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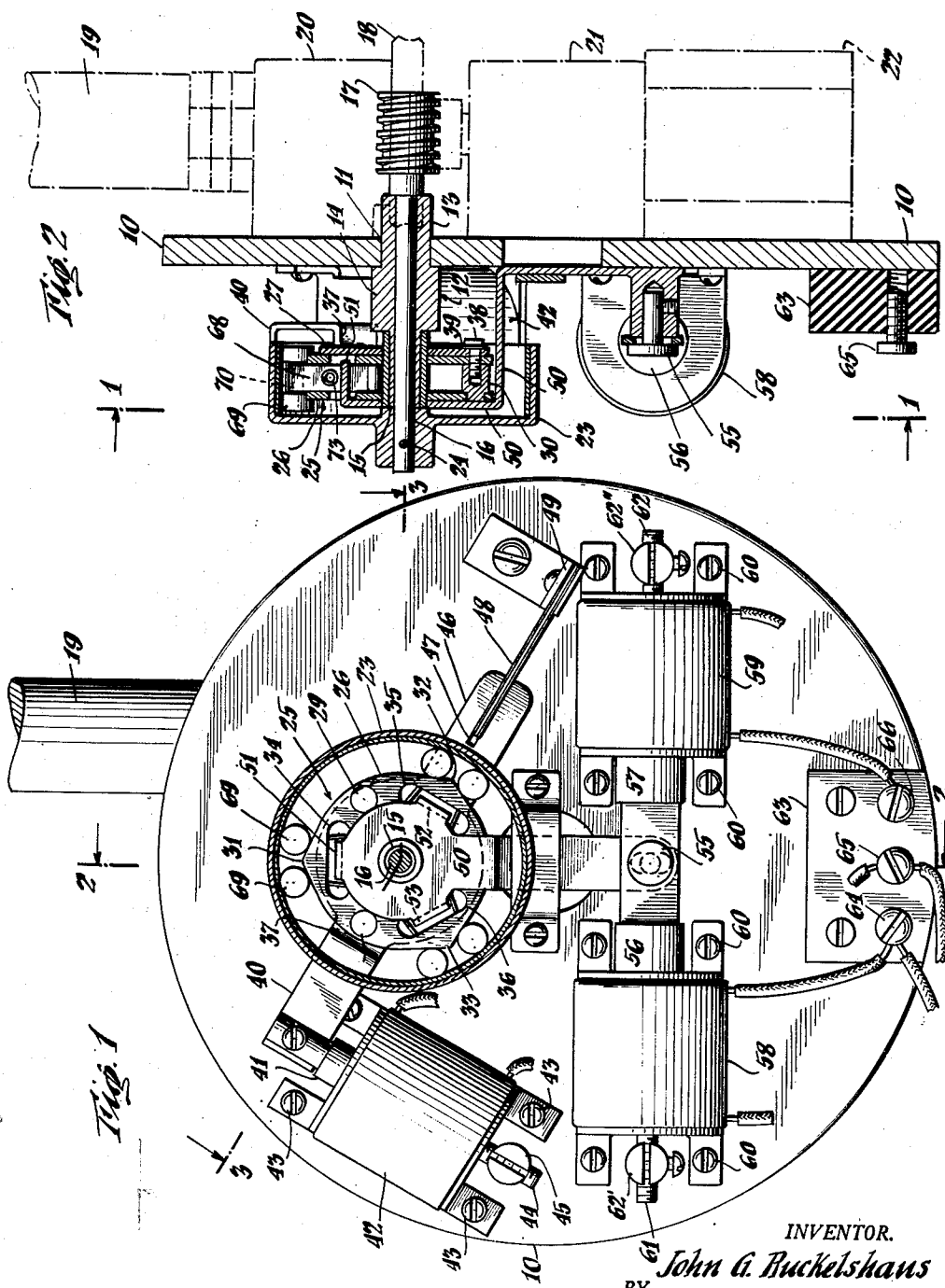
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2,682,175

DRIVE MECHANISM

Filed Oct. 21, 1948

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

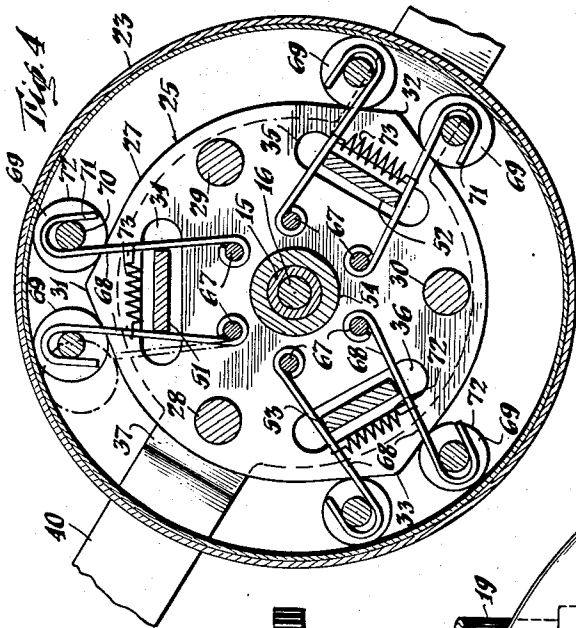


Fig. 5

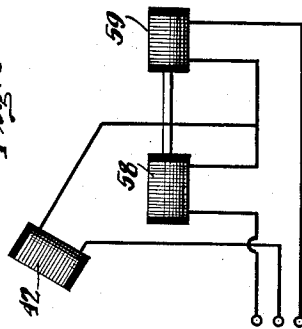
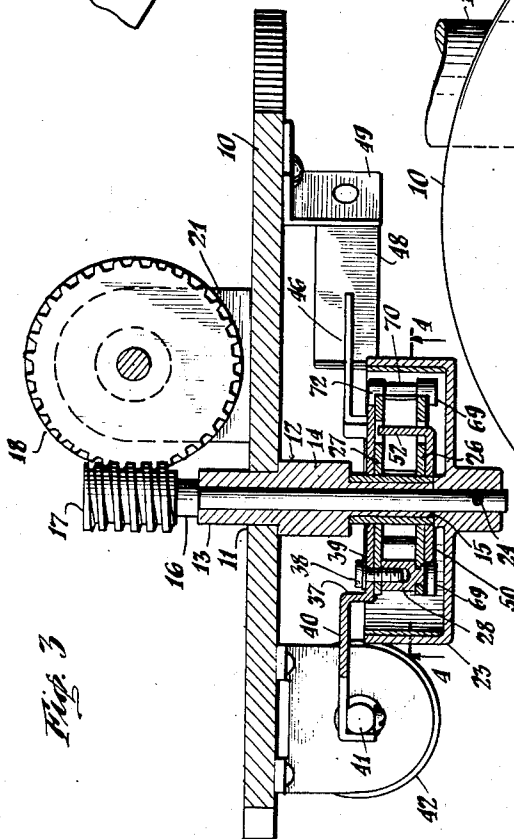


Fig. 3

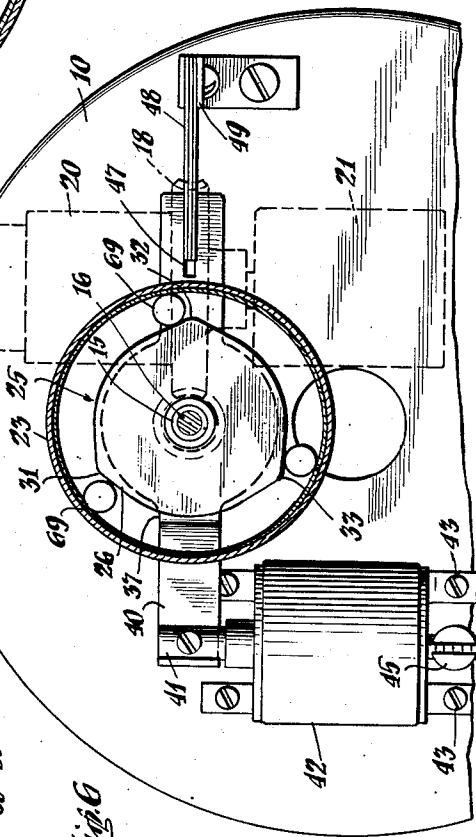


Fig. 6

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DRIVE MECHANISM

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7 Claims. (Cl. 74-157)

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This invention relates to a drive mechanism and, more particularly, to an electrically operated magnetized vibrator device for rotating shafts and the like commonly used in radio, radar, television and the like.

It is a general object of the present invention to provide an easily operable, economically constructed device for rotating shafts or staffs through any desired degree of rotation, in either a clockwise or counterclockwise direction, or both.

Another object of the present invention is to provide an electrically operated vibrator rotor device for connection with and adapted to rotate antenna shafts requiring little or no maintenance.

Still another object of the present invention is to provide relatively simple means for rotating antennas which can be actuated from a point remote from the antenna or shaft by the elimination of high speed reversible motors with gear trains.

Still another object of the present invention is to provide a weather resistant and fool-proof mechanism including a vibratory type of motor which does not stall or freeze and in which the current drawn to operate said mechanism is independent of whether or not the shaft to which said mechanism is connected rotates.

Other objects, desirable features and advantages will become apparent from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a plan view of a preferred embodiment of my invention, taken on line 1-1 of Fig. 2.

Fig. 2 is a sectional view taken on line 2-2 of Fig. 1.

Fig. 3 is a sectional view taken on line 3-3 of Fig. 1.

Fig. 4 is an enlarged sectional view of details taken on line 4-4 of Fig. 3.

Fig. 5 is a schematic view of the electrical circuit of the embodiment shown in Fig. 1, and

Fig. 6 is a sectional view of a modified form of the embodiment shown in Fig. 1, adapted to rotate in one direction.

Referring now to the drawings, in which similar reference characters refer to like parts throughout, there is provided a base member 10 which contains an opening 11 for accommodating a bushing 12. It will be noted that said bushing is so constructed that one end 13 is reduced to the extent that it passes through the opening 11, while the middle portion 14 is of greater diameter as to form a shoulder adapted to rest against the face of said base member 10 as shown in Figs.

2 and 3, and the opposite end 15 is of a reduced diameter.

Said bushing 12 is further adapted to carry a shaft 16 which, at one end, accommodates a worm gear 17 for engaging a gear member 18 fixed to a rotatable shaft 19. It is to be noted that the rear of said base member, as shown in Fig. 2, is provided with a housing or supporting unit 20, fixed to the rear of the base member on which rests said shaft member 19. There is also provided another supporting member 21 above the armature gear member to retain the shaft member 19 in rigid position. Below said supporting member 21 is a connecting member 22 adapted to be fixed to a base or supporting shaft (not shown). A cup shaped member or drum 23 is fixed to the opposite end of shaft 16 by means of a pin 24.

Fixed to said bushing 12 and between said cup member 23 and base member, there is provided a clutch cam 25 consisting of two spaced plate members 26 and 27 swaged to the bushing and held together in spaced relationship by means of connecting screw members 28, 29 and 30. It will be noted that the plates of the cam are so constructed as to provide a plurality of substantially apical portions, partial inclined planes or cam formations 31, 32 and 33 respectively. Furthermore, said spaced cam plates are also provided with a plurality of superimposed slots 34, 35 and 36 respectively, preferably disposed beneath the apical portion of said plates.

Said inner cam plate 27 is provided with an arm 37 fixed thereon by means of screws and washers 38 and 39 respectively, which fit into the screw bushing members 28, 29 and 30 respectively. Said arm 37 is provided with an extending portion 40 to the end of which is adjustably connected a reciprocable arm 41 extending into armature coil 42 fixed to base member 10 in any suitable manner, such as by screw members 43. It will be noted that said arm is movable at right angles to said extending portion 40. Said armature coil 42 is also provided at the end opposite reciprocable arm 41, with adjusting means 44 which may be extended in or out of armature coil 42 so as to adjust the speed and power of operation of said arm 37. Said adjusting member is fixed to base member 10 in any suitable manner, such as by a post 45 adapted to hold said adjusting means 44.

The other end of said arm 37 has another portion 46 provided with a slot 47 of sufficient width to accommodate one or more spring plates 48 as shown in Fig. 1 of the drawings. Disposed adjacent extending portion 46 there is a post 49

fixed to member 10 for holding the other end of said spring plate 48. The resistance to oscillation of the said arm 37 can also be regulated by the number of spring plates that can be attached to post 49.

In order to effect oscillation of the cam in a clockwise or counterclockwise manner, there is provided an actuator 50 provided with a plurality of spaced fingers 51, 52 and 53. Said actuator 50 is provided with a central opening 54 and is swaged or connected to the bushing 12 in any suitable manner. It is also provided as shown in Figs. 1 and 2 with an arm extending downwardly of said clutch cam 25 and is bent at right angles toward the base member 10 and then again bent at right angles so as to be parallel with the plane of the base member. Said bent arm of the actuator is pivotally connected by means of a linkage member 55 to core members 56 and 57 respectively of solenoids 58 and 59 respectively, which are fixed in any suitable manner to the base member 10 by means of screws 60. Said solenoids 58 and 59 are provided with adjusting means 61 and 62 respectively, disposed at the ends of the coil opposite to the solenoid cores to regulate the strength of the magnetic field in the coil. The solenoid and armature coils are electrically connected in series as shown in Fig. 5 to a panel section 63 fixed to base member 10 and provided with binding posts 64, 65 and 66 which afford connections for the wiring in the solenoids and the armature with an outside source of electrical energy. Said circuit can be connected in any suitable manner for purposes of remote control, by using a single pole double throw switch, so that when the switch is thrown to one position, one solenoid coil is connected in series with the armature coil, causing rotation of the shaft in one direction, and when thrown in the other position, the other solenoid is connected in series with the armature coil causing rotation of the shaft in the opposite direction.

Intermediate the cam plate members 26 and 27 of clutch cam 25 and as shown in Fig. 4, there are provided a plurality of pin members 67 which are disposed equi-distantly and circumferentially of each other around bushing 12. Each of said pins is adapted to retain a spring plate member 68 extending outwardly of the periphery of the cam plates 26 and 27 and bent so as to accommodate a roller 69 which is adapted to hug the inclined planes of the cam plates and also to make contact with the inner wall of said drum or cup member 23. It will be noted that each of said roller members is provided with a reduced shaft portion 70 which accommodates the terminal portions 71 of spring plates 68 and with opposed circular contacting portions 72 for making contact with the inclined cam formations 31. It will be further noted that the spring plate members 68 are mounted in pairs so that the rollers 69 are disposed adjacent the apical portions 31, 32 and 33 respectively of the cam 25 and that said spring plate members 68 extend across the slots 34, 35 and 36 respectively, in which fit fingers 51, 52 and 53 respectively of actuator 50. Each pair of said spring plate members 68 is provided with a tension coil spring 73 so as to retain said rollers in a position adjacent the apical portions of the cam plates and keep the spring plates 68 in each pair tensed towards each other and in direct contact with the periphery of drum or cylinder wall and of the inclined planes of the apical portions, thus locking the cam 25 with the cylinder.

In the modification shown in Fig. 6, there is provided a modified form in which there are only three rollers instead of three pairs of rollers and in which the solenoids are eliminated, so that there is effected a rotation of the antenna shaft in only one direction.

In the operation of the device according to the present invention, when solenoid 59 is energized core 57 is drawn inwardly of the coil and actuator 50 turns clockwise so as to move one of each pair of rollers 69 away from one set of contacting inclined planes or apical portions of the cam, the oscillating movement caused by armature 42 sets up vibrations in the cam which are transmitted to the rollers making contact between the inclined plane of the cam and the wall of drum 23, whereupon shaft 19 is moved in counterclockwise direction through any number of degrees. In this connection a stop may be provided on the shaft 19 to prevent said shaft from being rotated before one complete revolution. When solenoid 58 is energized, the other set of rollers is freed and rotation is effected in the other direction. It will be noted that armature coil 42 operating on A. C. current sets up a vibration in arm 37 which is tuned by spring plate members 48. As armature 41 moves back and forth in coil 42, it vibrates spring plate holding rollers 69. As one of each set of these rollers vibrates they wedge against the cup causing rotation of the cup which, in turn, actuates shaft 16. As to the free rollers, they make no driving contact with the cam or drum because the spring plates are not flexed towards the apical or cam portions 31, 32 and 33, respectively. As member 44 is adjusted in or out of the armature coil 42, it adjusts the speed and power of vibration of arm member 37, so that the shorter the air gap between the armature 41 and adjusting member 44, the greater the speed and power; whereas the greater the air gap between said members, the less speed and power are imparted to arm 37.

From the foregoing description, taken in connection with the accompanying drawings, it will be noted that I have provided a highly effective mechanism which, when not in use, forms a positive clutch without maintaining a constant contact of the movable parts. Furthermore, by my invention, there is imparted a fast intermittent motion, thereby eliminating any need of a fly-wheel or a motor as is common to presently used vibrator clutching devices. Also, there is imparted a steady rotation of movable parts due to better clutching action brought about by the three point gear which effectively spreads the load so that the shaft does not bind at any time. By my construction, it will be also noted that any wear of the parts in the course of time does not affect the moving action and that the speed of operation can be readily and easily adjusted without requiring any highly complicated changes in the parts of the device.

A device made according to my invention is easy to manufacture and highly economical in use and can be readily controlled at remote points and operating shafts in uni- or omni-directional rotation.

Another important feature of the present invention is that when the cam is in neutral and locked position, there is no strain produced on the worm gear and that further windage would not affect the shaft to the extent that it would rotate since the neutral position of the vibrator acts as a clutch stop.

While preferred forms of the invention have

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been described herein, it is to be understood that changes in the use, form, structure or arrangement of parts may be made without departing from the spirit and scope of the invention as claimed in the appended claims.

I claim:

1. Clutching apparatus for rotating a shaft comprising actuatable shaft means, a cam member pivotally mounted on said actuatable means, tensioned vibratory means fixed to the cam member, said cam member being adapted upon actuation to oscillate, tensioned roller means freely extending from the cam member and forming a sliding contact therewith, cup shaped cylindrical means in connection with the actuatable means adapted to receive the impulses set up by the vibration of the cam member to the tensioned roller means and thereby form a locking action with the cam and roller means to produce rotation of the actuatable means, and drive means in contact with the tensioned vibratory means whereby the impulses to the cylindrical means may be imparted in a clockwise or counterclockwise manner, said cam member when in non-operative position forming a lock for said shaft means adapted to prevent rotation of the shaft.

2. Apparatus according to claim 1, in which the tensioned roller means consist of a plurality of sets of pairs and one of each set acts in unison with respect to the cam and makes contact with the inner wall of the cylindrical means so as to impart rotational energy to the shaft in a clockwise direction, while the other roller means of the set idles and is adapted upon being actuated to deliver impulses to the inner wall of the cylindrical means and cause rotation of the shaft in a counter-clockwise direction.

3. Apparatus according to claim 1, in which there are provided energizable and electrically operable means connected in series for operating the actuatable means.

4. Clutching apparatus for selectively rotating a shaft, comprising a drive member in operative connection with the shaft, oscillatory cam means rotatably mounted on the drive member and operable thereby, tensioned roller means extending from the cam means adapted to make contact with the cam means and receive the oscillating impulses of the cam means, means in operative connection with the shaft adapted to receive the impulses from the tensioned roller means and rotate the shaft, and means for oscillating the cam means, in which said tensioned roller means occurs in pairs and the cam drive means is provided with a plurality of apical edges on each side of which rests a roller in each pair, each pair of said tensioned means comprising a roller riding the respective apical edge of the drive means, and a spring member connected thereto and to the drive means, each pair of

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roller springs having a tensioned spring coil adapted to bring the rollers of each pair together toward the respective apical portion of the drive means.

5. Apparatus according to claim 4 in which the cam means is provided with an actuating member and in which there is provided energizable means in connection with the actuating member, and an electrical circuit in series with the energizable means adapted to selectively actuate the drive means.

6. In a clutch device of the character described for rotating a shaft, a clutch for permitting selective rotation of said shaft, comprising actuatable tensioned vibrating means, two way oscillatory means in connection with said means, and actuatable by the vibrating means, tensioned oscillatory means intermediate the two way oscillatory means and the drive means adapted to receive short continuous driving impulses from the oscillatory means and frictionally impart said impulses to the actuatable drive means to rotate the shaft, and means in connection with the vibratory means to shift said oscillatory rotary means to impart motion to said shaft.

7. In a clutch device for imparting rotary motion to a shaft, a rotatable element fixed to the shaft, an armature, an oscillating element coaxial with the shaft actuated by said armature including cam means to intermittently engage said rotatable element and rotate the same by a series of short, rapid, continuous impulses imparted to the element, spring means engaging the oscillating element, and shifting means for causing the oscillating element to impart selective, continuous, unidirectional impulses to the rotatable element.

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