J. DAIN.

GEARING.

APPLICATION FILED NOV. 7, 1908. RENEWED JULY 3, 1911.

1,028,442. Patented June 4, 1912.

3 SHEETS—SHEET 1.

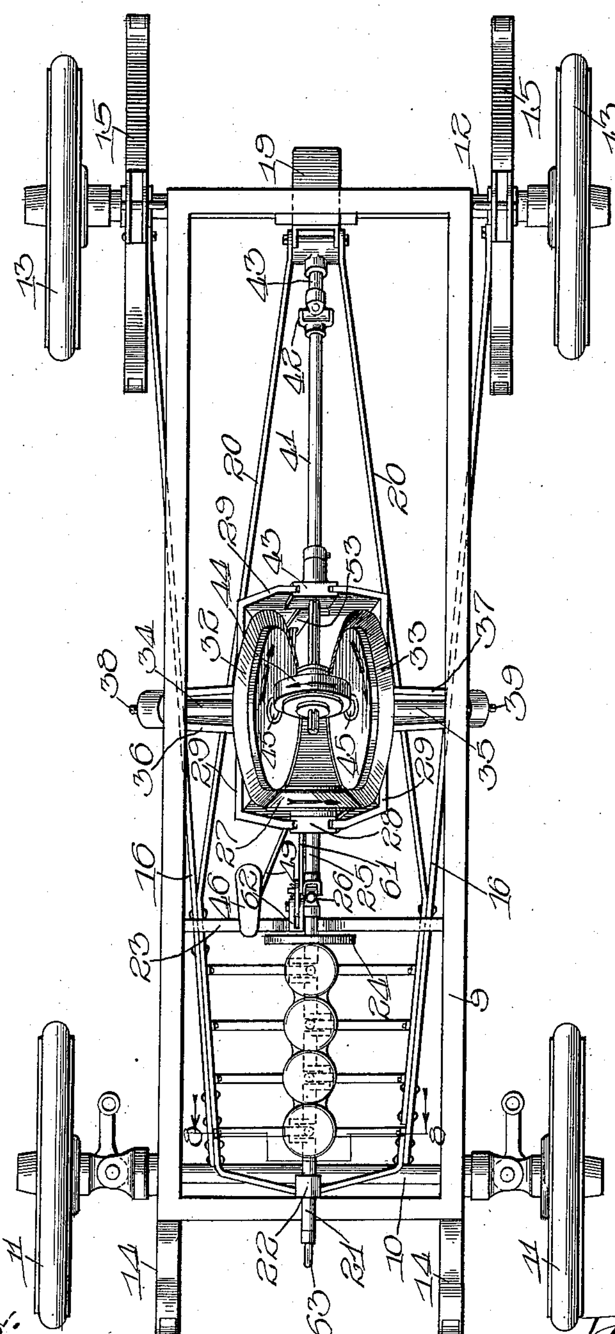

Fig. 1.

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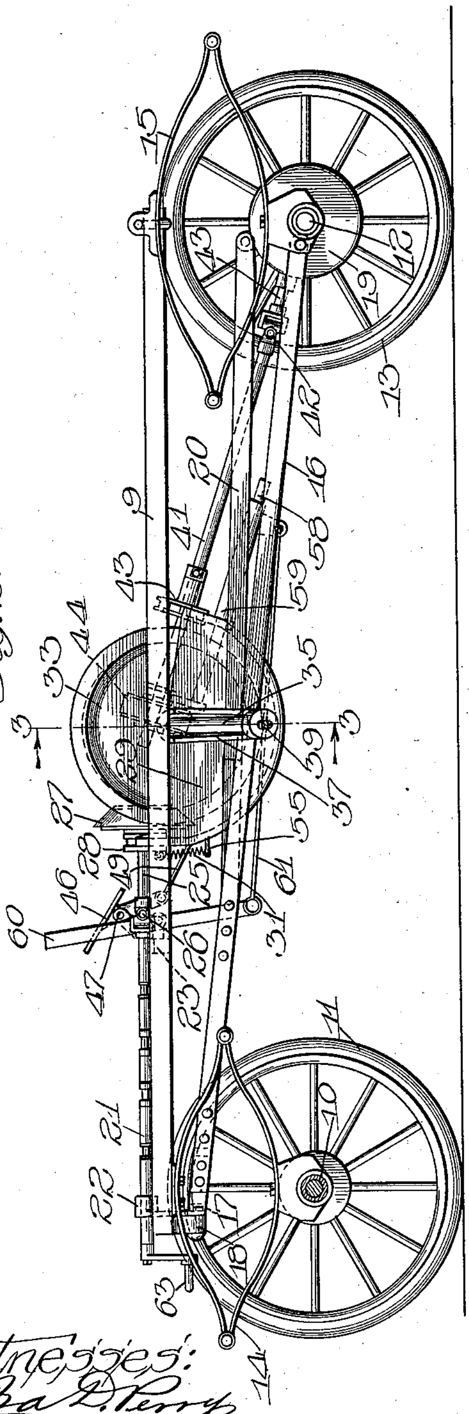

Fig. 2.

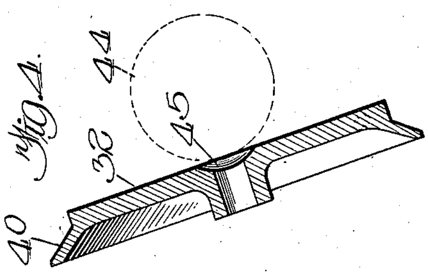

Fig. 4.

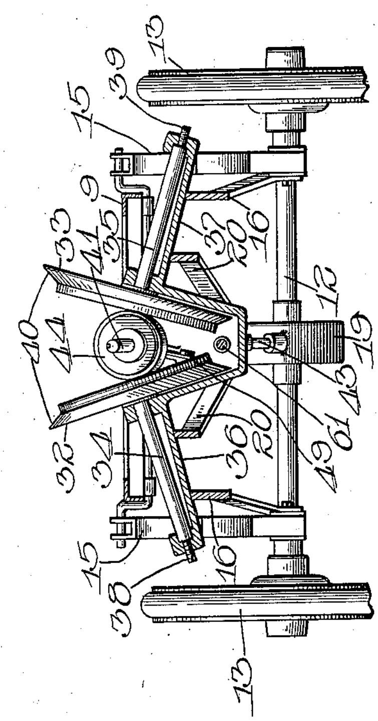

Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 5.

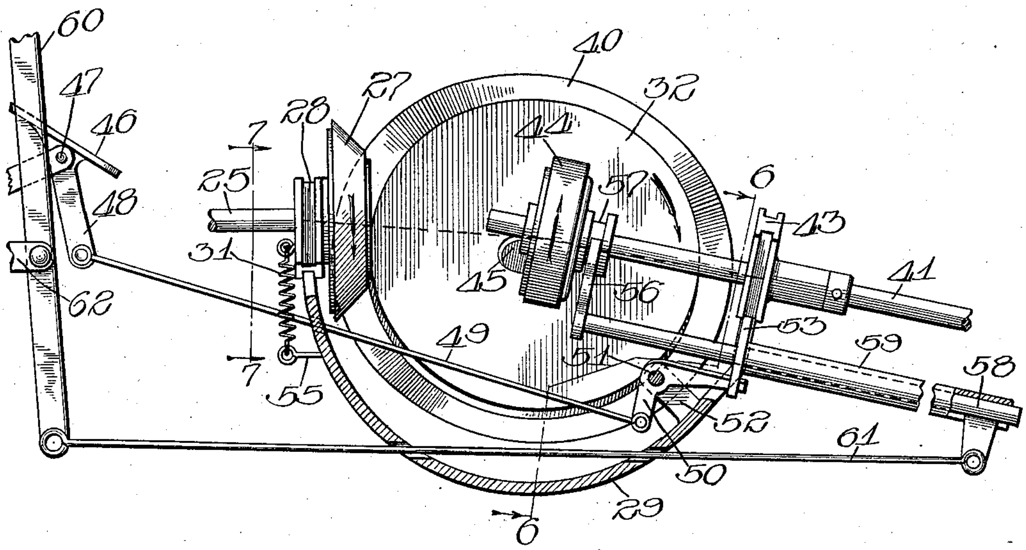


Fig. 7.

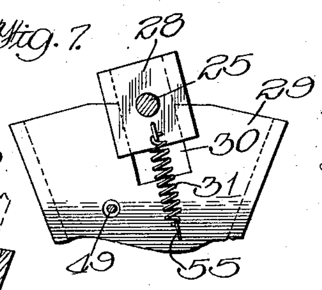


Fig. 6.

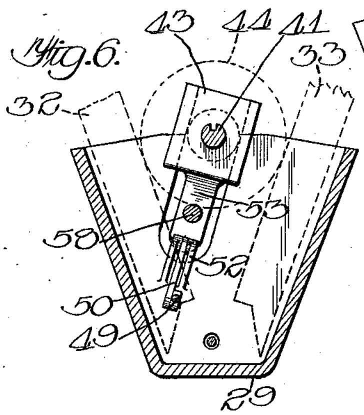
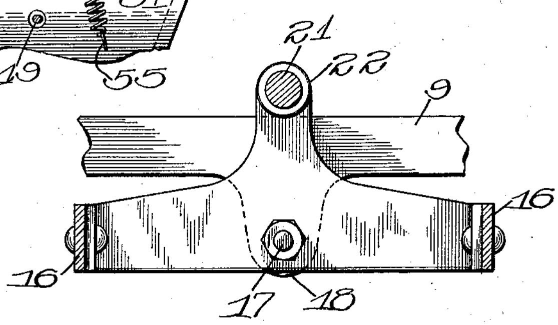


Fig. 8.



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UNITED STATES PATENT OFFICE.

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GEARING.

1,028,442. Specification of Letters Patent. Patented June 4, 1912.

Application filed November 7, 1908, Serial No. 461,568. Renewed July 3, 1911. Serial No. 636,708.

To all whom it may concern:

Be it known that I, Joseph Dain, a citizen of the United States, residing at Ottumwa, in the county of Wapello and State of Iowa, have invented certain new and useful Improvements in Gearing, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to gearing, and in the embodiment thereof illustrated in the accompanying drawings has particularly to do with the mechanism employed in motor vehicles for transmititng power from the engine or motor to the traction wheels of the vehicle.

It also relates to transmission mechanism of the type illustrated and described in my pending application, Serial No. 400,371, filed November 2, 1907, in which coacting disks are employed arranged at an angle to each other in connection with a disk coöperatively engaging the inner faces of said angularly-disposed disks and movable into and out of engagement therewith and also toward and from the centers of said angular disks. In the device of my said application the intermediate disk which engages the two angularly-disposed disks is driven by its engagement therewith and therefore may properly be termed the "driven disk,"—the angularly-disposed disks being termed the "drive disks." In the construction of my present invention the same general arrangement is employed, but in lieu of providing independent motors separately connected to the drive disks as in my said application, I provide for supplying power for the rotation of the drive disks by an intermediate drive disk which engages the angularly-disposed drive disks at the peripheries thereof so as to cause them to rotate in opposite directions and at an equal rate of speed. The intermediate drive disk may be driven by either a single or a multiple cylinder gasolene engine, by a steam engine, or by any other suitable motor. The intermediate disk is disposed relatively to the angular drive disks in much the same way as the driven disk except that it is not movable toward or from the centers of the drive disks and is somewhat larger in diameter than the driven disk so as to secure greater peripheral velocity,—the peripheries of the angular drive disks being offset to compensate for the increased diameter of the intermediate drive disk. Both the intermediate drive disk and the driven disk are supported so as to be movable into or out of engagement with the inclined disks, and mechanism is provided by which when said disks are moved into engagement with said drive disks they are automatically pressed more tightly against those surfaces of the inclined drive disks respectively which are moving in such direction as to tend to throw the intermediate disks away therefrom, thus securing greater frictional engagement between them. In addition to the features above referred to, my present invention also includes various other improvements, which will be hereinafter particularly pointed out.

Referring to the drawings, which illustrate the chassis of a car, in which my improvements are embodied,—Figure 1 is a plan view; Fig. 2 is a side elevation; Fig. 3 is a cross-section on line 3—3 of Fig. 2; Fig. 4 is a sectional view of one of the angular drive disks; Fig. 5 is an enlarged detail, being a partial longitudinal section through the transmission mechanism; Fig. 6 is a cross-section on line 6—6 of Fig. 5; Fig. 7 is a partial section on line 7—7 of Fig. 5; and Fig. 8 is a sectional view of the front portion of the frame on line 8—8 of Fig. 1.

Referring to the drawings for a detailed description of my improvements as illustrated therein,—9 indicates the frame of the chassis, which is designed to carry the carbody. 10 indicates the front axle, 11 the front wheels, 12 the rear axle, and 13 the rear wheels. It will be understood that these parts are of any well-known and approved construction, the front axle having any suitable construction of steering knuckles, etc., and the rear axle having the usual differential mechanism. The frame 9 is supported at its ends on front and rear springs 14—15 of any suitable type, and the outer end-portions of the rear axle 12 are pivotally connected by converging bars 16 with the front portion of the frame 9, as shown in Fig. 1.

17 indicates a pivot connecting the joined front ends of the bars 16 with the front portion of the frame 9, said frame having a depending arm 18 to receive said pivot, as shown in Fig. 8, so that the forward portion of the sub-frame formed by the bars 16 lies below the plane of the frame 9. The

rear ends of the bars 16 connect with the rear axle housing 19 substantially in line with the axle, as shown in Fig. 2, and said housing is braced and prevented from rotating by means of brace-rods 20, the rear ends of which are connected with the upper portion of the housing 19, as shown in Fig. 2, their front ends being connected with the side bars 16, as shown in Fig. 1. The construction and arrangement of the sub-frame and connected parts are not herein claimed as they form the subject of a separate application filed of even date herewith, Ser. No. 461,569.

21 indicates the crank-shaft of the motor, which, in the construction shown, is of the four-cylinder type of gasolene motor. Said crank-shaft extends longitudinally of the chassis, its front end-portion being journaled in a sleeve 22 carried by the sub-frame above the pivot 17, as shown in Fig. 8. The rear end-portion of said crank-shaft is journaled in suitable bearings in a crossbar 23 secured to the sides of the frame 9 as shown in Fig. 1.

24 indicates the usual fly-wheel mounted on the rear end-portion of the crank-shaft.

25 indicates a drive-shaft, which extends longitudinally of the machine and is connected with the rear end-portion of the crank-shaft 21 by a universal connection 26 of any suitable type. At its rear end the drive-shaft 25 carries a beveled drive-disk 27. Said shaft is journaled in a sliding box 28 arranged to move up and down in an inclined plane in suitable ways provided in the housing 29 of the transmission mechanism. The box 28 and the manner in which it is mounted are best shown in Fig. 7, from an inspection of which it will be seen that the box 28 slides in an inclined slot 30 provided in the housing 29 and is normally drawn downward by a spring 31. The purpose of this arrangement will hereinafter appear.

32—33 indicate angularly-disposed drive disks, which are arranged opposite to each other on transverse shafts 34—35, respectively, suitably mounted on the machine frame. Said shafts are preferably journaled in lateral extensions 36—37 of the housing 29, as best shown in Fig. 3, and are adjustable endwise by means of screws 38—39 which bear against their outer ends, as shown in said figure. The drive disks 32—33 are best set so that they are closest together at the bottom, as shown in Fig. 3, thus utilizing gravity to assist in normally holding the driven disk and the intermediate drive disk in engagement therewith. The angular drive disks are provided with offset peripheries, as shown at 40 in Fig. 3, the offset portion being beveled so as to properly engage the intermediate drive disk 27.

41 indicates the main transmission shaft, which extends longitudinally of the machine and is inclined upward toward its forward end, the latter being in line with the projected axes of the transverse shafts 34—35. The rear end of said transmission shaft 41 is connected by a universal connection 42 with a differential shaft 43, which connects with the differential in the rear axle housing 19. The forward portion of the shaft 41 is journaled in a box 43 similar to the box 28 and slides up and down in an inclined plane in suitable guides formed by the transmission housing 29, as shown in Fig. 1. It will be understood that the guides of the boxes 28—43 are inclined in opposite directions.

44 indicates the driven disk, which is mounted upon the forward portion of the shaft 41 and is movable longitudinally thereon in a suitable key-way so that it rotates therewith. The disk 44 frictionally engages the inner faces of the inclined disks 32—33 and may be moved either forward or back of the centers thereof so as to drive the transmission shaft 41 in either direction. The purpose of mounting the boxes 28 and 43 in inclined guides as described is to provide for automatically pressing the disks 27 and 44 more tightly against those surfaces of the inclined drive disks which are moving in such direction as to tend to throw the intermediate disks away therefrom, thus securing greater frictional engagement between them. The speed of the shaft 41 may be regulated by varying the position of the disk 44 with reference to the centers of the inclined disks 32—33, and this rotation may be stopped altogether by moving the disk 44 into line with the centers of the disks 32—33. As best shown in Figs. 1 and 4, said disks 32—33 are provided with recesses 45 at the centers so that when the disk 44 is in line with such centers it is out of engagement with said disks.

It will thus be seen that the speed by which the transmission shaft may be driven may be accurately controlled without varying the speed of the inclined drive disks. If desired also the disk 44 may be moved entirely out of engagement with the inclined drive disks, either by moving it into line with the centers thereof or by lifting it out of engagement with the inclined disks. The latter operation is accomplished by means of a foot-pedal 46 pivotally mounted at 47 on a suitable support having a depending arm 48 connected by a rod 49 with one arm of a bell-crank lever 50 fulcrumed at 51 on an arm 52 rising from the transmission housing 29, the other arm of said bell-crank lever being connected with an arm 53 depending from the box 43, as shown in Fig. 5. Thus by rocking the bell-crank lever 50 the box 43 may be moved vertically and the position of the transmission shaft 41 and driven disk 44 adjusted accordingly. The intermediate drive disk 27 may also be moved out of engagement with the inclined disks, if desired, but it is seldom that it needs to be moved out of engagement therewith, and consequently mechanism for so moving it is not shown. A device similar to that shown for the disk 44 may be employed, if desired. In order to assist in holding the disk 27 in engagement with the inclined disks, the spring 31 is provided which is connected with the box 28 and with a fixed connection 55 attached to the housing 29, as shown in Fig. 5. A similar spring may be employed in connection with the box 43, if desired.

For moving the driven disk 44 upon the shaft 41 I preferably provide a fork 56 which engages a grooved collar 57 connected with the disk 44, said fork being carried by a rod 58 sliding in a sleeve 59 suitably supported on the frame of the machine. The rod 58 is moved longitudinally in the sleeve 59 by means of a lever 60 connected thereto by a rod 61. Said lever is suitably fulcrumed on the frame of the machine on an arm 62 secured to the crossbar 28, as shown in Figs. 1 and 5. The crank-shaft 21 is provided with the usual hand-crank 63 for starting the engine.

While my improved transmission is designed particularly for motor vehicles, it will be understood that it is well adapted for other uses, and my invention, therefore, is not restricted to its use in a motor vehicle, but includes all other uses to which it may be put, and the claims hereinafter made are to be construed accordingly. It will be understood also that while the best results are secured by setting the drive disks so that the lowest points in their peripheries are closest together, they may be otherwise arranged, generically considered, and my invention is not restricted to placing them in the manner shown in the drawings, except in so far as that arrangement is particularly claimed.

That which I claim as my invention, and desire to secure by Letters Patent, is,—

1. A transmission device comprising coacting disks arranged at an angle to each other, a driven disk adapted to coöperatively engage the inner faces of said coacting disks, a power-transmitting device connected with said driven disk, an intermediate drive disk engaging said coacting disks, and means connected with said intermediate drive disk for driving the same.

2. A transmission device comprising coacting disks arranged at an angle to each other, a driven disk adapted to coöperatively engage the inner faces of said coacting disks, a power-transmitting device connected with said driven disk, an intermediate drive disk engaging said coacting disks, and means connected with said intermediate drive disk for driving the same, said intermediate drive disk being movable into and out of engagement with said coacting disks.

3. A transmission device comprising coacting disks arranged at an angle to each other, a driven disk adapted to coöperatively engage the inner faces of said coacting disks, a power-transmitting device connected with said driven disk, an intermediate drive disk engaging said coacting disks, and means connected with said intermediate drive disk for driving the same, said driven disk being movable into and out of engagement with said coacting disks.

4. A transmission device comprising coacting disks arranged at an angle to each other, a driven disk adapted to coöperatively engage the inner faces of said coacting disks, a power-transmitting device connected with said driven disk, an intermediate drive disk engaging said coacting disks, and means connected with said intermediate drive disk for driving the same, said driven disk being movable into and out of engagement with said coacting disks and toward and from the centers thereof.

5. A transmission device comprising coacting disks arranged at an angle to each other, a driven disk adapted to coöperatively engage the inner faces of said coacting disks, a power-transmitting device connected with said driven disk, an intermediate drive disk engaging the peripheries of said coacting disks, and means connected with said intermediate drive disk for driving the same.

6. A transmission device comprising coacting disks arranged at an angle to each other, said disks having offset peripheries, a driven disk adapted to coöperatively engage the inner faces of said coacting disks, a power-transmitting device connected with said driven disk, an intermediate drive disk engaging the peripheries of said coacting disks, and means connected with said intermediate drive disk for driving the same.

7. A transmission device comprising coacting disks arranged at an angle to each other, a driven disk adapted to coöperatively engage the inner faces of said coacting disks, a power-transmitting device connected with said driven disk, an intermediate drive disk engaging the peripheries of said coacting disks, and means connected with said intermediate drive disk for driving the same, said intermediate drive disk being movable into and out of engagement with said coacting disks.

8. A transmission device comprising coacting disks arranged at an angle to each other, said disks having offset peripheries, a driven disk adapted to coöperatively engage the inner faces of said coacting disks, a power-transmitting device connected with said driven disk, an intermediate drive disk engaging the peripheries of said coacting

disks, and means connected with said intermediate drive disk for driving the same, said intermediate drive disk being movable into and out of engagement with said coacting disks.

9. A transmission device comprising coacting disks arranged at an angle to each other, a drive disk adapted to coöperatively engage the inner faces of said coacting disks, a power-transmitting device connected with said driven disk, an intermediate drive disk engaging said coacting disks, means connected with said intermediate drive disk for driving the same, and means whereby said intermediate drive disk may be pressed more firmly against one of said coacting disks than the other.

10. A transmission device comprising coacting disks arranged at an angle to each other, an intermediate disk adapted to coöperatively engage the inner faces of said coacting disks, power-transmitting devices connected with said disks, and means whereby said intermediate disk may be caused to press more firmly against one of said coacting disks than the other.

11. A transmission device comprising separated disks arranged at an angle to each other, and an intermediate disk adapted to coöperatively engage said disks and movable into and out of engagement with said separated disks in a plane inclined more to one of said separated disks than the other.

12. A transmission device comprising separated disks arranged at an angle to each other, an intermediate disk adapted to coöperatively engage said disks and movable into and out of engagement with said separated disks in a plane inclined more to one of said separated disks than the other, and a shaft connected with said intermediate disk.

13. A transmission device comprising coacting disks arranged at an angle to each other, a driven disk adapted to coöperatively engage the inner faces of said coacting disks, a power-transmitting device connected with said driven disk, an intermediate drive disk engaging said coacting disks, means connected with said intermediate drive disk for driving the same, said intermediate drive disk being movable into and out of engagement with said coacting disks, and a lever for moving said driven disk into and out of engagement with said coacting disks.

14. A transmission device comprising separated disks arranged at an angle to each other, an intermediate disk adapted to coöperatively engage said disks and movable into and out of engagement with said separated disks in a plane inclined more to one of said separated disks than the other, and means for moving said intermediate disk into and out of engagement with said coacting disks.

15. A transmission device comprising coacting disks arranged at an angle to each other, said coacting disks having recesses in their inner faces at the centers thereof, an intermediate disk adapted to coöperatively engage the inner faces of said coacting disks and movable toward and from the centers thereof and toward and away therefrom, and power-transmitting devices connected with said disks.

16. A transmission device comprising coacting disks arranged at an angle to each other, a driven disk adapted to coöperatively engage the inner faces of said coacting disks, a shaft on which said disk is mounted and on which it is movable longitudinally toward and from the centers of said coacting disks, an intermediate drive disk adapted to engage said coacting disks, a shaft connected with said intermediate drive disk, and a motor connected with the latter shaft.

17. A transmission device comprising separated disks arranged at an angle to each other, means for adjusting said disks toward and from each other, and means adapted to coöperatively engage said disks and movable into and out of engagement therewith.

18. A transmission device comprising coacting disks arranged at an angle to each other, an intermediate disk adapted to coöperatively engage the inner faces of said coacting disks, a power transmitting device connected with said intermediate disk, an intermediate disk engaging the peripheries of said coacting disks, and means connected with the latter intermediate disk for driving the same, said intermediate disks being movable into and out of engagement with said coacting disks.

19. A transmission device comprising separated disks arranged at an angle to each other, means for adjusting said disks toward and from each other, and means adapted to coöperatively engage said disks and movable toward and away therefrom into and out of engagement therewith.

20. In a variable speed power transmitting mechanism, opposite rotary disks disposed in downwardly-converging planes, intermediate disks in wedging frictional contact with the first-named disks, means for moving one of said intermediate disks axially across the faces of the first-named disks, and additional means for rotating one of the intermediate disks.

21. In a variable speed power transmitting mechanism, opposite rotary transmission disks disposed in downwardly-converging planes, a rotary driving disk in contact with the meeting faces of said transmission disks, a rotary axially-movable driven disk also in contact with the meeting faces of the first-named disks, and means for moving said driven disk axially.

22. In a variable speed power transmit-

ting mechanism, opposite transmission disks disposed in downwardly-converging planes, a rotary driving disk in frictional contact with the transmission disks, and a rotary axially-movable driven disk also in frictional contact with the transmission disks, means for moving the driven disk axially, and additional means for moving the said driven disk vertically.

23. In a power transmitting mechanism, opposite friction disks disposed in planes converging in one direction, a driving shaft composed of sections connected by a universal joint, one of the sections being movable toward and from the apex of such angle and a friction wheel thereon engaging the disks, a separate friction wheel also engaging the said disks, and means for moving the last named wheel axially.

24. A power transmitting mechanism comprising opposite friction disks disposed in planes converging in one direction, a driving shaft, a friction wheel thereon engaging said disks, a driven shaft composed of sections connected by a universal joint, one of the sections being tiltable transversely of its axis, a separate friction wheel mounted upon and movable lengthwise of the tiltable shaft section for engagement with the disks, means for moving said friction wheel axially, and separate means for tilting the movable shaft section.

25. A power transmitting mechanism comprising a pair of transmission disks disposed in planes at an angle with each other, intermediate disks in frictional contact with the opposing faces of said transmission disks, and a prime-mover connected with one of said intermediate disks.

26. A power transmitting mechanism comprising a pair of transmission disks disposed in planes at an angle with each other, intermediate disks in frictional contact with the opposing faces of said transmission disks, a prime-mover connected with one of said intermediate disks, and means for varying the pressure between the contacting surfaces of said intermediate and transmission disks.

27. A power transmitting mechanism comprising a pair of transmission disks disposed in planes at an angle with each other, intermediate disks in frictional contact with the opposing faces of said transmission disks, and a prime-mover connected with one of said intermediate disks, said intermediate disks being movable to vary the pressure between the contacting surfaces of said intermediate and transmission disks.

28. In a power transmitting mechanism, opposite transmission disks disposed in downwardly-converging planes, said disks being spaced apart, intermediate disks in wedging contact with the opposing faces of said transmission disks, a prime-mover connected with one of said intermediate disks, and means for moving the other intermediate disk toward and from the centers of said transmission disks.

29. In a power transmitting mechanism, opposite transmission disks disposed in downwardly-converging planes, said disks being spaced apart, intermediate disks in wedging contact with the opposing faces of said transmission disks, a prime-mover connected with one of said intermediate disks, means for moving the other intermediate disk toward and from the centers of said transmission disks, and means for moving said intermediate disks toward and from the apex of said converging planes.

30. In a power transmitting mechanism, a pair of friction disks disposed at an angle to each other, a driving-wheel between and frictionally engaging the disks, a driven wheel also between and frictionally engaging said disks, both of said friction wheels being movable transversely of their axes into and out of contact with the friction disks.

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