May 12, 1925. 1,537,415

K. DAVIS

POWER TRANSMITTING MECHANISM

Filed April 15, 1922 2 Sheets-Sheet 1

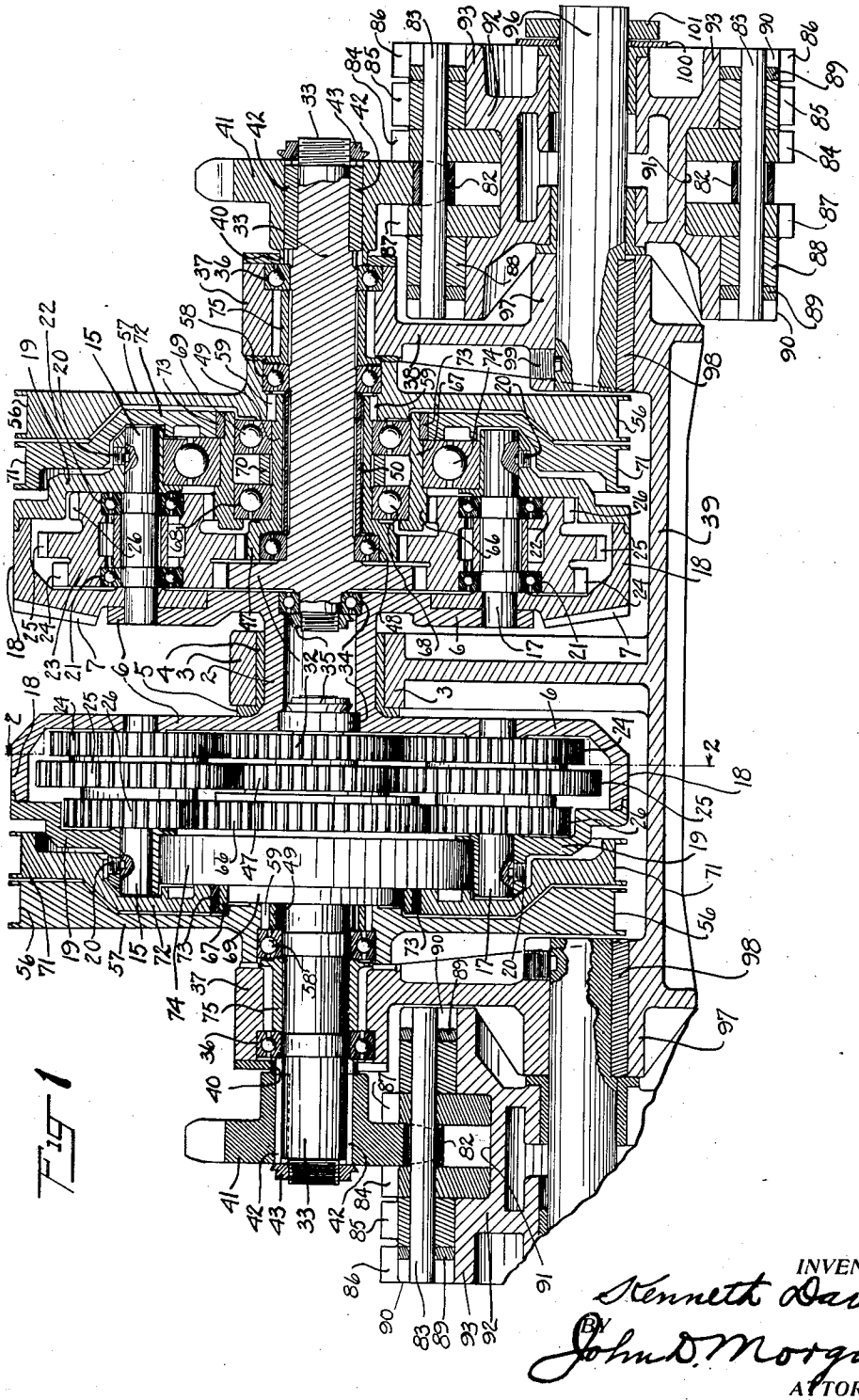


Fig. 1

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Fig 2

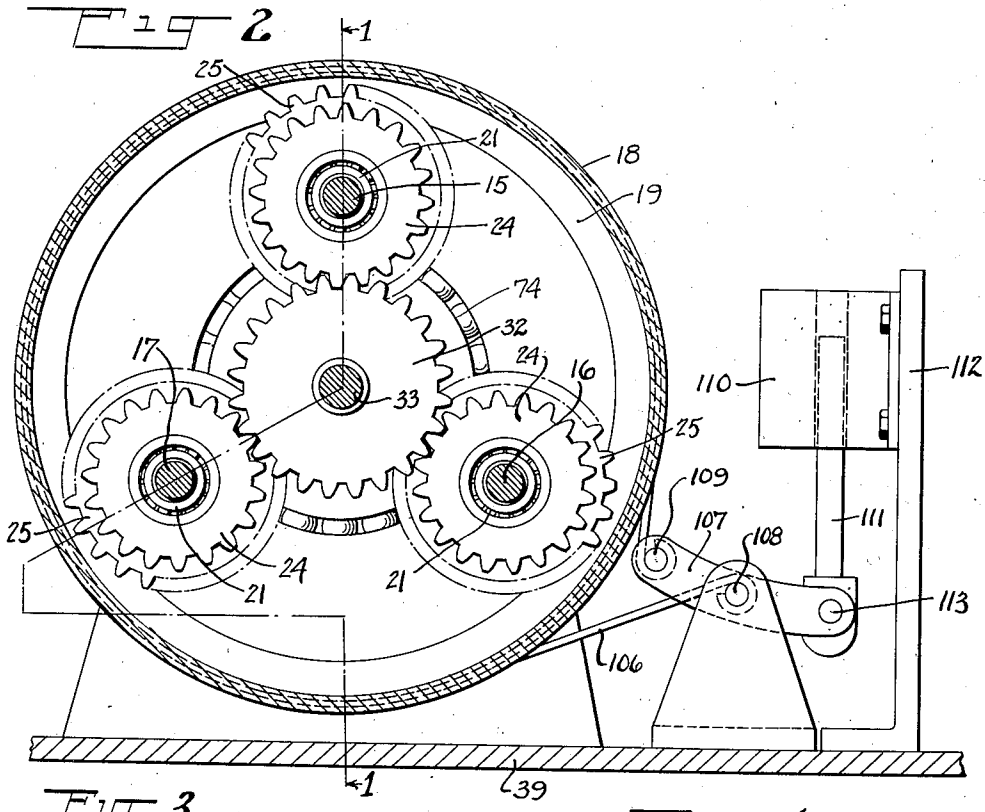


Fig 3

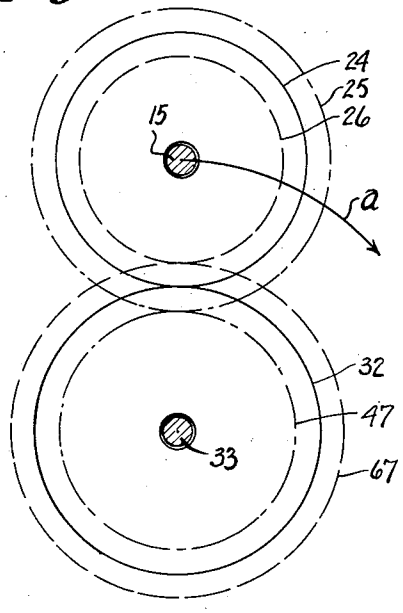
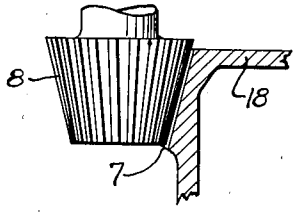


Fig 4



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UNITED STATES PATENT OFFICE.

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POWER-TRANSMITTING MECHANISM.

Application filed April 15, 1922. Serial No. 553,252.

To all whom it may concern:

Be it known that I, KENNETH DAVIS, a citizen of the United States, residing at St. Benedict, in the county of Cambria and State of Pennsylvania, have made certain new and useful Improvements in Power-Transmitting Mechanism, of which the following is a specification.

The invention relates to power-transmitting, speed-reducing and direction-reversing mechanism, and more particularly to a novel and useful gear mechanism of the kind described which is especially adapted for use between a rapidly rotating drive and a relatively very heavy and slow-moving load.

Objects and advantages of the invention will be set forth in part hereinafter, and in part will be obvious herefrom, or may be ascertained through practice with the invention; the same being realized and attained through the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, herein referred to and constituting a part hereof, illustrate one embodiment of the invention, and together with the description serve to explain the principles thereof.

Of the drawings;

Fig. 1 is a view, with parts in elevation and parts in vertical transverse section, on the line 1—1 of Fig. 2, of a mechanism embodying the invention;

Fig. 2 is a vertical section taken on line 2—2 of Fig. 1;

Fig. 3 is a diagrammatic representation of a part of the gear mechanism for the purpose of explaining the relative movements thereof;

Fig. 4 is a fragmentary detail showing the pinion drive from the motor shaft to the housing.

The herein illustrated and described exemplification and embodiment of the invention is shown in my co-pending application Ser. No. 247,240, filed July 29, 1918, applied in a machine for loading, transporting and unloading loose material, and as constituting a direct-drive, speed-reducing and direction-reversing and starting and stopping mechanism between the relatively rapidly rotating shaft of the electric motor and the traction treads at each side of the machine.

In the practical application of the invention just referred to, the mechanism of the present invention operates between the rapidly rotating motor shaft and the relatively slow-moving and heavy-duty treads on which the machine travels, and by which the shovel is pushed into the loose material to get its load, the machine is started and stopped, driven backwardly and forwardly and wheeled or turned or otherwise maneuvered as required or desired, both when unloaded and when under its load.

The mechanism possesses great strength, power-transmitting capacity, compactness, quick operation, and responsiveness as to starting and stopping, changing direction and the like, with a very great speed reduction ratio, without heating and without undue friction, and with capability for absolute, certain, quickly-acting and safe control from a distance.

It will be understood that this particular exemplary practical application of the invention is illustrative and not restrictive thereof. Other features and advantages of the invention will be set forth primarily in connection with the following detailed description of the present embodiment, and it will be understood that the foregoing general description and also the following detailed description are explanatory and exemplary and are not restrictive of the invention.

In the embodiment of the invention illustrated by way of example in the accompanying drawings, and in accordance with certain features of the invention, a single drive is provided for two independently controlled and independently operating power-transmitting, speed-reducing, and direction-reversing mechanisms, the mechanism being especially adapted for a very high ratio speed reduction in connection with the independently operating direction-reversing mechanisms, whereby a single relatively rapidly rotating driving shaft drives two relatively very slowly moving loads, independently of each other, in that they may move in opposite directions, or one may be in motion in either direction while the other is at rest, or they may both move together.

The illustrated and exemplary embodiment is shown applied to the two traction

treads of a material handling and transporting automotive machine, this particular application of the invention being fully shown and described in my copending application, Serial Number 553,251, filed April 15, 1922. It will be understood, however that the invention is of much more general application than this illustrative application thereof.

In said embodied form, and pursuant to the features of the invention already referred to, a shell or housing is provided, receiving the drive from the rapidly rotating driving shaft and conveying it to the two speed-reducing and direction-reversing mechanisms and for this purpose carrying a part of the gearing. As embodied, the shell or housing is provided with an intermediate, concentrically hollow cylindrical portion 2, journaled in a bearing 3, with an interposed sleeve 4, which sleeve is provided with a flange 5, which takes up the thrust from the drive of the bevel pinion on the motor shaft.

Except as to minor structural features, the mechanisms from this central bearing to the load on each side, are substantially duplicate and identical, and a single description will suffice for both. It will be understood, however, that both trains of mechanism are capacitated for independent control, whereby through their simultaneous operation either load, such as the traction treads, can be driven in either direction, or may remain at rest, concurrently with any of these operations or conditions on or for the opposite side or other load. In the illustrative case of the two traction-treads, either tread may be run forwardly or backwardly concomitantly with the operation of the opposite tread in the same direction, thus providing for the forward or backward travel of the machine lengthwise of itself or, one tread may be run forwardly, while the other is run backwardly causing the machine to wheel sharply either to the right or to the left, or either tread may be run forwardly or backwardly, while the other is at rest, to wheel the machine less sharply in either direction.

Continuing the common description, applicable to either side as stated, the shell or housing on either side of the bearing 2, is expanded outwardly in a general radial disposed disc or bowl, to constitute a bearing for sets of pinions later to be described. In Fig. 1, the common drive for the entire mechanism is shown on the right-hand part 6, of the housing, as an annular series of beveled gear teeth 7, with which meshes the driving beveled pinion 8. This pinion in my copending application is on the motor shaft, but so far as concerns the general features of the invention, it may represent any source of driving power. In Fig. 1 this beveled gear ring 7, as a structural feature or convenience, is shown set into the shell 6, while the shell 6 on the opposite side of the mechanism is shown continuous at the corresponding part.

Mounted in the housing member 6 are a plurality of shafts, preferably 3 in number, and indicated as 15, 16 and 17, the shafts being mounted in the outer face of the housing 6, and also in an inwardly and downwardly directed extension thereof which extends about and partly incloses the gearing.

The housing 6 has an intermediate cylindrical, peripheral portion 18, and then a generally inwardly extending portion 19. The outer ends of the shafts 15, 16, and 17 are supported in the part 19 of the housing and are held in place by clamping screws 20.

All of the bearings in the gearing mechanism are shown provided with ball bearings, such bearings conducing to keep the friction and heating within efficiency limits in so condensed and compact a mechanism, which effects such a great speed reduction and which transmits relatively so great horse-power.

Accordingly, mounted on the respective shafts 15, 16, and 17, are two ball bearings 21 and 22, each set of these bearings rotatably carrying a triple gear pinion 23, provided with three annular series of gear teeth, marked as 24, 25 and 26, and meshing respectively, with three gear wheels next to be described.

Meshing with the series of gear teeth 24 on each of the pinions 23, is a gear wheel 32, fixed on a shaft 33. The inner end of shaft 33 is journaled in a ball bearing 34, within the cylindrical part 2 of the housing, and is provided with a retaining nut 35 for the ball race, screw-threaded on the inner end of the shaft within the part 2 of the shell. The shaft 33 extends laterally outwardly, concentric with the housing, and is journaled in a ball-bearing 36. This ball-bearing is mounted in a fixed bearing 37, carried on a standard 38, extending upwardly from the bed 39 of the machine.

An annular retaining flange 40 is fixed on the sprocket hub to maintain the ball races in position. The load is driven from the shaft 33, and in the exemplary embodiment, a sprocket wheel 41 is fixed to shaft 33 by keys 42, a nut 43 being screw-threaded on the end of the shaft to hold the sprocket wheel in position thereon.

The annular series of gear teeth 25 of each of the triple pinions 23, meshes with a gear wheel 47, fixed to a sleeve 49 loosely mounted upon and concentric with the shaft 33 and having a ball bearing 48 upon the shaft.

This sleeve 49, integral with and extending outwardly from the gear wheel 47, is mounted upon the shaft 33, a bushing 50,

being preferably interposed therebetween.

Means are provided whereby the gear wheel 47 is permitted to rotate freely or is held against rotation, as desired, to effect a desired function or change in the direction of the drive. As embodied, a brake drum 56 is carried upon a plate or disc 57, which is fixed to the sleeve 49 by one or more keys 59 and has a ball bearing 58 upon the shaft 33.

The other annular series of gear teeth 26 of the triple pinion 23 mesh with a gear wheel 66, which is integral with, or fast to, a sleeve 67 which is concentric with the shaft 33, and surrounds the sleeve 49, and which has a pair of ball bearings 68 and 69 upon the sleeve 49. A spacing collar 70 is provided between the ball bearings.

In like manner, means are provided whereby the gear wheel 67 is permitted to rotate or is held against rotation, to effect the desired change or function in the driving of the load. As embodied, a brake drum 71 is fixed to, or is integral with, a disc or plate 72 fixed to the sleeve 67 by suitable means such as keys 73.

The rim of the inwardly extending end portion 19 of the housing 6 rests upon a ball bearing 74, which in turn rests upon the sleeve 67. A spacing and thrust-absorbing flanged sleeve 75 encircles the shaft 33 between the ball bearings 36 and 58.

In the exemplary application of the drive to the traction treads of the material handling and transporting machine, both of the traction tread engaging sprocket wheels 41 mesh in the openings between rollers 82, which rollers are loosely mounted on rods or shafts 83, which also carry the floor or ground-engaging links 84, 85, 86 and 87 of the tread. Spacing links or blocks 88, are also mounted on the shafts or rods 83, with washers 89 and binding links 90. The links or lugs 84 and 87, extend inwardly, spaced apart by the rollers 82, and seat within the annular depressed or groovelike part 91 of the supporting and guiding wheels for the tread, the wheels having parts 92 of greater diameter at either side, having cylindrical peripheral bearings 93 for the inner and outer parts of the tread.

The supporting and guiding wheels are rotatably mounted on stub shafts 96, which are set into bearings in hubs 97 on the machine frame, and are held in place on the shafts by keys 98 and clamping screws 99. On the outer ends washers 100 and cotter pins 101 keep the wheels from outward displacement on their shafts.

In the embodied form of means for holding and releasing the gear wheels 47 and 67, the drums 71 and 56, respectively, are provided with brake bands 106, which may be of any standard or suitable form, and are shown in Fig. 2 with actuating levers 107, pivoted at 108, one end of the brake band being pivoted to the lever at 109, and the other end of the brake band being anchored on the pivot bearing 108.

In Fig. 2 the actuating means shown for the brake band is a solenoid 110, mounted on a support 112, and having its core 111 pivotally connected at 113 to the brake band actuating lever 107. This form of actuating mechanism permits of the distant control and operation of the machine as disclosed in my copending application Serial Number 445,701, filed Feb. 17, 1921, although so far as the present invention is concerned, other forms of control could be employed.

The manner of operation of the mechanism just described is substantially as follows:—

In Fig. 3 the pinions carried by the housing are shown diagrammatically, one in broken line, one in solid line, and the other in dot and dash line, and the intermeshing gear for each pinion is shown in the same kind of line to facilitate reading of the diagram, and the pinions and gears are numbered the same as in the other figures of the drawings. The direction of rotation of the driving shell 1, as now considered, is indicated by the arrow *a* in Fig. 3.

Assuming the shell 1 and the shafts 15, 16 and 17 to be rotating in the direction of the arrow *a*, if both brake drums 19 and 56 are free, the load will hold shaft 33 and gear wheel 32 stationary, and the gears 47 and 67 and their brake drums 19 and 56, respectively will have a certain amount of idle rotation.

If brake drum 56 be held, this will hold gear wheel 47 against rotation, and this will cause rotation of pinion 25 about its shaft 15, or 16 and 17, as the case may be, by reason of the pinion meshing with and rolling on the teeth of the stationary gear wheel. Pinion 24 will rotate with the pinion 25, but as its angular advance about shaft 33 is greater than its own angular velocity, due to its rotating with pinion 25 while having a lesser circumference, it will impart a corresponding and compensating plus rotation to the gear wheel 32 and to the shaft 33, and will correspondingly drive the load, which in this case is the traction tread.

If the brake drum 71 be held, gear wheel 67 is held therewith, and pinion 26 will rotate about its axis on the shaft 15, or 16 or 17, as it rolls about in mesh with the stationary gear wheel 67. Again the gear wheel 24 will rotate with pinion 26, but as its angular velocity about its own axis is greater than its angular movement about the shaft 33, due to its having a greater circumference than pinion 26, it will impart a corresponding and compensating minus rotation to the gear wheel 32, and through the shaft 33 to the load. That is, it will be in the opposite

direction from the movement when the brake drum 56 is held. The fact that the drive on shaft 33 is in one direction with respect to pinion 25 and is in the opposite direction with respect to the pinion 26 is due to the fact that the pinion 24 is intermediate in size between the two.

From all the foregoing it will be understood that a machine and mechanism have been provided realizing the objects and advantages hereinbefore set forth, together with other objects and advantages; and that changes may be made from the exact structure shown and described, within the scope of the accompanying claims, without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. A speed reducing and reversing driving mechanism including in combination a driven shaft having a gear wheel fixed thereto, a sleeve and a gear wheel fixed thereto, the gear wheel being of less diameter than the gear wheel on the shaft, a second sleeve and a gear wheel fixed thereto, the gear wheel being of greater diameter than the gear wheel on the shaft, one of the sleeves being rotatably mounted on the shaft and the other sleeve being rotatably mounted on said sleeve, a pinion having gear teeth meshing with each of said gear wheels, a rotatable shell in which said pinion is journaled provided with gear teeth near its periphery, geared means engageable with the gear teeth on the shell for driving it, and means for selectively holding the larger or the smaller gear wheel against rotation.

2. A speed reducing and reversing driving mechanism including in combination two gear trains each comprising a driven shaft having a gear wheel fixed thereto, a sleeve and a gear wheel fixed thereto, the gear wheel being of less diameter than the gear wheel on the shaft, a second sleeve and a gear wheel fixed thereto, the gear wheel being of greater diameter than the gear wheel on the shaft, one of the sleeves being rotatably mounted on the shaft and the other sleeve being rotatably mounted on said sleeve, a pinion having gear teeth meshing with each of said gear wheels, means for rotating the pinion axis concentrically with said shaft, means in each gear train operating independently of the like means in the other gear train for selectively holding the larger or the smaller gear wheel against rotation and means connected to a source of power and to both gear trains for applying power thereto.

3. A speed reducing and reversing driving mechanism including in combination two gear trains each comprising a driven shaft, the shafts of the two gear trains being concentric, having a gear wheel fixed thereto, a sleeve and a gear wheel fixed thereto, the gear wheel being of less diameter than the gear wheel on the shaft, a second sleeve and a gear wheel fixed thereto, the gear wheel being of greater diameter than the gear wheel on the shaft, one of the sleeves being rotatably mounted on the shaft and the other sleeve being rotatably mounted on said sleeve, a pinion having gear teeth meshing with each of said gear wheels, means for rotating the pinion axis concentrically with said shaft, means in each gear train operating independently of the like means in the other gear train for selectively holding the larger or the smaller gear wheel against rotation and means connected to a source of power and to both gear trains for applying power thereto.

4. A speed reducing and reversing driving mechanism including in combination a pinion carrying shell having a cylindrical part, a journal bearing therefor, a shaft concentric with the cylindrical part of the shell and journaled in said cylindrical part, a journal for the shaft, a gear wheel fixed on the shaft, a pinion having a plurality of sets of gear teeth and having one set of gear teeth meshing with said gear wheel fixed on the shaft, a gear wheel concentric with the shaft but rotating relatively thereto and meshing with another set of gear teeth on the pinion, means for holding the last mentioned gear wheel from rotation to cause the shell to drive the shaft, and an annular series of gear teeth on the shell and a driving pinion meshing therewith.

5. A speed reducing and reversing gearing mechanism including in combination a pinion carrying shell having a cylindrical part, a journal bearing therefor, a shaft concentric with the cylindrical part of the shell and journaled in said cylindrical part, a journal for the shaft, a gear wheel fixed on the shaft, a pinion having a plurality of sets of gear teeth and having one set of gear teeth meshing with said gear wheel fixed on the shaft, a plurality of gear wheels concentric with the shaft, one of said gear wheels being of greater diameter than the gear wheel on the shaft and another of said gear wheels being of less diameter than the gear wheel on the shaft, and means for selectively and independently holding said concentric gear wheels against rotation to cause the shell to rotate the shaft in a desired direction, an annular series of gear teeth on the shell and a driving pinion meshing therewith.

6. A speed reducing and reversing driving mechanism including in combination a pinion carrying shell, a shaft, a gear wheel fixed on the shaft, a pinion having a plurality of sets of gear teeth and having one set of gear teeth meshing with said gear wheel fixed on the shaft, a gear wheel concentric with the shaft but rotating relatively

thereto and meshing with another set of gear teeth on the pinion, means for holding the last mentioned gear wheel from rotation to cause the shell to drive the shaft, an annular series of gear teeth on the shell and a driving pinion meshing therewith.

7. A speed reducing and reversing driving mechanism including in combination a pinion carrying shell, a shaft, a gear wheel fixed on the shaft, a pinion having a plurality of sets of gear teeth and having one set of gear teeth meshing with said gear wheel fixed on the shaft, a plurality of gear wheels concentric with the shaft, one of said gear wheels being of greater diameter than the gear wheel on the shaft and another of said gear wheels being of less diameter than the gear wheel on the shaft, means for selectively and independently holding said concentric gear wheels against rotation to cause the shell to rotate the shaft forwardly or backwardly, an annular series of gear teeth on the shell and a driving pinion meshing therewith.

8. A speed reducing and reversing driving mechanism including in combination a pinion carrying shell having a cylindrical part, a shaft concentric with the cylindrical part of the shell and journaled in said cylindrical part, a gear wheel fixed on the shaft, a pinion having a plurality of sets of gear teeth and having one set of gear teeth meshing with said gear wheel fixed on the shaft, a gear wheel concentric with the shaft but rotating relatively thereto and meshing with another set of gear teeth on the pinion, means for holding the last mentioned gear wheel from rotation to cause the shell to drive the shaft, and an annular series of gear teeth near the periphery of the shell and a driving pinion meshing therewith.

9. A speed reducing and reversing driving mechanism including in combination a pinion carrying shell having a cylindrical part, a shaft concentric with the cylindrical part of the shell and journaled in said cylindrical part, a gear wheel fixed on the shaft, a pinion having a plurality of sets of gear teeth and having one set of gear teeth meshing with said gear wheel fixed on the shaft, a plurality of gear wheels concentric with the shaft, one of said gear wheels being of greater diameter than the gear wheel on the shaft and another of said gear wheels being of less diameter than the gear wheel on the shaft, and means for selectively and independently holding said concentric gear wheels against rotation to cause the shell to rotate the shaft forwardly or backwardly, an annular series of gear teeth on the shell and a driving pinion meshing therewith.

10. A speed reducing and reversing driving mechanism including in combination a pinion carrying shell having a cylindrical part, a journal bearing therefor, a shaft concentric with the cylindrical part of the shell and journaled in said cylindrical part, a journal for the shaft, a gear wheel fixed on the shaft, a pinion having a plurality of sets of gear teeth and having one set of gear teeth meshing with said gear wheel fixed on the shaft, a gear wheel concentric with the shaft but rotating relatively thereto and meshing with another set of gear teeth on the pinion, and means for holding the last mentioned gear wheel from rotation to cause the shell to drive the shaft, an annular series of gear teeth on the shell and a driving pinion meshing therewith, and a bearing for the shell concentric with and supported by the shaft.

11. A speed reducing and reversing gearing mechanism including in combination a pinion carrying shell having a cylindrical part, a journal bearing therefor, a shaft concentric with the cylindrical part of the shell and journaled in said cylindrical part, a journal for the shaft, a gear wheel fixed on the shaft, a pinion having a plurality of sets of gear teeth and having one set of gear teeth meshing with said gear wheel fixed on the shaft, a plurality of gear wheels concentric with the shaft, one of said gear wheels being of greater diameter than the gear wheel on the shaft and another of said gear wheels being of less diameter than the gear wheel on the shaft, and means for selectively and independently holding said concentric gear wheels against rotation to cause the shell to rotate the shaft in a desired direction, an annular series of gear teeth on the shell and a driving pinion meshing therewith and a bearing for the shell concentric with and supported by the shaft.

12. A speed reducing and reversing driving mechanism including in combination a pinion carrying shell having a cylindrical part, a shaft concentric with the cylindrical part of the shell and journaled in said cylindrical part, a gear wheel fixed on the shaft, a pinion having a plurality of sets of gear teeth and having one set of gear teeth meshing with said gear wheel fixed on the shaft, a gear wheel concentric with the shaft but rotating relatively thereto and meshing with another set of gear teeth on the pinion, and means for holding the last mentioned gear wheel from rotation to cause the shell to drive the shaft, an annular series of gear teeth near the periphery of the shell, a driving pinion meshing therewith, and a bearing for the shell concentric with and supported by the shaft.

13. A speed reducing and reversing driving mechanism including in combination a pinion carrying shell having a cylindrical part, a shaft concentric with the cylindrical part of the shell and journaled in said cylindrical part, a gear wheel fixed on the shaft, a pinion having a plurality of sets of

gear teeth and having one set of gear teeth meshing with said gear wheel fixed on the shaft, a plurality of gear wheels concentric with the shaft, one of said gear wheels being of greater diameter than the gear wheel on the shaft and another of said gear wheels being of less diameter than the gear wheel on the shaft, and means for selectively and independently holding said concentric gear wheels against rotation to cause the shell to rotate the shaft forwardly or backwardly, an annular series of gear teeth on the shell, a driving pinion meshing therewith and a bearing for the shell concentric with and supported by the shaft.

14. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, speed reduction gearing connected to each part of the shell, means for independently controlling said speed reduction gearings, and means for driving the shell.

15. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, direction reversing gearing connected to each part of the shell, means for independently controlling said direction reversing gearings, and means for driving the shell.

16. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, speed reduction and direction reversing gearing connected to each part of the shell, means for independently controlling said speed reduction and direction reversing gearings, and means for driving the shell.

17. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, speed reduction gearing connected to each part of the shell, means for independently controlling said speed reduction gearings, an annular series of gear teeth on the shell, and a driving pinion meshing therewith.

18. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, direction reversing gearing connected to each part of the shell, means for independently controlling said direction reversing gearings, an annular series of gear teeth on the shell, and a driving pinion meshing therewith.

19. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, speed reduction and direction reversing gearing connected to each part of the shell, means for independently controlling said speed reduction and direction reversing gearings, an annular series of gear teeth on the shell, and a driving pinion meshing therewith.

20. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and gearing connecting the shell and each of said shafts.

21. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and gearing connecting the shell and each of said shafts and separate controls for said two sets of gearing.

22. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and speed reducing and direction changing gearing connecting the shell and each of said shafts.

23. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and speed reducing and direction changing gearing connecting the shell and each of said shafts and separate controls for said two sets of gearing.

24. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and direction changing gearing connecting the shell and each of said shafts.

25. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and direction changing gearing connecting the shell and each of said shafts and separate controls for said two sets of gearing.

26. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and gearing connecting the shell and each of said shafts, an annular series of gear teeth on said shell, and a pinion meshing therewith.

27. A speed reducing and reversing driving mechanism including in combination a

double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and gearing connecting the shell and each of said shafts and separate controls for said two sets of gearing, an annular series of gear teeth on said shell, and a pinion meshing therewith.

28. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and speed reducing and direction changing gearing connecting the shell and each of said shafts and separate controls for said two sets of gearing, an annular series of gear teeth on said shell, and a pinion meshing therewith.

29. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and direction changing gearing connecting the shell and each of said shafts, an annular series of gear teeth on said shell, and a pinion meshing therewith.

30. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and direction changing gearing connecting the shell and each of said shafts and separate controls for said two sets of gearing, an annular series of gear teeth on said shell, and a pinion meshing therewith.

31. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and direction changing gearing connecting the shell and each of said shafts and separate controls for said two sets of gearing and connections to a load at the opposite ends of each of said shafts, an annular series of gear teeth on said shell, and a pinion meshing therewith.

32. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and gearing connecting the shell and each of said shafts and connections to a load at the opposite ends of each of said shafts.

33. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and gearing connecting the shell and each of said shafts and separate controls for said two sets of gearing and connections to a load at the opposite ends of each of said shafts.

34. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and speed reducing and direction changing gearing connecting the shell and each of said shafts and connections to a load at the opposite ends of each of said shafts.

35. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and direction changing gearing connecting the shell and each of said shafts and connections to a load at the opposite ends of each of said shafts.

36. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and direction changing gearing connecting the shell and each of said shafts and separate controls for said two sets of gearing and connections to a load at the opposite ends of each of said shafts.

37. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and gearing connecting the shell and each of said shafts, an annular series of gear teeth on said shell, a pinion meshing therewith and connections to a load at the opposite ends of each of said shafts.

38. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and gearing connecting the shell and each of said shafts and separate controls for said two sets of gearing, an annular series of gear teeth on said shell, a pinion meshing therewith, and connections to a load at the opposite ends of each of said shafts.

39. A speed reducing and reversing driving mechanism including in combination a double shell having a mediate cylindrical part constituting a bearing, two separate shafts, each having an end journaled in said cylindrical part of the shell and speed re-

ducing and direction changing gearing connecting the shell and each of said shafts and separate controls for said two sets of gearing, an annular series of gear teeth on said shell, a pinion meshing therewith and connections to a load at the opposite ends of each of said shafts.

40. A speed reducing and reversing driving mechanism including in combination a triple pinion having three annular series of gear teeth of different diameters, a rotatable shell in which the triple pinion is mounted and provided with gear teeth near its periphery constituting a relatively high speed reduction drive, three gear wheels meshing with the respective series of gear teeth on the pinion, the gear wheel meshing with the series of gear teeth of intermediate diameter being fixed to a shaft for driving a load, and means for selectively holding either of the other two gear wheels against rotation.

41. A speed reducing and reversing driving mechanism including in combination a triple pinion having three annular series of gear teeth of different diameters, three gear wheels meshing with the respective series of gear teeth on the pinion, the gear wheel meshing with the series of gear teeth of intermediate diameter being fixed to a shaft for driving a load, means for selectively holding either of the other two gear wheels against rotation, and a shell in which the triple pinion is journaled, provided with external gear teeth near its periphery for driving it, constituting a relatively high speed reduction drive.

In testimony whereof, I have signed my name to this specification.

KENNETH DAVIS.