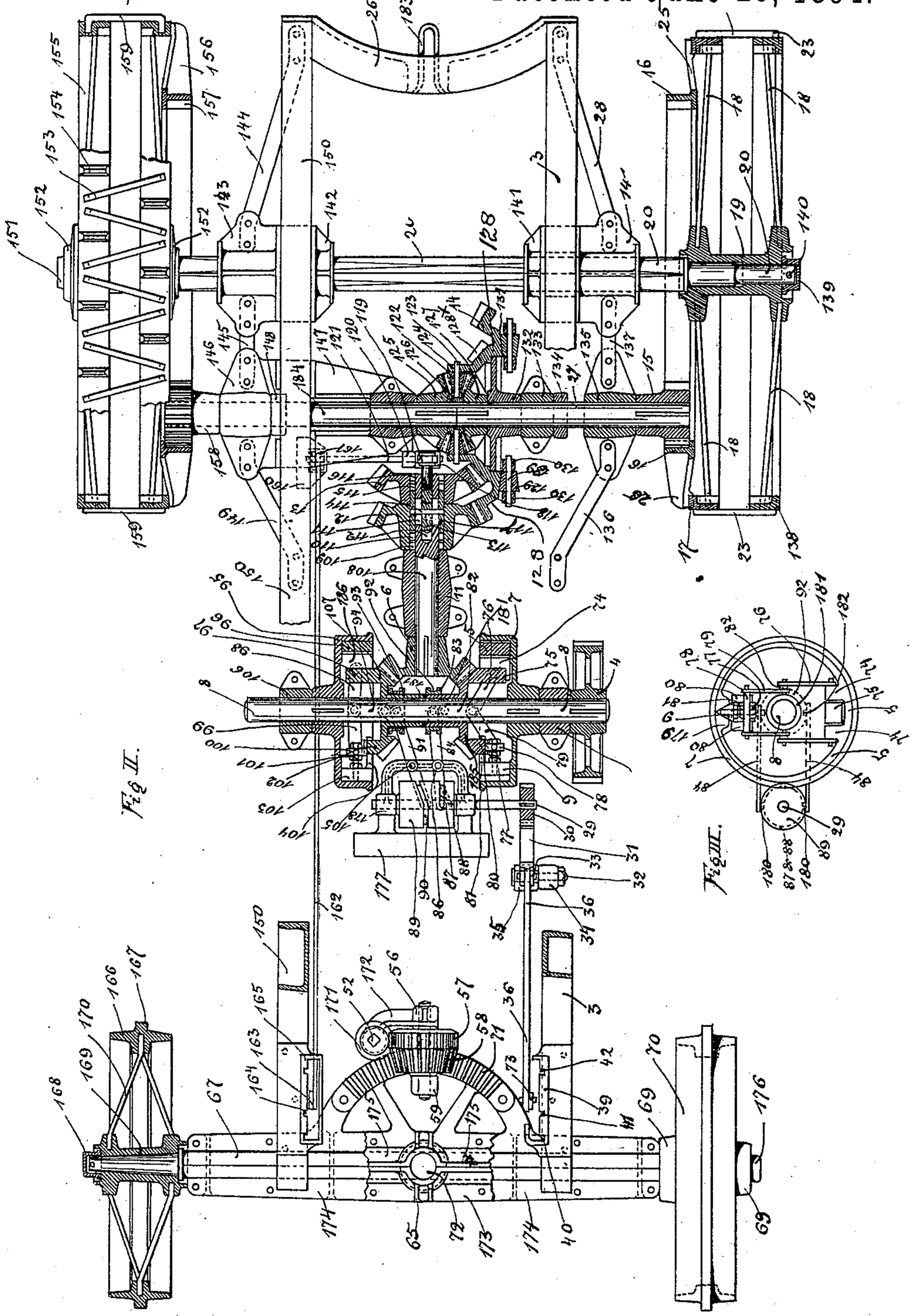

Fig. II.



Fig. III.

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(No Model.) 3 Sheets—Sheet 3.

# C. QUAST.

## TRACTION ENGINE.

No. 521,988. Patented June 26, 1894.

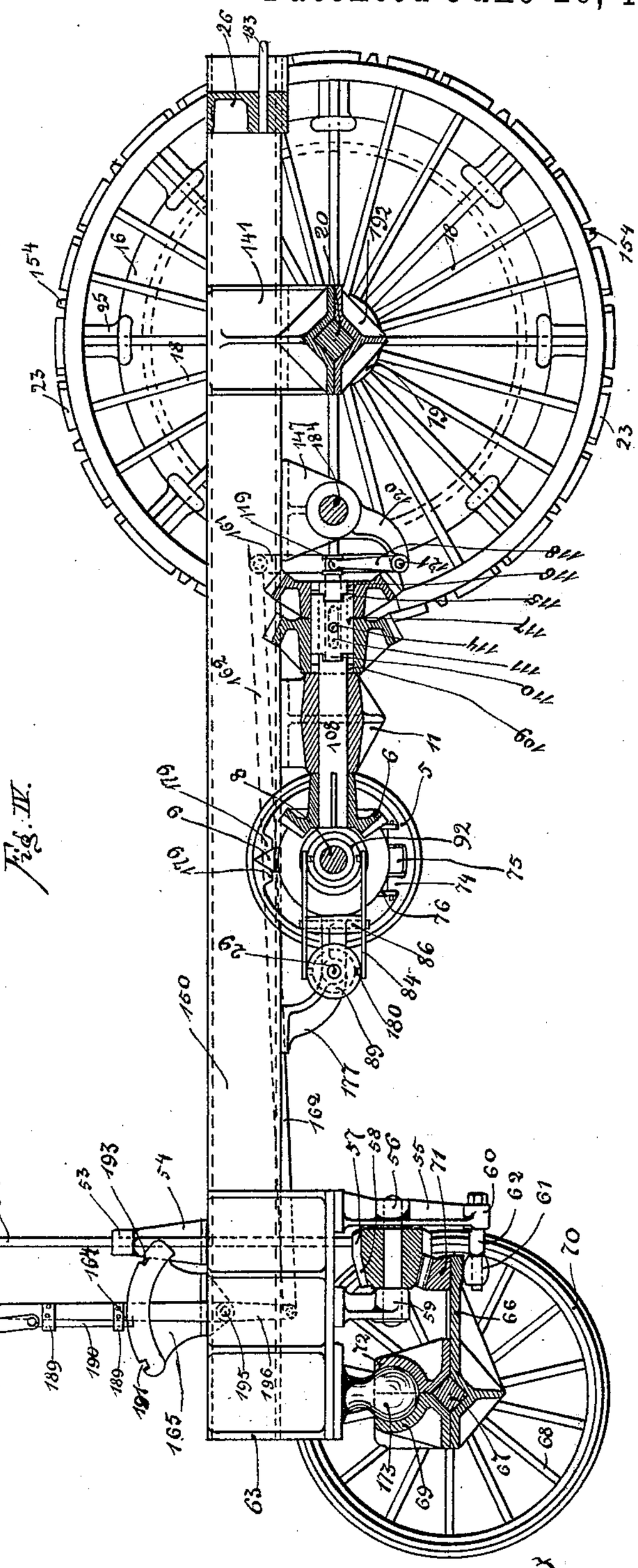

Fig. III.

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# UNITED STATES PATENT OFFICE.

CHARLES QUAST, OF MARION, OHIO.

## TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 521,988, dated June 26, 1894.

Application filed December 5, 1893. Serial No. 492,844. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES QUAST, a citizen of the United States, residing at Marion, in the county of Marion and State of Ohio, have invented certain new and useful Improvements in Traction-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

It is the object of my invention to provide a traction engine capable of being readily reversed or driven at different speeds without stopping the motor shaft and without requiring the driver to leave his position at the front of the engine.

The invention includes reversing gearing with clutches and speeding gearing with clutch mechanism arranged so that the operator may stop the machine by throwing either clutch to its central position.

It includes further compensating gearing whereby one wheel may turn faster than the other at different speeds in turning curves and in various features of construction hereinafter pointed out.

In the drawings:—Figure 1, is a side view of the machine; Fig. 2, a sectional plan view; Fig. 3, a detail view of one of the clutches, and Fig. 4, a sectional elevation.

1 is the drive shaft of the motor driving the traction. Said motor is not shown but may be of any suitable construction. The shaft 1 carries spur-gear 2 meshing in spur-gear 4 keyed on shaft 8, which has keyed thereon two clutch shells 7 and 95 and loose bevel-gears 185 and 107. Shaft 8 is journaled in bearings 10 and 106, Fig. 2.

In clutch shells 7 and 95 are friction-rings 5 and 96 carried through jaw-blocks 75 and 97 and guides 80 and 102 on the bevel-gears 185 and 107. These bevel gears have hubs 181 which abut midway between the gears and turn with them loosely on the shaft 8. On these hubs slide clutch sleeves 83 and 93 which have lugs to carry toggle connections 82 and 94 which connect with toggle-levers 76, 79, 98 and 99. Toggle-levers 76 and 98 connect on one end with blocks 74 and 186 of clutch-rings 5 and 96 and on the other end with lugs of clutch-sleeves 83 and 93. Toggle-levers 79 and 99, connect at one end with cross pieces 78 and 100 which connect through set-up bolts 81 and 101 with wedge 9 and 103 which fits in the open cut end of friction-rings 5 and 96, and on the other end these levers connect with lugs of the clutch-sleeves 83 and 93. Wedges 9 and 103 have tails 81 and 104 which slide in the guides 80 and 102 of the bevel-gears 185 and 107. Clutch-sleeves 83 and 93 have a groove 92 which receive the rollers 182 of levers 84 and 91, which are pivoted near the center in bracket 177 at 86 and 105. The other end of said levers slide by rollers 180 in grooves 87 and 90 of clutch cam 89 journaled in the bracket 177. The grooves of said cam are of such nature that one clutch only is in working position to throw the corresponding clutch ring in engagement with its clutch shell or both are out of working position. The clutch-cam is fastened on shaft 29 journaled at 178 and carries keyed on one end spur-gear 30 which meshes in segment 31. Segment 31 is connected with lever 33 and is pivoted in bracket 34. Lever 33 connects through rod 36 with lever 73 which is pivoted at 38 and has a large end 44 carrying a latch-rod 45 guided in eye 43 and having by link 46, connection with handle 50. Quadrant 39 has notches 40, 41 and 42, each one being one position of the clutch-cam and so one position of either one of the clutches. Bevel gear 185 and 107 meshing with bevel-gear 6 keyed on shaft 108 journaled at 11. As both clutch shells are keyed on shaft 8, by bringing either one of the clutches in gear the proper bevel-gear will transmit the motion to the bevel-gear 6 and shaft 108 and this may be in either direction, forward and backward or better right and left according to which clutch is thrown in. Shaft 108 carries on the other end loose bevel-gears 12 and 13 which rotate loosely on clutch sleeve 117. Shaft 108 is hollow on the end at 112 in which cavity is carried coupling bar 113 which carries pin 114 sliding in groove 111 of shaft 108 and this pin fits in sleeve 117. Coupling bar 113 has on the other end a groove 119 in which fits lever 118 pivoted in bracket 120 at 121. Bevel-gears 12 and 13 have clutch-jaws 109 and 116 which fit sleeve-jaws 110 and 115. Shaft 121 carries on the other end lever 161 which connects by rod 162 with lever 196 which fulcrums in 195 and has a long end 163 carrying a latch-rod 190 guided in 189. Latch rod connects with handle 187 by connections 188.

Quadrant 165 has notches 164, 191 and 193 each one being one position of the coupling sleeve 117 between bevel gears 12 and 13. Bevel-gears 12 and 13 mesh in the one solid bevel-gear, having two circles of teeth 14 and 128. Said bevel-gear carries small pinions 122 by pins 123 in ring 125 and collar 126, which mesh in bevel-gears 124 and 127, which are keyed upon shafts 27 and 184, while bevel-gear 128 is loose. Bevel-gear 128 has a runway 131 against which press rollers journaled in bracket 130 as a support. Disk 132 is loose on shaft, it also forms a support for bevel-gear 128. Shafts 27 and 184 work in bearings 135, 133 and 147, 146 and carry on the ends spur-gear pinions 15 and 158 meshing in drive gears 16 and 157. Drive gears 16 and 157 are carried through arms 25 and 156 by traction wheel ring 17 which is through arms 18 and 155 suspended around the hub 19 and 152 which turns on axle 20. Axle 20 is supported through brackets 141 and 142 and fastened to channels 3 and 150. Said supports 141 and 143 and bearings 135 and 146 are connected together and with the channels by rods 136, 149 and 145, 137 and 28, 144, this making a rigged truss and tying all together. Channels are connected by piece 26 which has eye 183 for hitching on wagons and the like. Traction-wheel is made out of two cast rings 17 and 138 kept at the proper distance apart by angular cast in rods 23 which are placed in such way that they brace each other and make twisting impossible. Rings also have arms 18 cast in which are suspended at both ends of the hub 19 and which brace one another. The hub is kept on the axle 20 by a cap 139 inserted in hub 19 by pin 140. Rings 17 and 138 also have lugs or prongs 154 cast on at intervals between the bars 153 at the farther end. The front axle 67 is strengthened by castings 174, 173 and 175 building at the same time a ball socket 72 in which rests ball 173 between walls 72 and 69 of piece 173 and 175. Pieces 173 174, and 175 are bolted together as shown. Ball 173 is carried by bracket 63 which is bolted between channels 3 and 150. Piece 174 carries piece 66 which carries segment 71 in which meshes bevel-gear 58 carrying on one end worm-gear 57. 58 and 57 are journaled on a shaft bearing in 56 and 59 both bearings carried by bracket 63. Bracket 55 carries also at 60 pin 62 and this, roller 61 to support 66 and segment 71. Worm 171 on shaft 52 meshes in worm-gear 57 and said shaft 52 is journaled at 53 and has a hand-wheel 51 at the top by which the engine is steered. Axle 67 has wheels composed of a cast iron ring 70 in which arms 68 are cast and hub 169 which is held on shaft by cap collar 168. As the lever 44 is moved forward to engage notch 40 the corresponding clutch grooved collar 83 or 93 is shoved toward the gear wheel 185 or 107 of that side by the clutch cam. Thus causing the toggle-levers of that clutch for instance, 79 and 76 are shoved inward into a straight position by rod 82, thus pressing against the bottom of the clutch-ring 5 and 74, Fig. 3, and shoving the wedge 9 against the cheeks 179 of the ring 5 and spreading same apart, which causing the ring to come in strong contact with clutch-frame or shell 7 and as the same rotates with the shaft 8, the clutch-ring will be set in a rotary motion thus transmitting the motion through jaws 74 and blocks 75, slides 80 and tail 81 of wedge 9 to bevel-gear 185. Bevel-gear 185 meshes in bevel-gear 6 and the latter being keyed on shaft 108 transmits the motion to sleeve 117 which is splined on shaft 108. As lever 44 is shoved in the notch 40 from the center notch 41 the lever 91 and that clutch remains without motion. In taking the lever 44 back to the center from 40 the clutch ring 5 and toggles are brought out of action and the clutch-grooved collar 83 brought into the center position where there is no engagement of either one of the clutches. In shoving the lever backward past the notch 41 into 42 the opposite lever 91 and clutch collar 93 are brought to position a greater distance from the center and thus bring the toggle-levers 98 and 99 through rod 94 to a straight position. This causes pressure upon the bottom of the clutch-ring 97 and also shoves the wedge 103 between the ring-cheeks of ring 96 which causes said ring to spread and be brought in contact with clutch shell 95, which rotates with shaft 8 and is fixed thereto. This causing the clutch-ring to rotate carrying with it, through jaws 186 and 75, and the slides 102 with tail 104 of wedge 103, the bevel-gear 107 and this meshing in bevel-gear 6 transmit the motion to shaft 108 and sleeve 117. As the lever 44 is brought back to the center again the clutch is brought out of action and the gears stop. Only one clutch can be in mesh at one time or both out, but never both in. As the shaft rotates always in one direction and either one of the gear wheels 185 or 107 brought in motion the gear 6 will move in opposite motion through which right and left motion is obtained. Bevel-gears 12 and 13 are both loose on sleeve 117 and shaft 108, but have clutch-jaws 109 and 116 and sleeve 117 has corresponding jaws 110 and 115. Sleeve 117 is splined on shaft 108 and rotates with same in the direction of the shaft. Gears 12 and 13 mesh in gear 128 having two sets of teeth $128^{\times}$ and 14 of two different diameters causing two different speeds of the main gear 128. Lever 163 is the speeding lever and carries a latch 190 and moves on quadrant 165 between the notches 164, 191 and 193. The movement of lever 163 is transmitted through lever 196 and rod 162 upon levers 161 and 119. The latter engages bolt 113 which is carried by shaft 108. Bolt 113 has a pin 114 sliding in slot 111 of shaft 108 engaging sleeve 117 so that by moving lever 163 the sleeve will move also. By bringing the lever in notch 191 the sleeve 117 and its clutch jaws 116 will be shoved in wheel 13 and its jaws 116 through which said gear be-

comes locked and rotates with the shaft 108 transmitting the motion to wheel 128. By bringing the lever back to its center notch the connection between gear 13 and shaft 108 will be broken and the wheel 128 stops. Shoving the lever 163 back into notch 193 the sleeve will clutch and couple gear 12 and its coupling jaws 109 causing the gear 128 to turn with different speed according to the difference between gear $128^{\times}$ and 14. This secures two different speeds, any number of gears of different sizes and relations may be used and more notches in quadrant 165 may be found necessary also the coupling sleeve may have any number of jaws to couple any different number of gears. Gear 128 carries centrically bevel-gears 122 on pins 123 between ring 124 and hub 126. Said bevel gears 122 mesh in bevel-gears 125 and 127 on each side and these are keyed on shafts 184 and 27 respectively. Shafts 184 and 27 join with their ends in the hub 126 of wheel 128 but loose. Gear 128 in being loose on the shafts 184 and 27 but in connection through gears 122, 125 and 127 make up what is called a compensating gear and allow either one of the shafts and drive wheels to rotate ahead or faster than the other one this being necessary in making curves. From this it will be seen now that the entire machine can be stopped instantly by reversing lever 44 and also by speeding lever 163. Also can be run either forward or backward through the gearing system as described, and at different speed without stopping or changing the speed of the driving motor. Any number of speeding gears can be used. The most essential point in the different speeds is to travel in accommodation with the roads and to be able to pull heavy and slowly by high speed of the driving motor and on very poor roads. The steering is done by a hand wheel 51 in front of the traction. Reversing, starting and stopping is done by merely moving lever 44 and the speeding is done by lever 163 while the motor is not disturbed in its motion and at any moment can give the full power.

I claim—

1. In a traction engine, the motor shaft, the transmitting shaft 8, the shaft 108, the gear 6 fixed thereon, the two gears loose on the shaft 8 and in constant engagement with the gear 6, the clutch shells on the shaft 8, the clutch rings adapted to engage the clutch shells and connected with the loose gears to impel the same, the toggle levers for throwing the clutch rings into engagement with the shells, the means for operating the toggles and the transmitting mechanism between shaft 108 and the axle, substantially as described.

2. In combination, in a traction engine the motor shaft the shaft 108, the connections therefrom to the axles, the gear 6 on the shaft 108, the shaft 8 extending transversely of the engine the loose gears thereon in engagement with the gears 6, the clutches outside of the loose gears, the grooved collars intermediate of the loose gears and arranged on the shaft 8, the connections for operating the grooved collars and the connections between the collars and the clutch beyond the loose gears, substantially as described.

3. In combination, the traction wheels, the motor shaft, the transmitting shaft 108, between the same and the traction wheels, the clutch shaft 8, the gearing and clutches thereon, the levers 84 and 91 for operating the said clutches, the grooved cam for operating the levers and the means for operating the cam shaft, the arrangement being such that only one clutch can be brought into action at a time but never both, or both are out of action, substantially as described.

4. In combination in a traction engine, the motor shaft, the transmitting shaft 108, the traction wheels, the clutch shaft 8, the clutch shell rigid thereon, the ring 5, having inclined cheeks, the wedge for spreading said cheeks apart and setting the clutch, the toggle levers connected to the ring at one side and arranged to operate the wedge at the other side, the gear engaging the clutch ring to be turned thereby and the means for operating the toggle arms, substantially as described.

5. In combination, the motor shaft, the traction wheels, the transmitting shaft, the shells on the clutch shaft, the clutch rings thereon, the gears on the clutch shaft between the rings, the toggle levers for operating the rings against the shells, the grooved collars on the clutch shaft between the gears and the levers for operating said collars, the arrangement being such that only one clutch is in action at a time but never both, or both are out of action, substantially as described.

6. In combination in a traction engine, the traction wheels, the shaft 108, the speeding gear, the gears 12 and 13 on the shaft 108 having clutch teeth, the sliding clutch sleeve outside the shaft for engaging the teeth, the bolt moving in a recess in the extreme end of shaft 108 projecting therefrom and connected with the clutch sleeve through a slot in the shaft and means for operating said bolt lengthwise, the arrangement being such that only one gear is in action at one time but never both, or both are out of action, substantially as described.

7. In combination in a traction engine, the traction wheels, the two shafts 27—184 for operating the wheels independently, said shafts being brought together end to end centrally of the machine the gears 125—127 both rigidly fixed on adjacent ends of said shafts, the gear 128 loose on one shaft, the means for operating said gear and the pinions 122 carried by the gear 128 and engaging the gears 125—127 constituting a compensating gearing, substantially as described.

8. In combination, in a traction engine, the traction wheels, the independent shafts for driving them, the compensating gearing for

operating the said shafts whereby one wheel may turn faster than the other in turning curves, and the change speed driving means for operating the gearing, including the double gear 128 carrying the pinions 122 and thus constituting a part of the compensating gearing, substantially as described.

9. In a traction engine, the combination of the frame work, the gearing and the traction wheels comprising the two rings and the cross bars connecting them and the cross prongs between the cross bars, both the said cross bars and the cross prongs being external of the wheels periphery, substantially as described.

10. In combination in a traction engine, the frame work the gearing and traction wheels, the front truck, the ball bearing, the socket 69 therefor, the segment carried by the truck, the pinion journaled in bearings in the frame and having one end formed as a worm wheel and the gear and hand shaft for turning said worm wheel and pinion, substantially as described.

11. In combination the motor shaft, the shaft 8 extending transversely of the engine, the loose gears thereon, the clutches for fixing either gear to the shaft, the shaft 108 extending lengthwise of the engine and centrally of the same and of the transverse shaft 8, the gear 6 thereon engaging the loose gears of the shaft 8, the two shafts 27 and 184 extending transversely at the rear end of the shaft 108 and having their ends brought together at the center of the engine the gears fixed on said adjacent ends, the pinions meshing with said gears, the double gear 128 loose on the shaft 27 and carrying the said pinions 122, the loose gears 12, 13 at the rear end of the shaft 108, the clutch fixing either of said gears to the said shaft to drive the gear 128 and the means for operating the clutches, substantially as described.

12. In combination, in a traction engine, the traction wheels, the motor shaft and the transmitting connections including the gears connected with the traction wheels, the rolling pinions 122 between and the combined compensating and change speed gear 128 having the double rows of teeth and carrying the pinions 122, substantially as described.

13. In a traction engine the traction wheel comprising the two rings and the cross bars extending between them inclined reversely in relation to each other and forming triangular spaces between them, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES QUAST.

Witnesses:

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