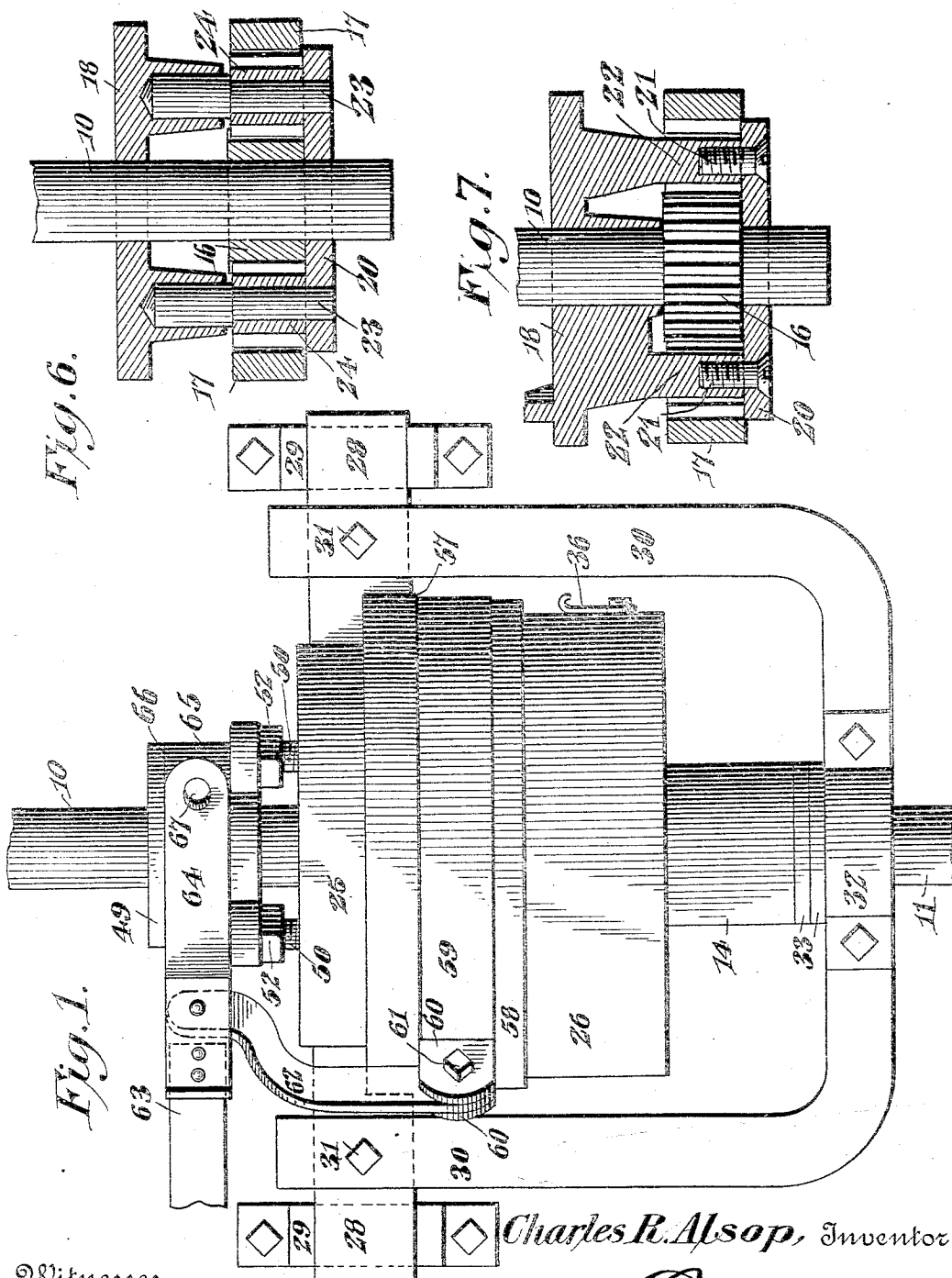


C. R. ALSOP.
 REVERSING GEARING.
 APPLICATION FILED APR. 29, 1908.

936,072.

Patented Oct. 5, 1909.

4 SHEETS—SHEET 1.



Witnesses
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R. J. Felt

Charles R. Alsop, Inventor

By

E. G. Siggers

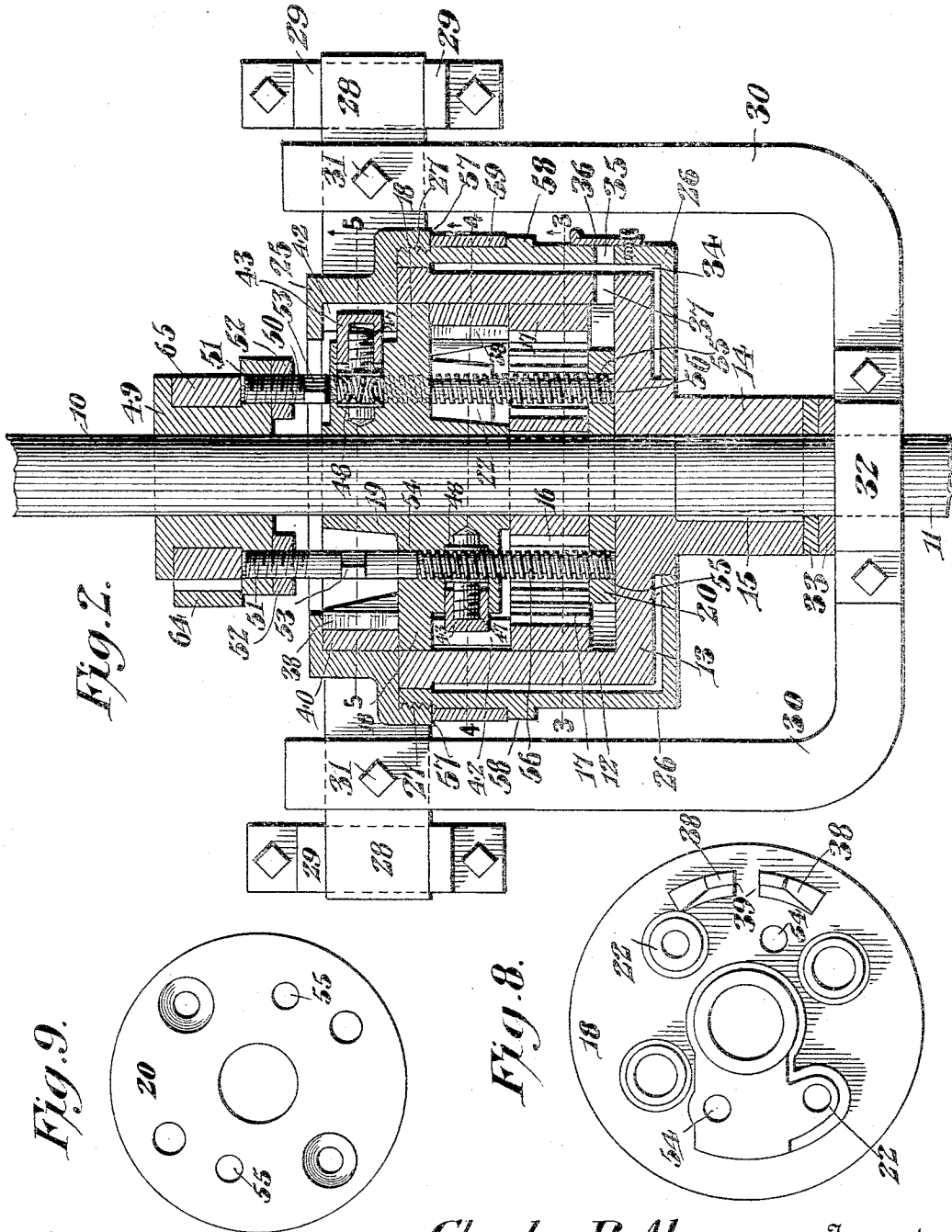
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4 SHEETS—SHEET 2.

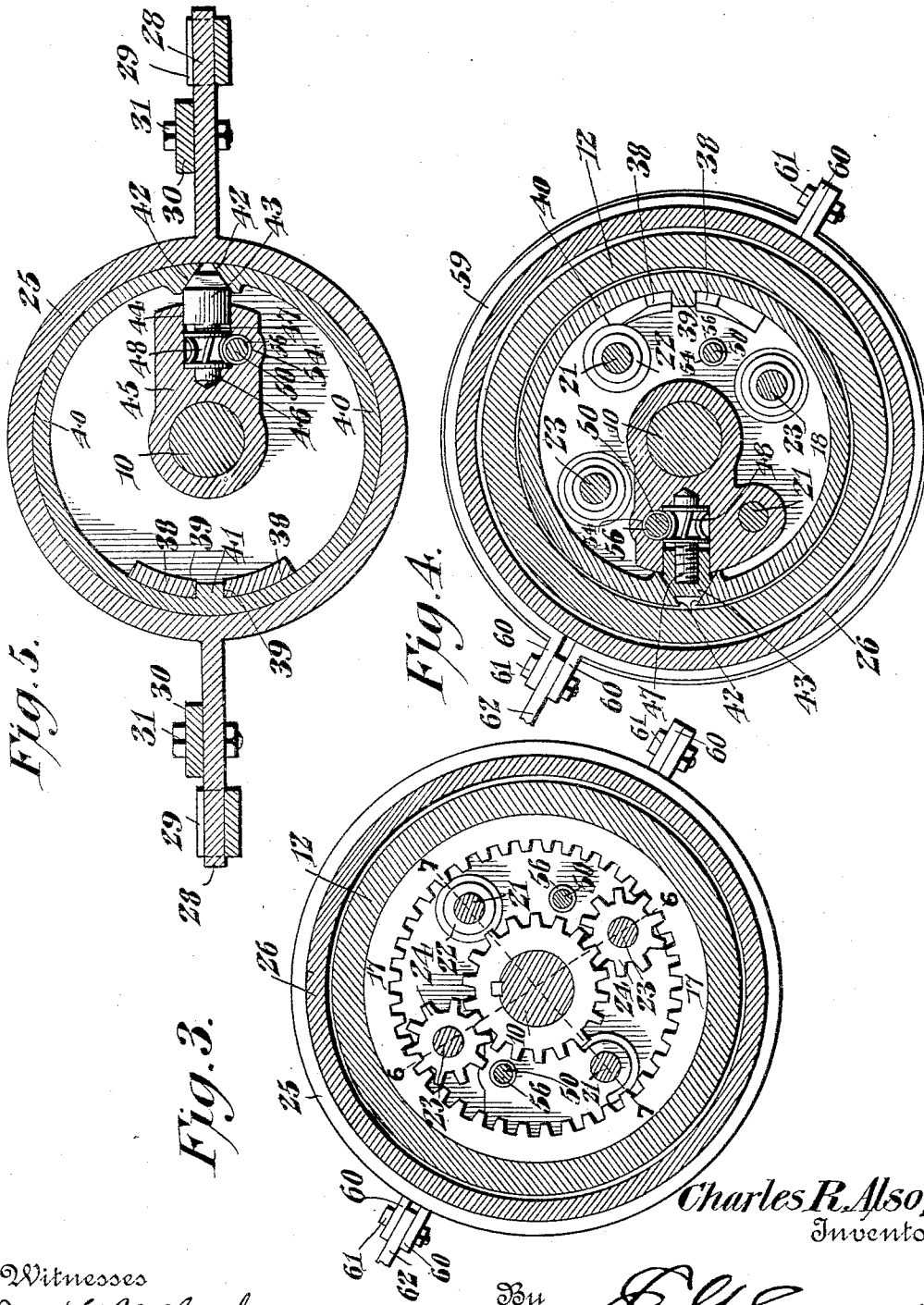


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936,072.

Patented Oct. 5, 1909.
 4 SHEETS—SHEET 3.



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 4 SHEETS—SHEET 4.

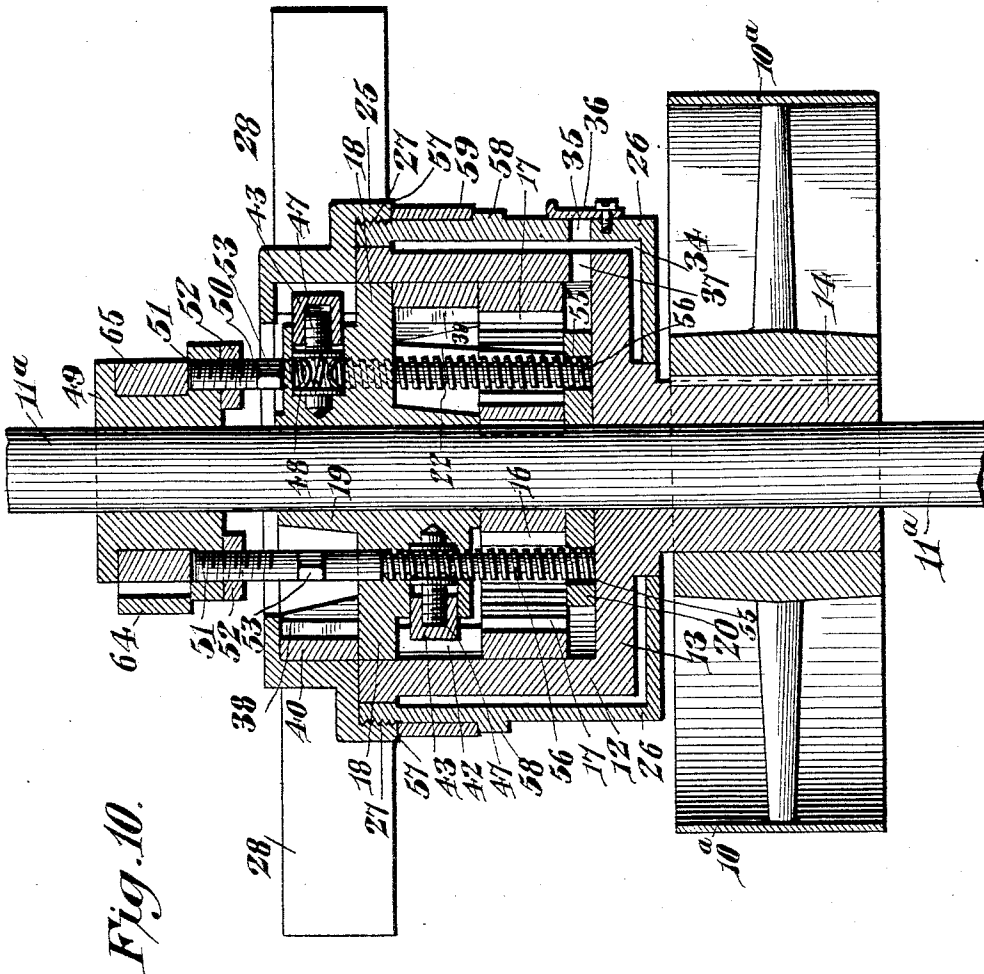


Fig. 10.

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UNITED STATES PATENT OFFICE.

CHARLES RICHARD ALSOP, OF MIDDLETOWN, CONNECTICUT.

REVERSING-GEARING.

936,072.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed April 29, 1908. Serial No. 429,853.

To all whom it may concern:

Be it known that I, CHARLES R. ALSOP, a citizen of the United States, residing at Middletown, in the county of Middlesex and State of Connecticut, have invented a new and useful Reversing-Gearing, of which the following is a specification.

The primary object of the present invention is to provide a simple reversing gear mechanism of a novel nature that is very compact, so that it will occupy but little space, is light in weight, is very efficient in operation, is so constructed that the parts are not liable to become loose or deranged, and is comparatively cheap to manufacture.

A further and important object is to provide a structure of the above character in which the working parts are completely housed and protected, yet are entirely accessible, the necessary adjustments moreover being obtainable without the necessity of dismembering said structure.

An embodiment of the invention that is at present considered the preferable one is illustrated in the accompanying drawings, and is described in the following specification, but it will be evident from an inspection of the appended claims that the invention is not limited to the exact structure set forth.

In the drawings: Figure 1 is a plan view of the reversing gear. Fig. 2 is a longitudinal sectional view therethrough. Figs. 3, 4 and 5 are respectively cross sectional views on the lines 3—3, 4—4, and 5—5 of Fig. 2. Fig. 6 is a detail sectional view on the line 6—6 of Fig. 3. Fig. 7 is a detail sectional view on the line 7—7 of Fig. 3. Fig. 8 is a view in elevation of the spider or gear carrier. Fig. 9 is a similar view of the associated supporting disk. Fig. 10 is a longitudinal sectional view through a slightly modified form of construction.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In the embodiment illustrated, a driving shaft 10 and a driven shaft 11 are employed, these shafts being disposed in alinement. A cylindrical gear case 12 is provided with an end wall 13 carrying a hub 14, and this hub is keyed, as shown at 15 or otherwise secured to the end of the driven shaft 11, while the adjacent end of the driving shaft is loosely journaled in the hub. A gear wheel 16, suitably secured to the driving shaft 10, is located within the gear case 12, and sur-

rounding the gear 16 in spaced relation thereto, is an internal gear 17 fast to and located within the gear case 12.

A gear carrier is employed that is in the form of a spider 18, which fits within the gear case 12, and has a hub 19 in which the driving shaft 10 is loosely journaled. A supporting disk 20 is located on the driving shaft 10 in spaced relation to the spider 18 and is connected to said spider by screws 21, shown more particularly in Fig. 7, said screws engaging in suitable bosses 22 formed upon the adjacent side of the spider. Bridging the space between the spider 18 and disk 20 are suitable axles 23 carrying planetary gears or pinions 24 that are in mesh with the gear 16 of the driving shaft and with the internal gear 17 of the gear case 12.

Surrounding and housing the gear case and the projecting hub portion 19 of the spider is an outer shell composed of sections 25 and 26, said sections being threaded together, as shown at 27, or otherwise detachably connected. The section 25 has opposite outstanding fingers or holding bars 28, the terminals of which engage some suitable portion of a support for the mechanism, in order to hold the shell against rotation. Thus in the present embodiment, said terminals are engaged in seat brackets 29 fastened in place on opposite sides of the mechanism. A yoke 30, secured as shown at 31 to the holding arms 28, has a bearing 32 in which the driven shaft 11 is journaled, and interposed between said bearing and the hub 14 of the gear case, are suitable washers 33. It will thus be evident that the yoke and through the yoke, the arms 28, resist any end thrust of the driven shaft. The section 26 of the outer shell is spaced from the gear case, as shown, thus forming an annular chamber 34 for oil or other lubricant, said lubricant being introduced therein through a port 35 controlled by a suitable closure 36. Another port 37 is formed in the gear case to permit lubrication to be passed therein.

Now referring again to the gear carrier or spider 18, it will be noted that the same is provided on opposite sides and at diametrically opposite points with sets of outstanding lugs 38 forming between them seats 39, and two expansible friction clutch rings 40 arranged respectively on opposite sides of said spider have inwardly extending lugs that engage in said seats 39. One of these rings is expansible into engagement with the

inner face of the gear case 12, the other being expandable into engagement with the section 25 of the stationary outer shell. For the purpose of expanding these rings, the following mechanism is preferably employed. The rings are split as shown, and the terminals have inner beveled faces 42, against which operate outwardly and inwardly movable wedges 43 slidable in guideways 44 formed in enlargements 45 provided on opposite sides of the spider 18. Journaled in said enlargements 45 in rear of the wedges are radially disposed shafts 46 having their outer portions threaded as shown at 47 in the wedges 43. The shafts 46 are furthermore provided with worm gears 48. An actuating collar 49 is slidably mounted on the driving shaft 10 outside the outer shell, and a pair of rods or bars 50, extending longitudinally of the shaft on opposite sides thereof, have their outer ends threaded as shown at 51 into the collar this collar forming a longitudinally shiftable carrier for the rods, 50. Jam nuts 52, normally hold these rods or bars against rotation. Said rods or bars are, however, provided with angular portions 53 by means of which they may be turned, when the jam nuts 53 are loosened. The bars or rods extend longitudinally into the outer shell, and into the gear case, the spider and the shell 20 being provided respectively with openings 54 and 55 to permit their passage. The inner portions of these bars or rods are provided with coarse threads 56, which constitute in effect combined worms and racks, said threads 56 being formed opposite to the finer threads 51 that engage the collar 49. As shown particularly in Figs. 2, 4 and 5, the combined worms and racks mesh with opposite sides of the worm wheels 48.

It will be noted by reference to Fig. 2 that the outer shell section 26 is threaded within the shell section 25. Consequently the end of said section 25 constitutes a shoulder 57 upon the section 26, and said section 26 is provided with an annular flange 58 spaced from the shoulder 57, and forming therewith a guideway. A split collar 59 surrounding the outer shell, is located in this guideway, and is thus held against longitudinal movement on said shell. The ends of the collar sections are outturned to form ears 60, which are clamped together by bolts or other fasteners 61. Between one set of these ears 60 and fastened by the bolt 61 thereof, is the end of a link 62 which link has fulcrumed upon its other end an actuating lever 63. This lever terminates in a yoke 64 that embraces the actuating collar 49, and a ring 65, located in a groove 66 in the collar 49, has opposite outstanding pin-
tles 67 engaged by the yoke 64.

The operation of the mechanism is substantially as follows. Assuming the driving shaft to be rotated from any suitable

source of power, if both of the expandable friction rings 40 are out of coaction with their respective bearing surfaces, no motion will be transmitted to the driven shaft 11, inasmuch as the spider 18 can rotate freely with respect to both shafts and the planetary gears can rotate on their own axes and revolve about the axis of the driving shaft. If now, the actuating and rod-carrying collar is moved by the lever 63 in one direction, the rods 50 will be moved longitudinally of the shaft. Consequently the worm gears 48 will be rotated and the shafts 46 revolved. As a result, one of the wedges will be moved outwardly while the other will be moved inwardly. The outwardly moving wedge will expand the ring with which it is associated, and carry said ring into frictional engagement with its coacting surface. If therefore the outer ring is expanded into engagement with the section 25 of the outer case, it will be evident that the spider 19 will be clutched against rotation, while the planetary gears 24 can still revolve on their axes. As a result, motion will be transmitted from the driving shaft through its gear 16, and the planetary gears to the internal gear 17, and this gear being fast to the gear case 12, said gear case will be revolved in one direction, the motion being of course transmitted to the driven shaft 11 keyed to said case. On the other hand, if the actuating collar 49 is moved in a direction to expand the inner ring, the outer ring will contract, the inner ring will be expanded into engagement with the gear case 12, as already explained. Consequently the spider 18 will be clutched to said gear case, and thus the planetary gears will revolve about the axis of the driving shaft, but will be held against rotation on their own axes. Motion will therefore be transmitted directly from the driving shaft through the gear case to the driven shaft and the direction or rotation of the driven shaft will be opposite to that first described.

There are a number of advantages for the structure disclosed. In the first place, it is very compact, is light in weight, and is completely housed. Moreover the structure is comparatively simple and all the parts can be readily reached should access to them become necessary or desirable. At the same time, it is not necessary to dismember the mechanism for the purpose of securing proper and accurate adjustment or for taking up wear. It will be noted that the bars or rods 58 are rotatably mounted in the carrying collar 49 and have their outer ends exposed so that by loosening the jam nuts 52, these rods can be turned. Ordinarily they are held against turning and during their longitudinal movement, the coarse screws 56 act in the nature of racks upon the worm gears 48, but if the rods or bars 58 are ro-

tated, then the threads 56 act as worms to also rotate the worm gears 48, their turning movements being independently effected. Consequently it will be evident that each clutch ring can be separately adjusted so that it will properly operate in connection with the other and in order that wear can be compensated for.

A slightly modified form of construction is illustrated in Fig. 10. In this embodiment of the invention, the driving member is in the form of a pulley 10^a, and the driven member is a shaft 11^a. The mechanism for transmitting motion from the pulley to the shaft for the purpose of rotating the latter in opposite directions is exactly the same as that already described, and therefore the same reference numerals have been employed. In this embodiment, the driving member, namely the pulley 10^a is keyed on the hub 14 of the gear case, while the shaft 11^a constitutes the support for the mechanism. It will be evident that this structure has all the advantages of the first described embodiment, and it will also be clear that either member can be employed as a driving member, and the other as a driven member.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

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

1. In mechanism of the character set forth, the combination with driving and driven members, of a gear secured to one member, a gear case secured to the other member and inclosing the gear, an internal gear located in the gear case, a gear carrier rotatable with respect to both the driving and driven members, planetary gears journaled on the carrier and meshing with the first mentioned gear and with the internal gear, a stationary device and means movably mounted on the gear carrier for securing the gear carrier against rotation to the stationary device and for securing it to one of the members.

2. In mechanism of the character set forth, the combination with driving and driven members, of a gear secured to one member, a gear case secured to the other member and inclosing the gear, an internal gear located in the gear case, a gear carrier rotatable with respect to both the driving and driven members, planetary gears journaled on the carrier and meshing with the first mentioned gear and with the internal gear, means for securing the gear carrier against rotation,

and means mounted on the gear carrier and movable into and out of engagement with the gear case for securing the two against relative rotation.

3. In mechanism of the character described, the combination with driving and driven members, of a gear secured to one member, a gear case secured to the other member, gearing for transmitting motion from one member to the other through the gear and gear case, a rotatable gear carrier for said gearing, and means for clutching the gear carrier and casing against relative rotation and unclutching the same to permit their relative rotation.

4. In mechanism of the character described, the combination with driving and driven members, of a gear secured to one member, a gear case secured to the other member, gearing for transmitting motion from one member to the other through the gear and gear case, a rotatable gear carrier for said gearing, clutch mechanism including a stationary device and another device movably mounted on said carrier and movable into coaction with the stationary device for preventing the rotation of the carrier, and clutch mechanism movably mounted on the carrier for holding the same and the gear casing against relative rotation.

5. In mechanism of the character described, the combination with driving and driven members, of a rotatable gear carrier, means for transmitting motion from the driving to the driven member, including gearing mounted on said carrier, a stationary clutch member, another clutch member movably mounted on the carrier into and out of engagement with the stationary member for holding the transmitting means against rotation, a clutch member movably mounted on the carrier for clutching said carrier to one of the members, and means for operating the clutch members.

6. In mechanism of the character set forth, the combination with driving and driven members, of a rotatable gear carrier comprising a spider journaled on one of the members, means for transmitting motion from the driving to the driven member including gearing mounted on said spider, a stationary clutch member, an expandible clutch ring mounted on one side of the spider and movable into engagement with the stationary member for holding the transmitting means against rotation, another expandible clutch ring mounted on the opposite side of the spider for clutching the spider to one of the members, and means for operating the clutch members.

7. In mechanism of the character set forth, the combination with aligned driving and driven shafts, of a gear carried by one shaft, a gear case mounted on the other shaft, an internal gear carried by the case, a spider

rotatably mounted on the shaft having the gear and closing the end of the gear case, planetary gears journaled on the spider and meshing with the shaft and internal gear, 5 expansible clutch rings mounted on opposite sides of the spider, one being located within and expanding into engagement with the gear case, a stationary device against which the other ring expands, and means for effecting the expansion of said rings. 10

8. In mechanism of the character set forth, the combination with driving and driven members, of means for transmitting motion from one to the other including a rotatable 15 gear carrier, means for clutching said gear carrier and one of the members together, and means mounted on the other member for actuating the clutch means.

9. In mechanism of the character set forth, 20 the combination with driving and driven shafts, of a gear case connected to one shaft, a gear carrier rotatably mounted with respect to the case and shafts, transmission gears mounted on one of the shafts, the carrier and the case, means for clutching the 25 carrier to the case, and actuating mechanism for the clutch means including a reciprocatory collar mounted on the other shaft to that carrying the gear case.

10. In mechanism of the character set forth, the combination with driving and driven members and means for transmitting motion in opposite directions from the driving to the driven members, said means including independent clutches, of means for 35 securing the simultaneous movement of the clutches in reverse directions into and out of actuating position, respectively, said means including a separate worm gear for each 40 clutch, a completely rotatable longitudinally movable rack bar for each worm gear, and a longitudinally movable carrier in which the rack bars are mounted, each for an independent 45 rack bars are all simultaneously moved longitudinally to actuate said clutches.

11. In mechanism of the character set forth, the combination with driving and driven members, one of which is a shaft, 50 of means for transmitting motion in opposite directions from the driving to the driven member, said means including independent clutches, means for securing the simultaneous movement of the clutches in reverse directions into and out of actuating position 55 respectively said means including a worm gear for each clutch, an actuating collar slidably mounted on the shaft on one side of both clutches, rotary worm and rack bars engaged with the worm gear and rotatably 60 engaged with the collar on opposite sides of the shaft, and means for separately locking each bar against rotation on the collar.

12. In mechanism of the character set forth, the combination with driving and

driven members, one of which is a shaft, of means for transmitting motion in opposite directions from the driving to the driven member, said means including independent 70 clutches, and means for securing the simultaneous movement of the clutches in reverse directions into and out of actuating position respectively, said means including a worm gear for each clutch, an actuating collar slidably mounted on the shaft on one side 75 of both clutches, and rotary worm and rack bars engaged with the worm gears and having threaded engagements with the collar on different sides of the shaft.

13. In mechanism of the character set forth, the combination with driving and driven shafts, of means for transmitting motion from one to the other, including a rotatable gear carrier, clutch mechanism mounted on the gear carrier, and means for operating the clutch mechanism including a 80 rotary worm gear mounted on the carrier, a reciprocatory collar slidable longitudinally of the shaft, means for reciprocating the collar, a combined worm and rack bar having one end threaded into the collar, said bar 90 having a worm engaging the worm gear, and a jam nut for holding the bar against rotation in the collar.

14. In mechanism of the character set forth, the combination with alined driving and driven shafts, of means for transmitting motion from the driving to the driven shaft, including a rotatable gear carrier, an expansible clutch ring mounted on the carrier, 100 a wedge for expanding the ring, a shaft journaled on the carrier and having a threaded engagement with the wedge, a worm gear connected to the shaft, an actuating collar movable toward and from the gear carrier, a bar having an adjustable 105 threaded connection with the collar and having a coarse thread worm that meshes with the worm gear, and means for holding the bar against rotation in the collar. 110

15. In mechanism of the character set forth, the combination with driving and driven members, of means for transmitting motion from one to the other of the members, said means including a rotatable gear 115 carrier, clutches for holding the gear carrier against rotation and for securing the same to one of the members, and mechanism for operating the clutches including rotary worm gears, an actuating device movable toward and from the carrier, combined worms and racks rotatably mounted on the device and meshing with the gears, and means for holding the combined worms and racks against rotation on the actuating device. 120 125

16. In mechanism of the character set forth, the combination with driving and driven members, of means for transmitting motion from one to the other of the members including a rotatable gear carrier, a 130

stationary clutch element, expansible clutch rings mounted on the carrier, one of the rings being movable into engagement with the stationary element for holding the carrier against rotation, and the other ring being movable into engagement with one of the members for securing the gear carrier to the same, and mechanism for operating the clutches including worm gears journaled on the carrier, a reciprocatory actuating collar, and rods adjustably threaded into the collar and having coarse worm threads that mesh with the worm gears.

17. In mechanism of the character set forth, the combination with alined driving and driven shafts, of a gear case secured to one of the shafts, a gear carrier rotatably mounted on the other shaft, gearing carried by said other shaft, the carrier and the gear case for transmitting motion from one shaft to the other, expansible clutch rings mounted on the carrier, one of said rings being expansible into engagement with the gear case, stationary means for engagement with the other ring, wedges for expanding the rings, shafts journaled on the carrier having threaded engagement with the wedges, worm gears carried by said shafts, a reciprocatory collar, combined worm and rack bars having threaded engagement with the collars and having combined worm and rack threads meshing with the worm gears, and means for securing the bars against movement on the collar.

18. In mechanism of the character set forth, the combination with driving and driven members, of a spider rotatable with respect to the same, gearing connecting the members and having portions mounted on the spider, two expansible friction rings mounted on the spider, a stationary device engaged by one ring, a device carried by one of the members and engaged by the other expansible ring, and means for expanding the rings.

19. In mechanism of the character set forth, the combination with driven and driving members, of a spider rotatable with respect to the same and having seats on its opposite sides, gearing connecting the members and having portions mounted on the spider, two expansible friction rings located on opposite sides of the spider and having lugs engaging in the seats, a stationary device engaged by one ring, a device carried by one of the members and engaged by the other ring, and means mounted on the spider for expanding the rings.

20. In mechanism of the character set forth, the combination with an outer stationary shell, of driving and driven members having portions located in the shell, a gear carrier rotatably mounted within the shell, gearing connecting the members and mounted on the carrier, and means for

clutching the carrier to the shell and to one of the members.

21. In mechanism of the character set forth, the combination with an outer stationary shell, of driving and driven members, one of which includes a gear case located within the shell, a gear carrier rotatably mounted within the shell, gearing connecting the members and including gears mounted on the carrier and case, and clutches mounted on the carrier for clutching said carrier to the shell and to one of the members.

22. In mechanism of the character set forth, the combination with an outer shell, comprising sections detachably connected, of means carried by one of the sections for holding the shell against rotation, driving and driven members, having portions located in the shell, a gear carrier rotatably mounted within the shell, gearing connecting the members and having portions mounted on the carrier, an outwardly expansible clutch member mounted on the carrier and engaging the shell, and means for expanding said member.

23. In mechanism of the character set forth, the combination with an outer case comprising detachably connected sections having spaced shoulders forming a guideway between them, of a collar located in the guideway, alined driving and driven shafts, extending centrally through the outer shell, a gear carried by one of the shafts, a gear case affixed to the other shaft and located within the shell, an internal gear carried by the case, a spider rotatably mounted on one of the shafts within the shell, planetary gears journaled on the spider and meshing with the shaft and internal gear, said spider having spaced lugs on its opposite sides, expansible friction rings having lugs engaged between the spaced lugs of the spider, said rings respectively expanding into engagement with the gear case and with the outer shell, wedges for expanding the rings, shafts journaled on the spider and having threaded engagements with the wedges, worm gears carried by the shafts, a reciprocatory collar, a lever for reciprocating the collar, said lever being connected to the ring that is located in the guideway of the outer shell, combined worm and rack bars threaded into the collar, means for holding said bars against rotation, and coarse worm threads formed on the bars and meshing with the worm gears.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES RICHARD ALSOP.

Witnesses:

JACOB P. SCHILLING,
FRANK A. COLES.