

June 6, 1967

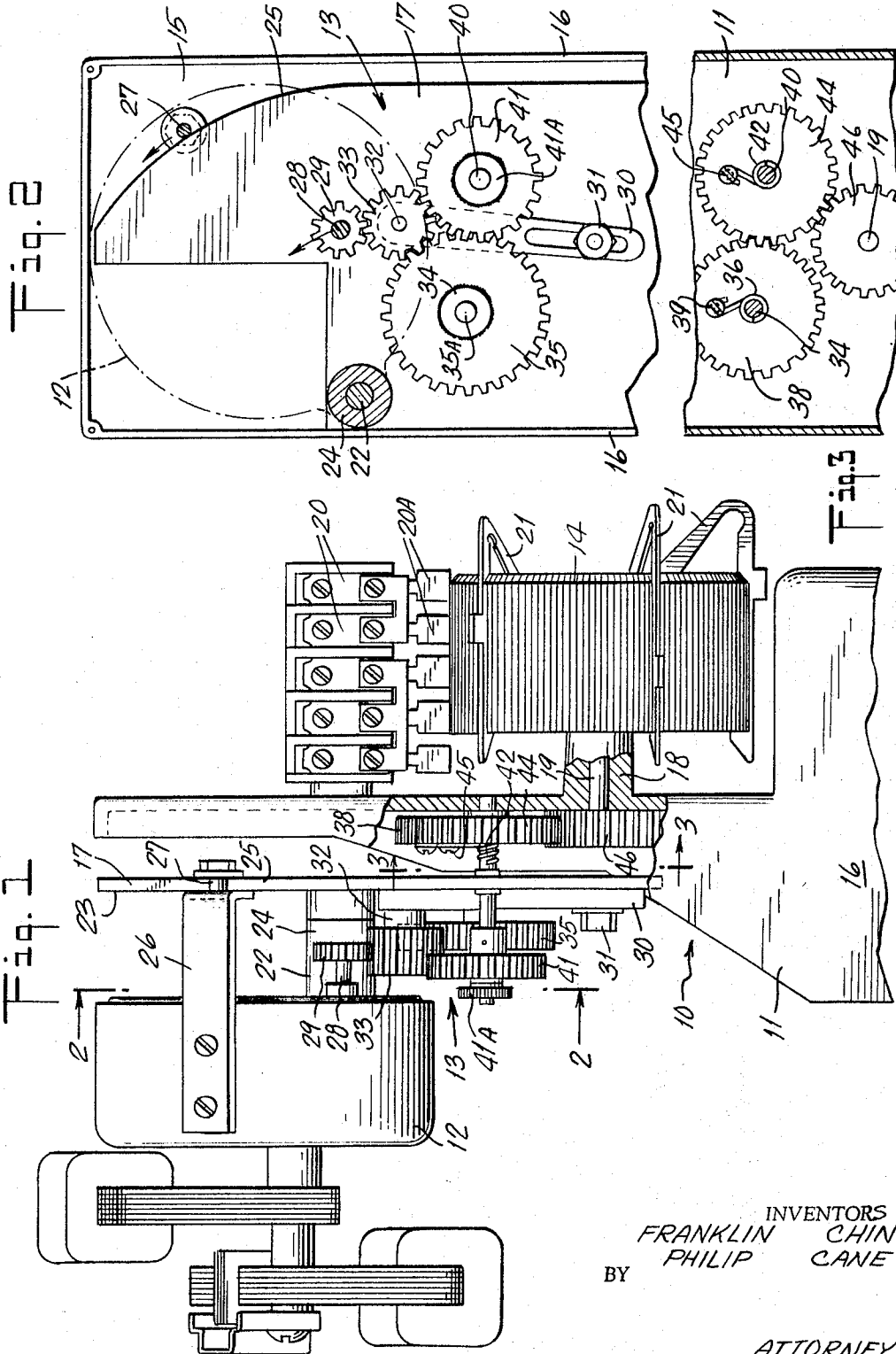
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DUAL SPEED DRIVE SIGNAL CONTROL SYSTEM

Filed Sept. 14, 1964

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Fig. 4

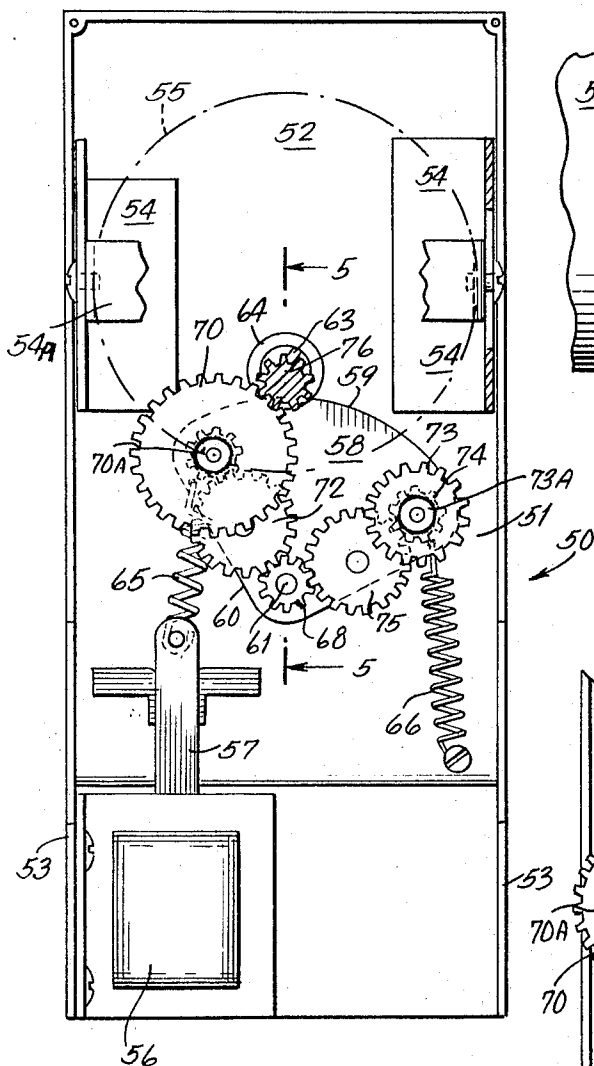


Fig. 5

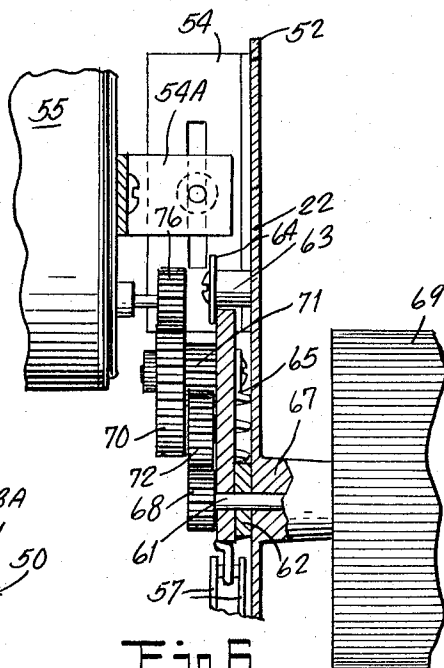
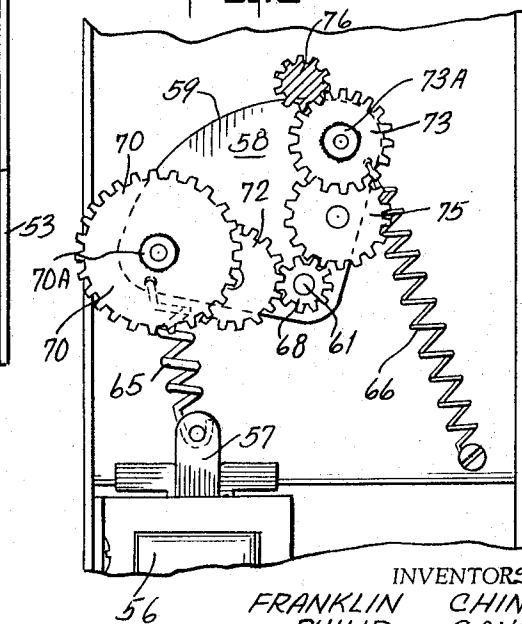


Fig. 6



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DUAL SPEED DRIVE SIGNAL CONTROL SYSTEM
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Filed Sept. 14, 1964, Ser. No. 396,054

15 Claims. (Cl. 74—812)

Our invention relates to gear drives for rotatable signal control cylinders, and more specifically to a variable or a dual speed gear drive to provide a dual speed signal control cylinder.

Heretofore in a stop and go traffic light system, each unit (consisting of two or three different colored reflectors, lamps and the controls therefor) was provided with a plurality of motors each driving a separate interceptor timing drum, cylinder or disc operating switches controlling the lights in back of the reflectors. By this system, to change the timing interval of the lights in a unit, a switch in a headquarters was thrown which motivated a relay to deactivate a motor and its driven drum and to activate a second motor and its drum. Thus, in a normal unit where three different timing systems were desired it was necessary to have three motors, each with a drum unit.

Our new device is comprised of a reversible motor with a unique variable or dual speed gear train drive for the drum, which gear train causes the drum to rotate at one speed and control the timing of the lights accordingly when the motor is driven clockwise and causes the drum to rotate at another speed and differently control the timing of the lights when the motor is driven counter-clockwise. Thus, with the new device, six different timing systems can be obtained by using three reversible motors, each with one of the dual speed gear trains and a drum.

It can therefore be easily understood that the new structure permits six light control systems by using three motors, each with its gear train and drum, while the present set up permitting three light control systems also requires three motors and three drums. Thus the reversible motor with its unique gear train drive produces double the number of timing systems with only slightly greater complexity of equipment and without requiring added space to house six drums. As this saving of material, equipment and space will occur at each place where there is a highway traffic light control, the total saving in a single street of any length where there are innumerable different traffic controls will become highly significant.

We accomplish these and other objects by forming our traffic light control system of a reversible motor, a means for reversing the motor, a power gear on the motor shaft, a unique divided gear train having two wire clutches and a driven gear secured on and driving the interceptor drum controlling the light switches, said gear train having an idler gear driven by the power gear, two gears of different sizes each directly driven by the idler and each secured on and to a separate shaft, the two shafts each having wound thereabout in opposing directions a wire clutch capable of gripping the shaft about which it rests when the shaft turns in the direction of the winding, each of said wires secured to a gear and both said wire secured gears meshed together and one of them driving the driven gear on the interceptor drum, whereby when the motor turns in one direction one of the gears on one of the wire clutch shafts drives one of the wire connected gears and the drum at one speed while the other wire connected gear on the other clutch shaft merely idles and when the motor is reversed, the line of drive runs through the other wire connected gear.

In a modification of the invention which accomplishes the same object, there is provided a single directional motor with a power gear connected thereto, a solenoid which swings a plate and a gear train, the gear train positioned on the plate and divided into two sections, one

positioned to the left of the plate and one to its right and each said section having a gear positioned to be driven by the power gear when the plate is properly positioned and an idler gear driving the driven gear and both said idler gears meshing with a third gear, said third gear being positioned on and secured to a shaft axial of the swing of the plate and said shaft secured to and rotating an interceptor drum whereby when the plate is in one position, one of the gear train sections operates the third gear and when in another position the other gear train section operates the third gear.

For further comprehension of the invention and of the objects and advantages thereof, reference will be had to the following description, the accompanying drawings and the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIG. 1 is a side elevational view, partly broken away, of a signal control drum drive embodying our invention.

FIG. 2 is a sectional view along the line 2—2 of FIG. 1 and shows part of the gear drive structure.

FIG. 3 is a sectional view along the line 3—3 of FIG. 1 and shows additional elements of the gear drive structure.

FIG. 4 is an elevational view of a modification of the invention employing a different means of transferring the drive from one section of gears to another.

FIG. 5 is a sectional view along the line 5—5 of FIG. 4, and

FIG. 6 is a fragmentary elevational view, similar to FIG. 4, but with the plate repositioned to permit the second section of the gear driven to function.

In the specification and in the drawing, in which like numerals indicate similar elements, our invention 10 (see FIGS 1, 2 and 3) is comprised of a frame 11, a reversible motor 12, a gear train and clutch mechanism 13 and an interceptor timing cylinder or drum 14, with the motor, gear train and timing cylinder all secured on the frame, and the motor, gear train and clutch mechanism co-functioning together so that when the motor turns in one direction the interceptor timing drum rotates at one speed and when the said motor turns in the opposite direction the drum rotates at another speed, but always in the same direction.

The frame 11 is comprised of an upstanding side element 15 and a pair of upstanding end elements 16 integral thereto, which flank the element 15 and extend beyond its front and rear. Spaced away from, to the left and parallel to the element 15 is a support panel 17 suitable for mounting the motor and to carry bearings for shaft supports. Integral with and extending outwardly from and to the right of the element 15 is a bearing 18 which supports a shaft 19 upon which the drum or cylinder 14 is positioned. Also secured to the right side of the element 15 are switches 20 having extending tabs 20a which are operated by interceptors 21 positioned on the drum, as the drum rotates. The switches 20 and their tabs 20a are conventional and in the present instance motivate signal lamps (not shown) in a highway or other system. The drum and its interceptors are also conventional.

A stud bearing 22 extends outwardly from the outer face 23 of the panel 17 and rotatably supports a ring or tubing 24 upon which is secured the motor 12. The panel 17 is shaped along its upper side edge with a circular arcuate contour 25 whose center is the stud bearing 22. The motor 12 has an extending bracket 26 attached to its frame, which terminates in a pin 27, the bracket 26 and pin 27 being of a suitable length that the pin rests on the arcuate contour 25 and together with the stud 22 and ring 24 rotatably support the motor. The motor is provided with a drive shaft 28 upon which is secured power gear or pinion 29.

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A slotted bracket or yoke 30 is adjustably secured to outer face 23 of panel 17 by screw 31 which rests in the slot and screws into the panel. The yoke bracket is provided with a bearing 32 which rotatably carries idler gear 33. The idler gear 33 meshes with and is driven by pinion power gear 29 of the motor and helps in supporting the motor. In order to permit the idler gear to drive two gears, it is provided with a double thickness. Because of the adjustability of the position of the yoke bracket 30 and of the idler gear 33, the sizes of the gears 35 and 41 can both be changed so that the timing system, which is motivated by the motor through the pinion gear 29, idler gear 33 and either gear 35 or 41, can be manually changed or altered when desired. To permit this alteration to be easily accomplished, knurled or thumb nuts 35a and 41a are provided to releasably retain gears 35 and 41 in position.

Shaft 34, carried by a bearing set in panel 17, extends through the panel and protrudes into the space between panel 17 and side element 15. This shaft carries to the left of panel 17, a gear 35, which meshes with and is driven by the idler gear 33. The portion of the shaft 34, to the right of the panel, carries a clockwise wound coiled wire 36. That is, the wire is wound around the shaft clockwise as the coils extend toward the right. The wire is wound closely but not tightly so that if the shaft turns counter clockwise, no binding occurs, but if the shaft is turned clockwise, the wire is gripped by or itself grips the shaft and both turn together, thus forming a wire clutch. Also carried loosely on shaft 34 is gear 38, which is secured to the end of the wire 36 by screw 39. Thus, when the motor rotates clockwise, power gear 29, gear 35 and shaft 34 rotate clockwise, the wire clutch grips shaft 34 and rotates and causes loose gear 38 to likewise rotate clockwise and at a speed depending on the relative sizes of power gear 29, idler gear 33, and on gear 35.

Shaft 40, carried by a bearing set in panel 17, extends through the panel and protrudes into the space between panel 17 and side element 15. This shaft carries to the left of panel 17 a gear 41 which meshes with and is driven by the idler gear 33. The portion of shaft 40, to the right of the panel, carries a counterclockwise wound coiled wire 42. That is, the wire is wound around the shaft counterclockwise as the coils extend toward the right. The wire is wound closely but not tightly so that if the shaft turns clockwise, no binding occurs, but if the shaft is turned counter-clockwise, the wire is gripped by or itself grips the shaft and both turn together, thus the wire becomes a clutch. Also carried loosely on shaft 40 is gear 44, which gear is secured to the end of wire 42 by screw 45. Thus, when the motor rotates counterclockwise, power gear 29, gear 41 and shaft 40 rotate counter-clockwise, the wire clutch grips shaft 40 and rotates and causes gear to likewise rotate counter-clockwise and at a speed depending on the relative sizes of power gear 29, idler gear 33 on the yoke bracket and on gear 41.

Gear 38 meshes with gear 44 which in turn meshes with a gear 46, positioned and secured to shaft 19. Shaft 19 extends through side element 15 and carries gear 46 to its left and the drum 14 to its right. Thus, when gear 38 is being driven clockwise through its clutch, it drives gear 44, which in turn drives gear 46, its shaft 19 and the carried timing drum 14, and gear 44 is merely an idler. However, when gear 44 is itself being driven counter-clockwise through its clutch, it drives gear 46, its shaft 19 and the carried drum 14, and gear 38 is merely an idler. Thus, the speed of rotation of the drum or cylinder 14 and the timing of the switches depend upon the direction of rotation of the motor and its power gear 29; as a clockwise rotation of the gear 29 transmits a drive through gear 35, clockwise wound clutch wire 36, gears 38 and 44 to drum shaft 19 and a counter-clockwise rotation of the gear 29 transmits a drive through gear 41, counter-clockwise clutch wire 42, gear 44 to drum shaft 19. It will be noticed that in the clockwise rotation gear 35 functions through its clutch wire 36 to clutch drive gear 38 and

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to drive gear 44 as an idler, and in the counterclockwise rotation gear 35 is not employed and gear 44 is directly driven through gear 41 and its own clutch wire 42 and so the speed of rotation of the timing cylinder depends on the size of gear 35 and gear 41. It should be further noted that by changing the number of gears in the system when the direction of rotation of the power gear changes, the last gear and drum always turn in the same direction, to wit, right handed or clockwise.

In a variation 50 of the invention (FIGS. 4, 5 and 6), a stand 51 is comprised of an upstanding side piece 52 and end pieces 53 formed integral with the side piece and positioned at right angles thereto. Secured to side pieces 52 are wings 54 and cross bar 54a to which a motor 55 is adjustably attached in any conventional manner. Secured to one of the end pieces 53 is a solenoid 56 having an upstanding magnetic bar 57, which is controlled by the solenoid operation to reciprocate the bar from a centered position to an off-centered position.

A plate 58, having a sector like contour with a circular edge part 59 and side edge parts 60, is pivotally pinned to the side piece 52 at the axis of the circular part by shaft 61. A washer 62 retains the plate from direct contact with the side piece. A stud 63 and a screw 64, with an enlarged head, are positioned on the side piece at the circular part 59 of the plate so as to support or retain the plate and at the same time permit its lateral reciprocation. A coiled spring 65 is loosely secured at one end to the plate in the vicinity of the plate's left edge and at its other end to the upstanding end of the solenoid bar 57, and another coiled spring 66 is secured at one end to the plate in the vicinity of its right edge and at its other end to the side of the stand at a position opposite the solenoid, spring 66 being more elastic than spring 65. Thus, the solenoid with the aid of spring 66 is able to reciprocally pivot the plate about the shaft 61, which here acts as a pin.

A bearing 67 is positioned on the face of the side piece 52 opposite to its face carrying the plate 58. This bearing carries shaft 61, which extends through side piece 52 and the plate 58, and there reciprocally supports plate 58 and is secured to gear 68, and on its bearing side is secured to and supports timing drum 69.

There is positioned on plate 58, at its left side, a gear train composed of gears 70, 71 and 72. Gears 70 and 71 are both secured on the same shaft and rotate together. Idler gear 72 is on its own shaft and meshes with and is driven by gear 71, and drives gear 68. There is positioned on plate 58, at its right side, a gear train comprised of gears 73, 74 and 75. Gears 73 and 74 are both secured on the same shaft and rotate together. Idler gear 75 is on its own shaft and meshes with and is driven by gear 74 and drives gear 68. Thus each train of gears terminates with the gear 68 which is common to both trains, and being positioned on and secured to shaft 61 drives the timing drum.

The motor 55 is provided with a power drive gear 76. The motor is so positioned in its wings and cross bar and the size of the gear 76 is such that the gear 76 can mesh with either gear 70 or gear 73, depending on whether the solenoid is holding the plate downward toward the left, with the bar 57 retracted or the spring 66 contracted and holding the plate downward toward the right. Thus by motivating the solenoid, either of the train of gears can be positioned to operate the drum, and so two different timing systems are obtained. Because of the springs 65 and 66, the plate is not held rigidly laterally and permits gear 70 and 73 to easily mesh with gear 68. It should also be noted that by altering the position of the motor and manually changing gears 76, 70 and 73, other timing systems can be had. To permit this to be easily accomplished, gears 70 and 73 are manually and releasably retained in position by knurled or thumb nuts 70a and 73a.

Although we have illustrated and described the preferred and one embodiment of the invention, it is under-

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stood that variations are possible in the detailed construction, in the gearing, and in the use and number of idlers, in the bracketing for the motor and in many other minor matters. In addition, it should be further understood that we do not limit ourselves to the precise construction herein disclosed and we reserve the right to all changes and modifications coming within the scope of the invention as defined in any or all of the appended claims.

Having thus described our invention, what we claim as new and desire to secure by United States Letters Patent is:

1. A dual speed drive for a signal control system, comprised of a power gear, a first gear, a first coiled wire clutch means, a second gear, a third gear, a fourth gear, a driven gear and a second coiled wire clutch means, said first gear meshing with the power gear, said first wire clutch means being a first shaft secured to and rotating with said first gear and a first wire coiled in one direction about said first shaft and secured to said second gear, and said first wire gripping said first shaft with such an intensity that when the first shaft turns in the direction of the coiling, the coils grip said first shaft and rotate with it and cause the second gear to rotate and when said first shaft turns in the opposite direction the coils do not grip the shaft and the second gear is not turned by said wire, said third gear meshing with and being driven by said second gear, said fourth gear meshing with said power gear, said second wire clutch means being a second shaft secured to and rotating with said fourth gear and a second wire coiled in a direction opposite to the coiling of the first wire about said second shaft and secured to said third gear and said second wire gripping said second shaft with such an intensity that when the second shaft turns in the direction of the coiling, the coils grip said second shaft and rotate with it and cause said third gear to rotate, and when said second shaft turns in the opposite direction, the coils do not grip the shaft and the third gear is not turned by the second wire, whereby the power gear, when turning in one direction, drives the third gear through the first gear, first clutch, second gear and when turning in the opposite direction, drives the third gear through the fourth gear and second clutch.

2. A dual speed drive comprised of a power gear, a first gear train, a second gear train and a driven gear, said first gear train having a first gear, a first wire clutch means, a second gear, and a third gear, said first gear meshing with the power gear and driving said first wire clutch only when turning in one direction, said second gear meshing with said third gear and being secured to and driven by said wire clutch, said third gear meshing with said driven gear, and said second gear train having a fourth gear meshing with said power gear and a second wire clutch means interconnecting said fourth gear and said third gear, said fourth gear meshing with said power gear and driving said second wire clutch only when turning in one direction, said third gear being secured to and driven by said second wire clutch, whereby said third gear is driven either by the power gear, first gear, first wire clutch and second gear or by said power gear, fourth gear and second wire clutch.

3. A dual speed drive in accordance with claim 2 wherein said third gear is intermeshed with said driven gear and said second gear is intermeshed with said third gear.

4. A multiple speed drive for a signal control system comprised of a power gear, two trains of gears, a first driven gear, and a clutch means for alternately engaging each of said gear trains to said power gear whereby said first driven gear can be rotated at different speeds determined by each of said gear trains.

5. A multiple speed drive for a signal control system as defined in claim 4, in which said clutch is comprised of a solenoid, a pivoted plate and a spring means interconnected with said plate, said solenoid and spring means together being capable of pivoting said plate and said plate

supporting both said gear trains and said gear trains each having a second driven gear so positioned on the plate that when the plate is pivoted, one or the other of said second driven gears meshes with and is driven by the power gear and each of said second driven gears meshes with and drives said first driven gear, whereby the speed of rotation of said first driven gear is determined by the size of one or the other of said second driven gears which are of different size.

6. A multiple speed drive, as defined in claim 4, in which said clutch means is comprised of a solenoid, a spring means and a plate, and in addition a shaft, said shaft acting as a pivot point for reciprocal pivoting of said plate and being secured to and rotating with said first driven gear, said solenoid and spring means together being capable of reciprocating said plate about said shaft and said plate supporting both said gear trains and said gear trains each having a second driven gear so positioned on the plate that when the plate is pivoted, one or the other of said second driven gears meshes with and is driven by the power gear and each of said second driven gears which are of different sizes meshes with and drives said first driven gear, whereby the speed of rotation of said first driven gear is determined by the size of one or the other of said second driven gears.

7. A dual speed drive comprised of a first driven gear, a plate, a spring and solenoid means for reciprocating said plate, a shaft, a power gear and two trains of gears, said shaft reciprocally supporting said plate and rotatably carrying said first driven gear, each of said two trains of gears positioned on the plate and each train having a second driven gear so positioned on the plate that either of said second gears can mesh with the power gear and each of said trains having another gear meshing with said first driven gear.

8. A variable speed drive comprised of a power gear, two wire clutches and two gear trains of different size, one of said wire clutches being a right hand rotation gripping means and the other a left hand gripping means and one of said wire clutches being positioned and functioning between the gears of one of said trains and the other clutch between the gears of the other train, and both said trains having a gear meshing with the power gear and the last gears in each train meshing with each other.

9. A variable speed drive comprised of a power gear, an idler gear, a first gear, a second gear, a third gear, a fourth gear, two wire clutch means and an adjustably positionable bracket, said bracket supporting said idler gear in a position where said idler gear meshes with and is driven by said power gear and meshes with and drives both said first and fourth gears, one of said wire clutches being a right hand rotation gripping means and one a left hand rotation gripping means and one of said clutches being positioned and functioning between said first and second gears and being driven by said first gear and driving said second gear, and the other of said clutches being positioned and functioning between said fourth gear and third gear and being driven by the fourth gear and driving said third gear, and said second and third gears meshing together, whereby said third gear is driven at one speed through the power gear, idler gear, first gear, one clutch and second gear and at another speed by the power gear, fourth gear, and other clutch, and because of the adjustability of the positioning of the bracket and the idler gear, the first gear and fourth gear can be manually replaced with gears of other sizes to result in further variations in the speed of the third gear.

10. A variable speed timing system comprised of a motor having a shaft, a power gear, said gear positioned on the shaft of the motor, an interceptor timing drum, a first driven gear, a second shaft, said timing drum and first driven gear both secured to and carried by said second shaft, a clutch, a second gear and a third gear, said clutch having a pivotable plate and means to cause said plate to reciprocally pivot, said plate pivotably mounted

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on said second shaft and rotatably carrying said second and third gears of different size in a position where one or the other meshes with said power gear and both said second and third gears meshing with and driving said first driven gear and the timing drum, whereby the drum is driven by the motor and power gear either through the second gear and first driven gear or through the third gear and first driven gear.

11. A variable speed timing system comprised of a reversible motor, an interceptor timing drum, a power gear, an idler gear, a first gear, a second gear, a third gear, a fourth gear, two wire clutch means and an adjustably positionable bracket and a shaft, said shaft secured to and carrying said third gear and interceptor drum, said power gear secured to and rotating with the motor, said bracket supporting said idler gear in a position where said idler gear meshes with and is driven by said power gear and meshes with and drives both said first and fourth gears, one of said wire clutches being a right hand rotation gripping means and one a left hand rotation gripping means and one of said clutches being positioned and functioning between said first and second gears and being driven by said first gear and driving said second gear, and the other of said clutches being positioned and functioning between said fourth gear and third gear and being driven by the fourth gear and driving said third gear, and said second and third gears meshing together, whereby said interceptor drum is driven at one speed through the power gear, idler gear, first gear, one clutch, second gear and third gear and at another speed by the power gear, idler gear, fourth gear, other clutch and third gear and because of the adjustability of the positioning of the bracket and the idler gear, the first gear and fourth gear can be manually replaced with gears of other sizes to result in further variations in the speed of the interceptor drum.

12. A variable speed timing system comprised of a reversible motor, a driven gear, an interceptor drum, two clutches and two gear trains each having a last gear, one of the clutches intermediate the gears in one train and the other intermediate the gears in the other train, the motor, one of the gear trains and one of the clutches rotatably connected, the motor, the other gear train and the other clutch rotatably connected and the last of the gears in each

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train common to and rotatably meshing with both trains and the driven gear and drum secured together.

13. In a dual speed drive, a switch controlling drum, a driven gear, a shaft, a plate and a means for reciprocally pivoting the plate, said shaft secured to and supporting the drum and driven gear, said plate being mounted for reciprocally pivoting with its pivotal axis being coincident with the axis of the shaft and said means for reciprocating the plate being spring and solenoid elements to the plate on either side of said shaft axis.

14. A dual speed drive comprised of a switch controlling drum, a driven gear, a shaft, a plate, a means for reciprocally pivoting the plate, a power gear and idler gears, said shaft secured to and supporting the driven gear and drum, said plate being reciprocally pivoted with its pivotal axis being coincident with the axis of the shaft and said means for pivoting the plate into a first or a second position being spring and solenoid elements attached to either side of the plate, said idler gears rotatably secured individually on either side of the plate and meshing with said driven gear and so positioned on the plate that either one or the other of said idlers meshes with the power gear in said first and second positions respectively.

15. A dual speed drive as defined in claim 14, and having in addition thereto finger hand grippable nuts, said nuts releasably securing said idler gears.

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