Aug. 27, 1935. K. K. HUPPMANN 2,012,629

INTERNAL REVERSIBLE MULTISPEED DRIVING MECHANISM

Filed Aug. 19, 1932 4 Sheets-Sheet 1

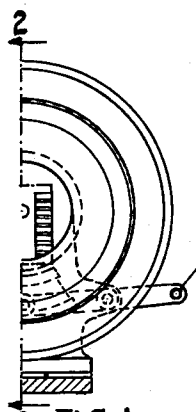


FIG. 1

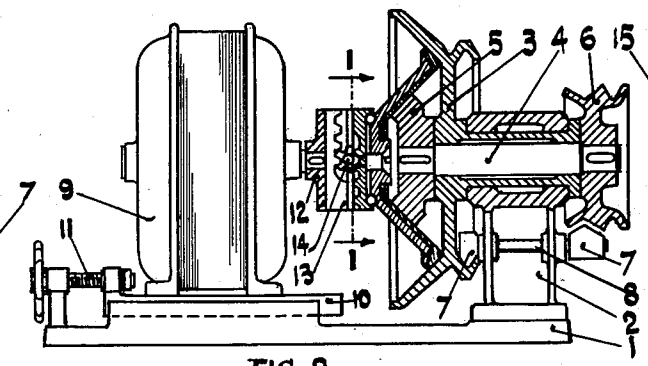


FIG. 2

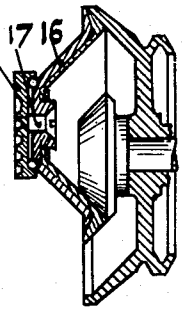


FIG. 3

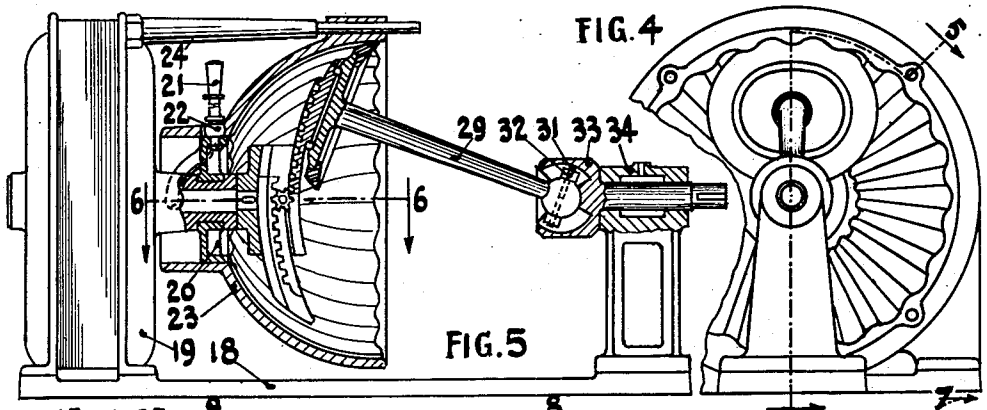


FIG. 4

FIG. 5

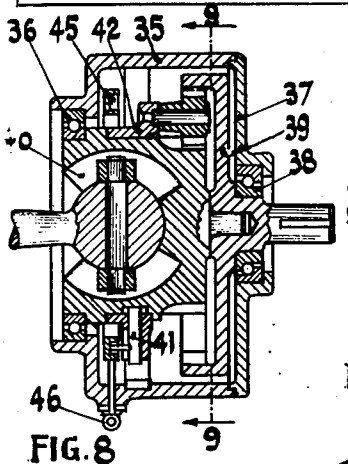


FIG. 8

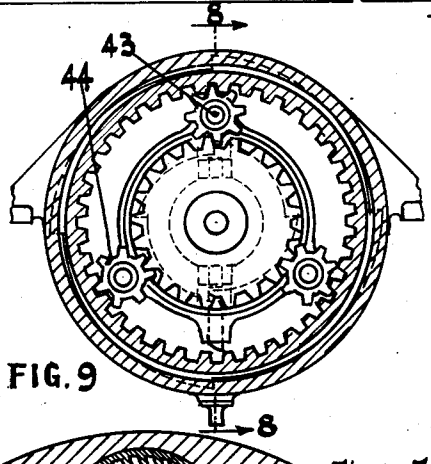


FIG. 9

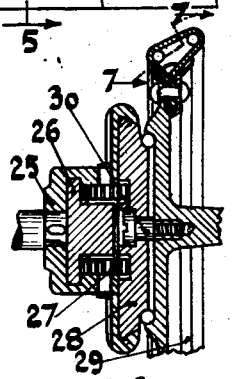


FIG. 6



FIG. 7

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INTERNAL REVERSIBLE MULTISPEED DRIVING MECHANISM

Filed Aug. 19, 1932 4 Sheets-Sheet 2

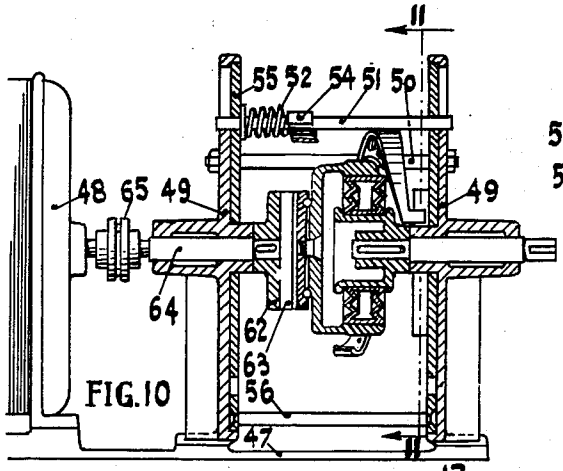


FIG.10

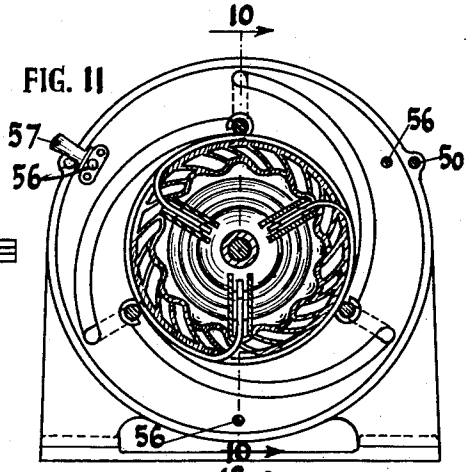


FIG. 11

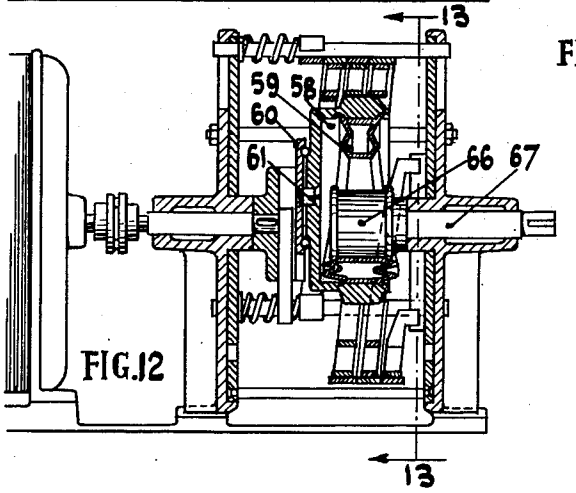


FIG.12

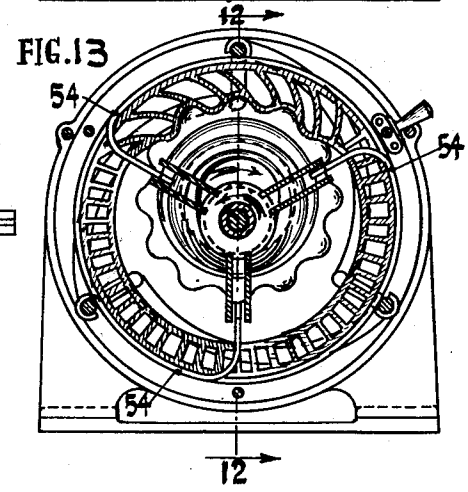


FIG.13

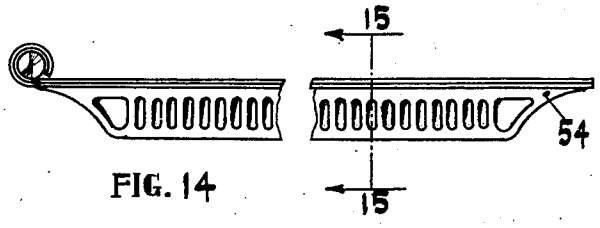


FIG. 14

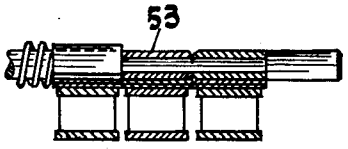


FIG. 15

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INTERNAL REVERSIBLE MULTISPEED DRIVING MECHANISM

Filed Aug. 19, 1932 4 Sheets-Sheet 3

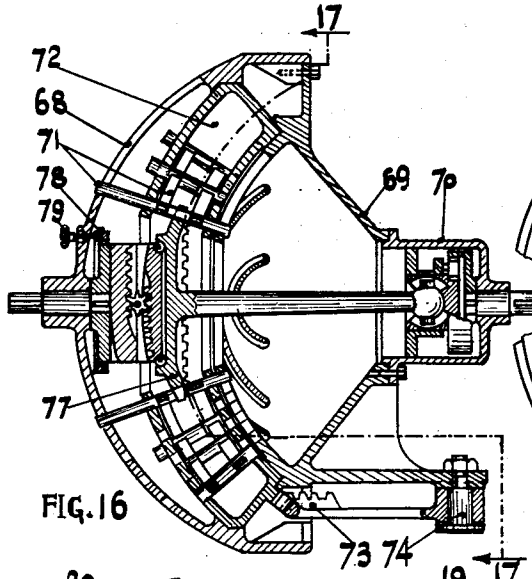


FIG. 16

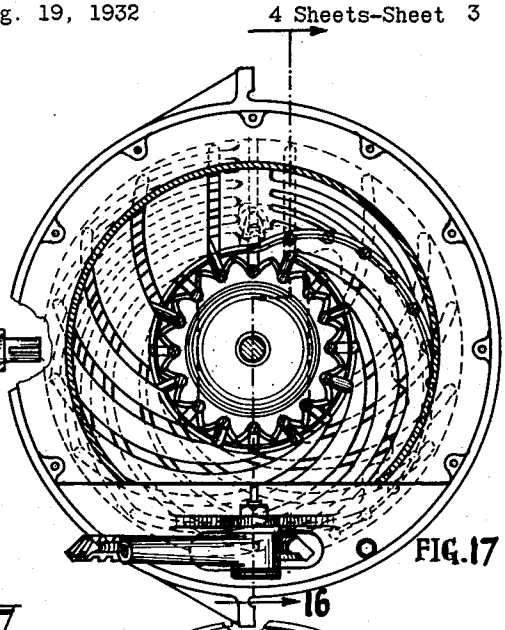


FIG. 17

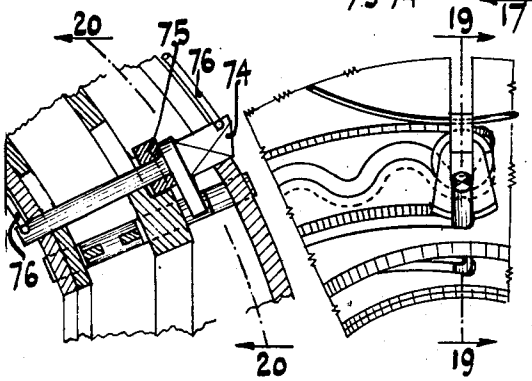


FIG. 19

FIG. 20

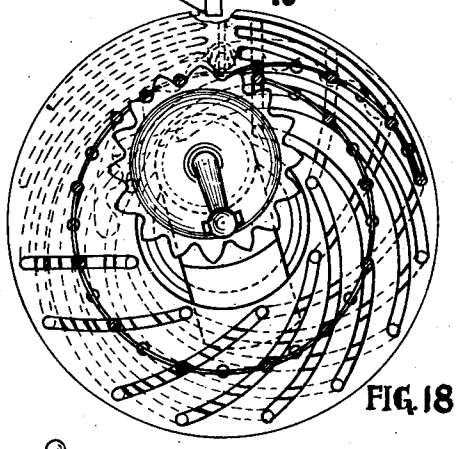


FIG. 18

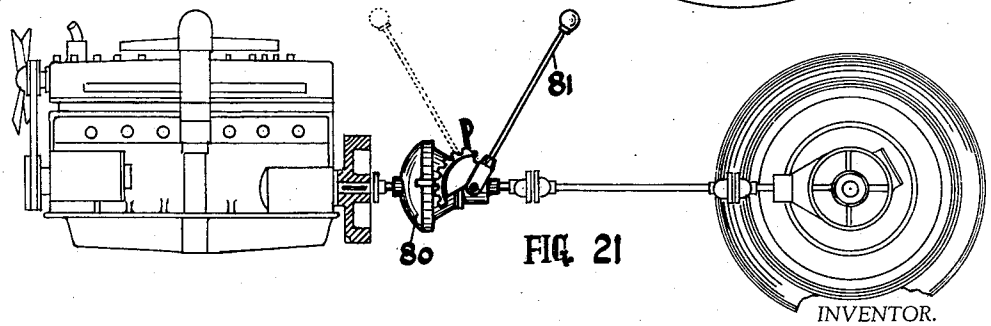


FIG. 21

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INTERNAL REVERSIBLE MULTISPEED DRIVING MECHANISM

Filed Aug. 19, 1932 4 Sheets-Sheet 4

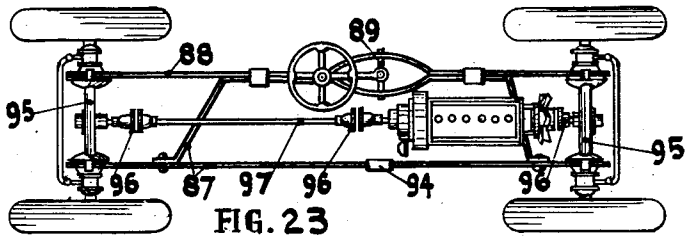


FIG. 23

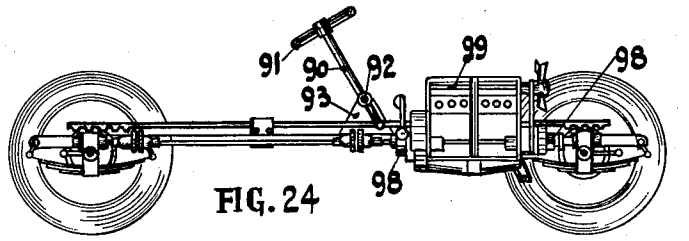
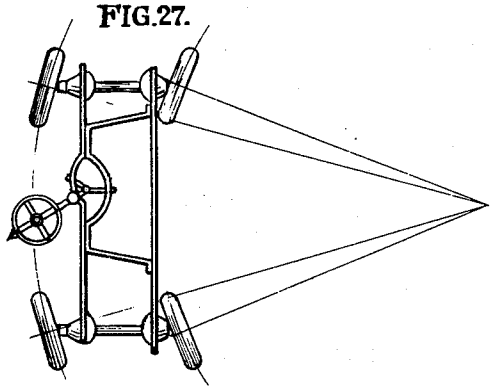


FIG. 24

FIG. 27.



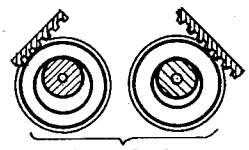
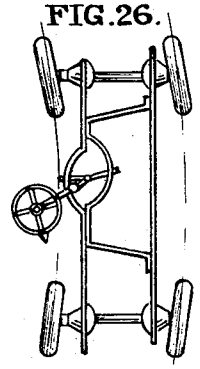


FIG. 27a

FIG. 26.



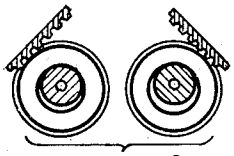
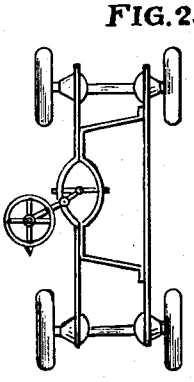


FIG. 26a

FIG. 25.



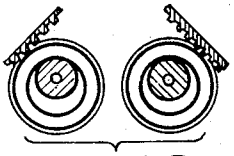


FIG. 25a

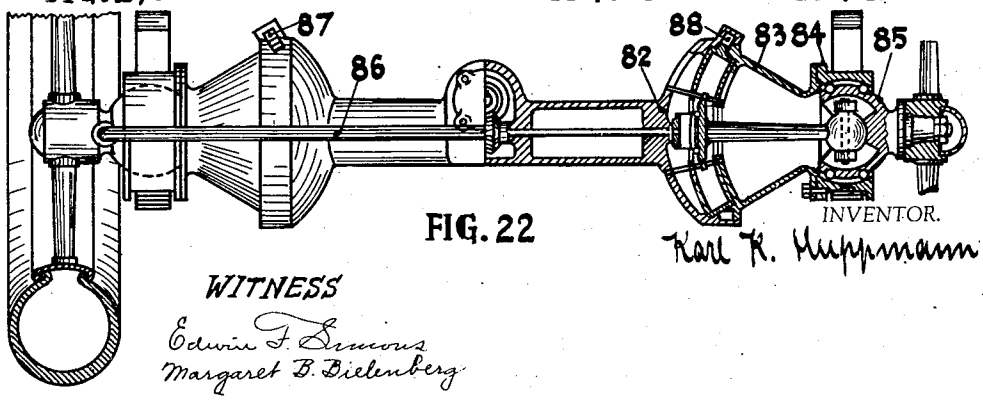


FIG. 22

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Patented Aug. 27, 1935 2,012,629

UNITED STATES PATENT OFFICE

2,012,629

INTERNAL REVERSIBLE MULTISPEED DRIVING MECHANISM

Karl K. Huppmann, Cicero, Ill.

Application August 19, 1932, Serial No. 629,559

14 Claims. (Cl. 74—230)

My invention relates to internal reversible multi-speed driving mechanisms for use in self propelled vehicles.

The object of my invention is to provide an internal reversible multi-speed drive for use between a suitable source of power and a driven machine without an intervening clutch, and operative to drive the machine from standstill, through infinitive graduation of speeds to the maximum speed and over of the source of power.

Another object of my invention is to use said drives in connection with motor driven vehicles, for propelling, steering and braking the same with one drive unit.

In the drawings a preferred embodiment of the invention is illustrated:

Fig. 1 is a vertical section of an internal reversible cone friction drive, of Fig. 2 on line 1—1.

Fig. 2 is a vertical section of Fig. 1 on line 2—2. Both figures showing the mechanism in neutral with the driving motor idling or running.

Fig. 3 is the same as Fig. 2 showing the idler at maximum speed.

Fig. 4 is an end view of Fig. 5 of an internal hemispheric friction or gear drive at standstill.

Fig. 5 is a section of Fig. 4 on line 5—5 at maximum speed.

Fig. 6 is an enlarged section of Fig. 5 on line 6—6 when the idler is in central or stop position.

Fig. 7 is an enlarged fragmental section of Fig. 6 on line 7—7 in mesh with the globular bell illustrating the rubber rim generating its own teeth during action.

Fig. 8 is a vertical section of Fig. 9 on line 8—8 of a gear reversing box.

Fig. 9 is a sectional view of Fig. 8 on line 9—9.

Fig. 10 is a vertical section of Fig. 11 on line 10—10 with one of three expansion bands in elevation of an internal multi-speed belt drive.

Fig. 11 is a section of Fig. 10 on line 11—11.

Fig. 12 is a cross section of Fig. 13 on line 12—12 at top speed with the three expansion bands sectioned.

Fig. 13 is a section of Fig. 12 on line 13—13.

Fig. 14 is an enlarged side elevation of one of the three expansion bands developed.

Fig. 15 is a section of Fig. 14 on line 15—15.

Fig. 16 is a cross section of Fig. 17 on line 16—16 of an internal reversible multi-speed chain drive.

Fig. 17 is a section of Fig. 16 on line 17—17.

Fig. 18 illustrates the same section as in Fig. 17 at medium speed position.

Fig. 19 is a section of Fig. 20 on line 19—19 showing the enlarged adjustment cam and stop pin for the chain.

Fig. 20 is a sectional view of Fig. 19 on line 20—20.

Fig. 21 illustrating above mentioned internal multi-speed chain drive applied to an automobile.

Fig. 22 is half elevation and half cross section of a unit composed of two above mentioned internal multi-speed chain drives with universal heads and wheels on both sides and a driving gear in the center, applied to a motor car.

Fig. 23 is a top view of an automobile at stop position with steering device and two internal multi-speed chain driven units without clutch for four wheel straight forward and backward driving, four wheel driving in left or right curves, four wheel steering and four wheel braking.

Fig. 24 is a side view of the same object.

Fig. 25 is a diagrammatic view of the same automobile with steering wheel and steering bars advanced in medium straight forward motion.

Fig. 26 is a diagrammatic top view of the same automobile going into a slight left turn.

Fig. 27 is a diagrammatic top view of the same automobile going into a sharp right turn.

Figs. 25*a*, 26*a*, and 27*a* indicate schematically certain adjustment means, such as racks engaging corresponding segments controlling the steering positions shown in Figs. 25, 26, and 27, respectively.

Similar numerals refer to similar parts throughout the description.

In the modification of the invention shown in Figures 1 to 3, inclusive, a driving motor 9 is mounted upon a base plate 1 by a sub-base 10, and is adapted to be moved longitudinally of the base plate through an operation of an adjusting screw 11. Base plate 1 also carries a journal block 2, which is rigidly fixed thereon. An internal friction cone 3 is journalled in the block 2 by a hollow shaft, preferably formed integrally with the cone. A driven shaft 4 is journalled in the hollow shaft and carries a pulley 6 keyed to its free end. An external friction cone 5 is keyed upon the other end of shaft 4 and disposed concentrically within cone 3. Journal block 2 is arranged to position cones 3 and 5 and the shaft 4 in axial alignment with the shaft of motor 9. A forked lever 7 is pivotally mounted upon block 2 by a pin 8 which registers with suitable brackets formed in the block. The lever is provided with a pair of brake shoes adapted to be registered with brake grooves in pulley 6 and cone 3, respectively. The groove in cone 3 is disposed internally of the cone and when lever 7 is rotated in one direction the corresponding brake block is registered with this groove to lock the cone against rota-

tion. The groove in pulley 6 is external and when lever 7 is rotated in the opposite direction to disengage the brake block from cone 3, and other brake block is engaged with the pulley to lock it against rotation.

The shaft of motor 9 carries a housing 12 in which a counterweight 13 and a bearing race 15 are mounted for sliding radially of the motor shaft. A spur gear 14 is journalled in housing 12 and meshed with racks on the weight and race. An idler cone 16 registers with a suitable anti-friction bearing on race 15 and is rotatably mounted thereon by a suitable pin 17. Cones 16, 5 and 3 are all formed with the same taper and cone 16 is adapted to engage the others in the manner shown, the engaging faces of cone 16 being lined with a suitable resilient material, such as rubber.

As shown in Figure 2, motor 9 is in its extreme position toward the driven members and cone 16 is aligned axially with cones 3 and 5. The mechanism is in neutral and housing 12 and the elements carried thereby are rotating with respect to cone 16. To start the driven members, screw 11 is operated to move the motor to the left. Counterweight 13 is moved in housing 12 by centrifugal force and through gear 14 moves race 15 and cone 16 radially outward from the axis of the motor shaft. The limits position of the movement of cone 16 is shown in Figure 3, this position being achieved when the motor is moved to its left hand limits position. Assuming that the circumference of cone 3, at the line of contact of cone 16 therewith, is twice the circumference of cone 16, and that the circumference of cone 5 is one half the circumference of cone 16, a 1 to 1 speed ratio is achieved. With the motor turning clockwise, and with brake block 7 locking cone 3, as shown in Figure 2, cone 16 is moved clockwise around the axis of shaft 4. Since cone 3 is locked, cone 16 turns on its own axis during this movement, making two revolutions in a counterclockwise direction while making one revolution around the axis of the shaft. The net result is one revolution counterclockwise with reference to a fixed point. Meanwhile cone 16 drives cone 5, and with it shaft 4 and pulley 6, through one revolution counterclockwise.

Because of the planetary motion of the idler, the ratio of driving depends upon the difference between the circumferences of the members as a function of the circumference of the driven member. Since the circumference of the stationary cone is twice that of the cone 16, the difference equals the circumference of the driven cone and a one to one ratio is achieved. Similarly the difference in diameter between the driving cone 16 and the driven cone 5 is equal to the circumference of the driven cone and a one to one ratio results. Cone 5 moves in the same direction as the driven cone.

By moving motor 9 to the right, the line of engagement of cone 16 with cone 5 is moved intermediate of the cone and the ratio of the drive is reduced. By moving lever 7 to unlock cone 3 and to lock cone 5, cone 3 becomes the driven cone and is moved in a clockwise direction.

Cones 3 and 5 are provided with belt grooves to receive belts by which power is taken from the device. Cone 16 is provided with large areas of contact with cones 3 and 5, and is maintained in firm engagement therewith by the combined centrifugal forces of counterweight 13, race 15 and cone 16, and consequently a large amount of power can be transmitted through the device.

In the embodiment of the invention shown in Figures 4, 5, 6, and 7, a substantially hemispherical gear member 23, having internal wave shaped teeth is slidably mounted upon an extending hub of the motor 19, and held against rotation thereon by studs 24 on the motor. A mounting ring 20 serves to support the member on the hub, this ring having a handle 21 on which is mounted a roller 22 that registers with a sinuous slot in member 23. A movement of handle 21 to rotate the ring on the hub moves member 23 longitudinally of the motor shaft.

A housing 25 is keyed upon the motor shaft and supports a counterweight 26, spur gears 27, and a bearing race 28. A driven gear 29 is rotatably mounted upon race 28 by a pin or screw 30, this gear having an integral shaft which is connected to a driven shaft 33 by a universal joint comprising elements 31 and 32. The driven shaft is journalled in a bearing 34 fixed upon the base plate. Counterweight 26 and bearing race 28 are of arcuate shape and register with an arcuate slot in the housing, the centers of these arcs coinciding with the center of the universal joint. The edge of driven gear 29 is equipped with a comb like rubber facing which registers with the teeth in hemispherical member 23 and in which teeth are formed as needed by the teeth on the member.

With handle 21 rotated to move member 23 to its right hand limits position, gear 29 is centered upon the axis of the motor shaft, and the rubber edge of the gear is registered with member 23 to hold the driven parts against rotation. The bearing between the gear and race 28 permits housing 25 and the elements carried thereby to rotate with respect to the gear. As the member 23 is moved to the left, towards the limits position shown in Figure 5, centrifugal force of the counterweight, gear and race, moves the gear out of alignment with the axis of the motor. As shown in the drawings, member 23 has an inside circumference, at its free edge, which is twice the circumference of gear 29, that is the difference in circumferences is equal to the circumference of the driven member. As the gear is driven through one revolution around member 23 in one direction, it will make two revolutions in the opposite direction around its own axis producing a net of one revolution, and a speed ratio of one to one results, as in the previous case. This maximum ratio can be reduced to zero in infinitely small steps by adjustment of lever 21.

In Figures 8 and 9, I have shown a gear box for reversing the direction of rotation of a shaft driven by the mechanism shown in Figure 5. The gear box comprises a cylindrical casing 35 which is closed by a plate 37. The driven shaft is journalled in the plate by a bearing 38 and carries a ring gear 39 having internal teeth. The driven shaft, such as 29, is connected to a universal joint 40 which is journalled in casing 35 by a bearing 36 and by a stud projecting into a counterbore in gear 39. Spur gear teeth project from member 40 within ring gear 39. A collar 42 fits around member 40 and carries pins 43 upon which are mounted pinions 44 which mesh with the ring gear and with the teeth on member 40. An anti-friction bearing fixed on pin 41 is registered with the groove in ring 45, and a control lever 46 governs movement of the ring and pin.

With lever 46 in the position shown in Figure 8, pin 41 registers with a recess in member 40 to fix collar 42 thereupon. As member 40 turns, collar 42 turns with it and through pinions 44 establishes a direct drive through the gear box. When

lever 46 is pulled out, pin 41 is registered with a recess in casing 35 to lock collar 42 against rotation with respect to the casing. As member 40 turns with respect to collar 42, pinions 44 are rotated to drive gear 39 in the opposite direction and at reduced speed. Lever 46 may be operated to reverse the direction of rotation of the driven member while power is being transmitted through the device without injury to the mechanism.

Figures 10, 11, 12, 13, 14, and 15 show a modification of the invention in which a driving motor 48 and a pair of bearing frames 49—49, spaced by bolts 50, are rigidly mounted upon base plate 47. Both frames contain a plurality of radial slots to guide pins 51, which carry springs 52, anti-friction rollers, and support rubber lined flexible expansion bands 54. Rotatably mounted inside the frames are two discs 55—55 containing a plurality of curved slots and rigidly connected together by bars 56. An adjusting handle 57 is fixed upon one of the discs 55. During expansion and contraction the bands 54 undergo a spiral movement, being pulled by guides fixed upon one of the discs. An idler 58 is rotatably secured to a ball bearing slide 60 by a center pin 61, and contains at its outer periphery wave shaped teeth, and at its inner periphery dovetail grooves in which is located an internal diaphragm U shaped belt 59. A housing 62 is rigidly mounted on shaft 64 and driven by the motor through a coupling 65, the housing supporting a ball bearing slide 60, a counterweight 63, and pinions of the type hereinbefore described. A shaft 67 is journalled in the hub of the right hand bearing frame 49 and a driven pulley 66 is keyed to this shaft.

When the adjusting handle 57 is moved clockwise, as seen in Figure 11, expansion bands 54 open uniformly, being centered by supporting pins 51. The bands are slidably mounted on the pins, are loosely guided in the right hand disc 55, and have a tendency to expand in an axial direction during this adjustment. Springs 52 are provided to keep the bands within the limits of the idler. The internal flexible belt 59 encloses the driven pulley completely in stop or neutral position, as will be seen in Figures 10 and 11, and opens gradually into an elliptical shape as the idler moves from a concentric into an eccentric position. When in an elliptical shape, belt 54 transmits power in the manner of an ordinary belt drive, as shown in Figures 12 and 13. In working position the wave like outside surface of the idler shapes its own teeth in the inside surface of the rubber facing on the flexible expansion bands, in the manner described in connection with the drive shown in Figure 5. The speed ratio of driving and driven members, and the relative direction of rotation, is the same as for the cone drive shown in Figure 2, as will be seen from Figure 13. This mechanism is capable of one way rotation only and can be reversed either by holding the driven pulley stationary and rotating the now stationary flexible bands, or, preferably, by placing inside the driven pulley, a reverse gear mechanism of the type shown in Figure 8.

In Figures 16, 17, 18, 19, and 20, I have shown an internal chain drive in which 68 and 69 are semi-spherical housings flanged together and having a bearing at the driving end and a reversing box 70, of the type described in connection with Figures 8 and 9, at the driven end. Both housings contain a number of slots arranged to receive the pins of a chain 71, which may consist of two flexible bands to which the pins are riveted and spaced according to the pitch of the teeth on the idler sprocket. A block, silent chain, or any other preferred type of chain may be used. The ends of the pins are disposed in the slots and may be provided with rollers to reduce friction. Inside the housings 68 and 69 is suitably mounted a semispherical U shaped slide 72, having at its outer periphery teeth which are in mesh with an adjustment bevel gear segment 73. The segment is mounted on a stud 74 fixed in a bracket in the housing 69. The slots in the housings 68 and 69 and slide 72 are of the same size and shape but the slots in the slide 72 slope oppositely to the slots in the housings. A spiral wave shaped gear segment, conforming to the path of the motion of the expanding chain, is mounted on the semispherical slide 72 next to casing 68 and is meshed with an anti-friction roller 75 that is rotatably mounted on a locking pin 74, which is held in position by springs 76. The pin is capable of sliding in the radial slots on the center line of the housings, as will be seen in Figures 19 and 20. A slip ring 78, having a handle adjustable in radial direction, is mounted on the inside of the housing 68. At all times except when the speed ratio of the drive is being altered, roller 75 is meshed with the teeth in the segment, and a projection on pin 74 engages a pin of the chain to lock the chain in position. During adjustment, roller 75 rides up over the teeth on the segment and the chain is unlocked so that another link may be added to the effective part of it.

The driving side of the mechanism is the same as described in the hemispherical friction drive, with the exception that the center of the idler radius, that is the radius between the sprocket and the center of the ball joint, and the center of the radius of the middle line of the U shaped slide 72, are in coincidence.

Figures 16 and 17 show the driving part of the mechanism in neutral, the driving housing running free in the ball bearing race of the idler while the driven part is positively braked by the idler which is entirely surrounded by the stationary chain 71. In case the driven part of the mechanism has to be turned when in neutral the chain must be opened, and, to keep the idler in axial alignment with the drive shaft, ring 78 is slipped over the counterweight in the driving housing to prevent it from slipping into eccentricity.

As will be seen from Figures 16 and 17, every second pin of chain 71 projects from both sides of the chain and slides in the slots in the stationary housings 68 and 69 and the slide 72 during adjustment, and the pins are properly located at four points by the intersection of the slots, which intersect at acute angles. The intermediate pins have only a short projection on one side of the chain which is used to locate the pin, as will be seen in Figures 17 and 18. The locating pin, positioned on the vertical center line of the mechanism, and seen in dotted lines in Figures 17 and 18, is in engagement with one of the intermediate chain pins. To the right of the center line of the mechanism the chain begins with the first pin located in the upwardly extending slot of the stationary housing, shown in dotted lines, and with the short radius slots of the slide 72, and extends around the idler in a clockwise direction leaving a gap of width equal to the pitch of the chain and located between the center line and first chain pins. The chain has a tail like continuance from the center line pin which is guided by the registration of its pins with the slots in the stationary housings, seen in the dotted lines to the left of the center line. Figure 18 shows the mechanism in

medium speed with the idler just leaving the first chain pin during a counterclockwise planetary motion. At this moment, during an adjustment of the mechanism, roller **75** rides over a tooth on the segment with which it is meshed and the idler carries the chain with it sufficiently far to reestablish the pitch distance between the first and last pin in the chain. It will be apparent that as soon as the chain opens and increases its diameter, the power transmitting idler will follow at increased speed. The drive may be likened to a valve opening and closing to govern the rate of flow of power.

Speed ratios in this drive depend upon the difference in the number of teeth on the idler and in the chain. As shown the idler has 16 teeth and when the chain also has 16 links engaged by the idler, the difference is zero and the ratio of drive is also zero. When the chain has been expanded to contain 32 links the difference will equal the number of teeth on the idler and a one to one ratio will result. As shown there are 16 links in the tail of the chain and any desired speed ratio between zero and one to one can be achieved.

In cases where the speed of the driving member is so low that the centrifugal force generated thereby is not sufficient to properly operate the idler, a spring, or other suitable device, can be inserted between the counter weight and bearing slide, and can be timed to work with the chain adjustment. Thus a gear may be provided on the housing and meshed with a segment on the adjustment slide so that as the chain is opened the eccentricity of the idler can be increased. The slots in the housings and slide are shaped so that during adjustment the chain changes from one pitch diameter to another by steps of one link, meanwhile maintaining itself concentric with the driving shaft.

The above described chain drive may be applied to an automotive vehicle in the manner illustrated in Figure 21. This figure shows a lever **81** for adjusting the chain drive, the handle being shown in its neutral position in full lines, and being shown in maximum speed position in dotted lines. The elements within the mechanism are altered by a movement of the handle from one position to the other in the manner previously described. The drive employs no separate clutch and the driving members are attached directly to the fly wheel of the engine. The driven shaft is provided with a reversing gear box and is connected through it to the propelling axles of the vehicle by a suitable propeller shaft which is provided with suitable universal joints, or flexible couplings.

In Figure **22** I have shown the mechanisms incorporated in a driving axle for a vehicle, the figure showing the left hand end of the axle in elevation and the right hand end in cross-section. It will be seen that two hemispherical housings **82** are formed integral with a central housing and that two conical housings **83** are joined to the housings **82** by flanges. Ball bearing spring supports **84** are joined to the housings **83**. The central housing contains a worm or bevel gear drive, by which the propeller shaft is connected to the axle, which axle constitutes the driving shaft of the mechanisms. The chain drive mechanisms are housed in the semispherical and conical housings. The universal joint **85** is journalled in the bearing housing **84** and the shaft of the mechanism idler is connected to it as before. The joint **85** carries a spindle to which the driving wheel is fixed. The spindle may be integral with the joint or secured thereto. The two universal joints are connected together by a cross rod **86** which serves to keep the wheels in parallel planes at all times. Adjustment of the mechanism is accomplished by racks **87** and **88** which are meshed with the teeth on the adjustment slides.

From the top view shown in Figure 23 and the fragmentary elevational view shown in Figure 24, it will be seen that the vehicle is provided with a right hand steering bar **87** and a left hand steering bar **88**, and that these bars are pierced with holes located in the center of an elliptically shaped part of the bars. A cross bar **89** is fixed to the lower part of a steering post **90** and registered with these holes. The steering post is pivotally supported on a bracket **93** fixed to the frame of the vehicle, and is provided with a steering wheel **91** which is rotated to operate the cross bar. Guides **94** are provided to hold the steering bars in alignment. Two axle assemblies **95**, Figure 23, are provided and driven by the engine through a propeller shaft **97** which is provided with suitable universal joints **96**, and a reversing gear **98**.

When the steering post **90** is pulled back upon its pivot **92**, steering bars **87** and **88**, which are provided with racks that are meshed to the control segments of the drive mechanisms, are operated to set the mechanisms in neutral, and since the idlers are locked when the mechanism is in that position, all four wheels of the vehicle are braked. By pushing the steering post forward, the bars are operated to set the mechanisms for driving, the speed depending upon the extent of the forward movement of the post as well as upon the engine speed.

When the steering wheel is rotated to the left, cross bar **89** is operated to slide steering bar **87** in a forward direction and thereby increase the speed of the right hand wheels of the vehicle while the speed of the left hand wheels remains unchanged. The vehicle will negotiate a left hand turn, in the manner shown in Figure 26. When the steering wheel is rotated to the right, the operation is reversed and the left wheels are driven faster to cause the vehicle to negotiate a right hand turn, in the manner illustrated in Figure 27. The sharpness of the turn in either case depends upon the degree of rotation of the steering wheel, just as in conventional steering arrangements.

Having thus described my invention, what I consider new and desire to have protected by Letters Patent is pointed out in the appended claims.

What is claimed is:

1. A mechanism for transmitting power comprising the combination of a driving member, a driven member disposed concentrically of the driving member, an intermediate member, portions of said intermediate member being flexible and resiliently engaging said driving and driven members, and means for moving said intermediate member in a translatory movement over a path eccentric with respect to said members.

2. A reversible friction cone drive for transmitting power from a motor to a driven member comprising a driving shaft, a driving cone mounted upon said shaft, means for imparting eccentricity to said cone as said shaft is rotated by said motor, a pair of concentrically disposed rotatable cones engaged by said driving cone, and means for locking one of said cones against rotation to

cause said driving cone to rotate the other one of the cones.

3. A reversible friction cone drive for transmitting power from a motor shaft to a driven member comprising, a pair of rotatable driven cones concentrically mounted in axial alignment with the motor shaft, means for selectively locking said cones against rotation, a driving cone having rubber faced driving surfaces engaged with said cones, and means on the motor shaft for moving said driving cone into eccentric position relative to said shaft to cause the same to drive the free one of said cones, said means including a counterweight for balancing dynamically the eccentricity of said driving cone.

4. A reversible friction cone drive for transmitting power from a motor shaft to a driven member comprising, a pair of rotatable driven cones concentrically mounted in axial alignment with the motor shaft, means for selectively locking said cones against rotation, a driving cone having rubber faced driving surfaces engaged with said cones, a housing fixed on the motor shaft, a counterweight slidably mounted in said housing, and means actuated by said counterweight for moving said driving cone into eccentricity with respect to said motor shaft.

5. In a power transmitting device, a shaft, a housing fixed upon said shaft, there being a transverse slot in said housing, a counterweight slidably mounted in said slot, a rack on said counterweight, a pinion pivotally mounted in said slot and meshed with said rack, a bearing race slidably mounted in said slot and having a rack with which said pinion is meshed, a driving disc pivotally mounted on said race, stationary driving means for rotating said disc as said shaft is rotated and said race is moved into eccentricity thereof by said counterweight and pinion, and a driven member rotated by said disc.

6. In a power transmitting device, a shaft, a housing fixed upon said shaft and containing a transverse slot, a counterweight slidably mounted in said slot, a rack on said counterweight, a pinion pivotally mounted in said slot and meshed with said rack, a bearing race slidably mounted in said slot and containing a rack with which said pinion is meshed, a driving disc pivotally mounted on said race, a stationary driving means disposed concentrically around said shaft, said driving disc being moved into engagement with said driving means by the centrifugal force of said counterweight and race as the shaft is rotated, and being rotated upon its own axis by the driving means as it is moved eccentrically around the shaft, means for moving said stationary means to vary the distance between the axis of the shaft and the point of engagement of the disc with the means to thereby vary the speed of the disc with respect to the speed of the shaft, and a driven member rotated by said disc.

7. In a power transmitting device, a shaft, a driving disc, means for mounting the disc upon the shaft and for moving the disc in an eccentric path around the shaft, a stationary driving member into engagement with which the disc is moved by said means to be rotated thereby during said movement, said member including a substantially hemispherical surface having inwardly projecting teeth, a resilient facing on said disc engaging said teeth to rotate the disc, and a driven member rotated by said disc.

8. In a power transmitting device, a shaft, a driving disc, means for mounting the disc upon the shaft and for moving the disc into eccentricity with respect to the shaft and around the shaft, a stationary driving member disposed concentrically around the shaft and into engagement with which the disc is moved by said means, said member including a plurality of flexible bands disposed upon the circumference of a cylinder in axial alignment with the shaft, means for varying the diameter of the cylinder defined by said bands to thereby vary the axial rotation of the disc as it is moved around the shaft, and a member driven by said disc.

9. In a power transmitting device, a shaft, a driving chain, means for holding the chain in circular form and concentric of said shaft, means cooperating with said holding means for increasing the length of said chain while maintaining said concentricity, a gear mounted upon said shaft and meshed with said chain, means for moving said gear with respect to the shaft to keep the same meshed with the chain and for moving the gear along the chain, said means permitting the gear to be turned with respect to the shaft by the chain, and a driven member rotated by the chain.

10. In a power transmitting device, a shaft, a chain, pins projecting from opposite sides of said chain, stationary plate means disposed adjacent to the chain and containing slots into which said pins project, an adjustment slide containing slots into which said pins project, the slots in said slide sloping oppositely to the slots in the plate means to locate the chain on a circle concentric with said shaft, means for moving said slide to reposition said pins in said slots and alter the diameter of the circle defined by the chain while maintaining its concentricity, a gear wheel having teeth meshed with said chain, means for mounting said wheel upon said shaft and for moving the same along the chain as the shaft is rotated, said means including means for moving the wheel radially of the shaft to keep said teeth meshed with the chain, and a driven member rotated by said wheel.

11. In a power transmitting device, a shaft, a chain, pins projecting from opposite sides of said chain, stationary plate means disposed adjacent to the chain and containing slots into which said pins project, an adjustment slide containing slots into which said pins project, the slots in said slide sloping oppositely to the slots in the plate means to locate the chain on a circle concentric with said shaft, locking means for holding the chain stationary, means for moving said slide to reposition the pins in said slots and alter the diameter of the circle defined by the chain while maintaining its concentricity, means actuated by said slide for releasing said locking means during adjustment of the chain, a gear wheel having teeth meshed with said chain, means for mounting said wheel upon said shaft and for moving the same along the chain as the shaft is rotated, said means including means for moving the wheel radially of the shaft to keep said teeth meshed with the chain, and a driven member rotated by said wheel.

12. In a power transmitting device, a shaft, a housing fixed upon said shaft and containing a transverse slot, a counterweight slidably mounted in said slot, a rack on said counter weight, a pinion pivotally mounted in said slot and meshed with said rack, a bearing race slidably mounted in said slot and containing a rack with which said pinion is meshed, a cup shaped driving gear pivotally mounted upon said race, teeth projecting radially from the outer surface of said gear, a stationary driving means disposed concentrically

around said shaft, a resilient member disposed upon the inner face of said driving means, said driving gear being moved radially of the shaft to embed said teeth in said resilient member by the centrifugal force of said counterweight and shaft as the shaft is rotated and being rotated on its own axis by the member as the shaft turns, means for varying the speed of rotation of said gear, a resilient collar disposed within said gear, and a driven pulley engaging said collar and rotated thereby as said gear is rotated.

13. In an automotive vehicle, a plurality of driving wheels, a driving gear for each wheel, a stationary driving member for each gear, a driving shaft projecting into the center of each driving member, means connecting the gears to the shafts to rotate the axes of the gears around the shafts as the shafts are turned, means for adjusting the driving member to regulate the speed of rotation of the gears as the same are rotated by the shaft, and a common control means for governing said individual adjusting means.

14. In a device of the class described, a driving member, a driven member, a speed and power transmitting means interposed between said driving and said driven members, means for moving said transmitting means on said driving member in direct contact therewith for varying the speed of said driven member, and means cooperating with said members and said transmitting means for reversing said driven member.

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