

Aug. 18, 1942.

E. B. OLSON ET AL
PRESELECTING MECHANISM

2,293,355

Filed July 12, 1941

2 Sheets-Sheet 1

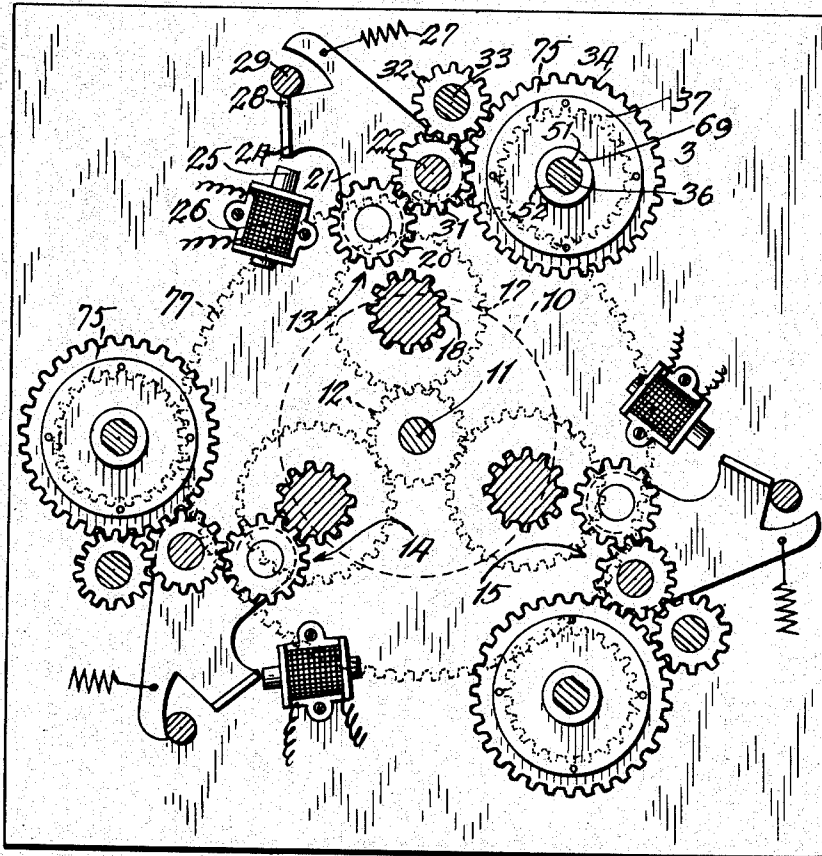
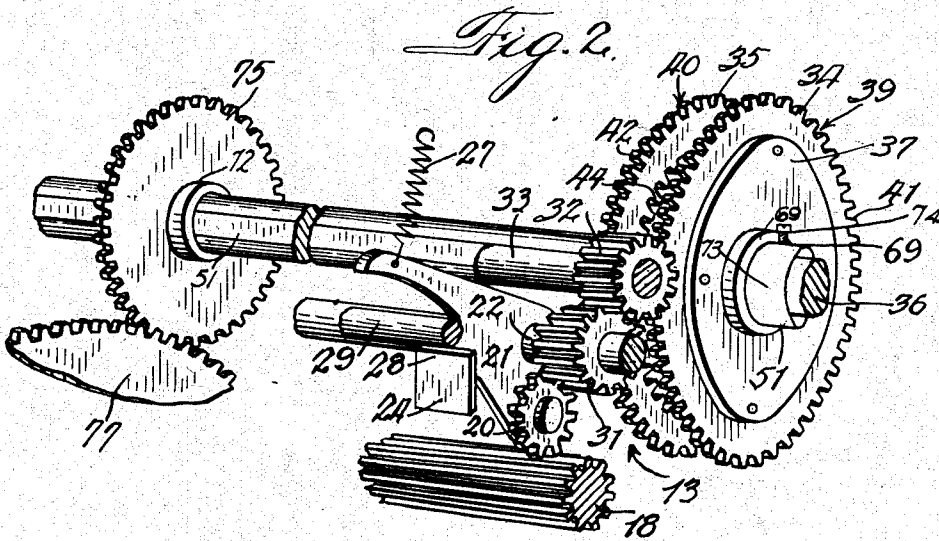


Fig. 1.

Inventors:
Elof B. Olson.
Edward J. Mastney.
By: Robert L. Kalue

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2 Sheets-Sheet 2

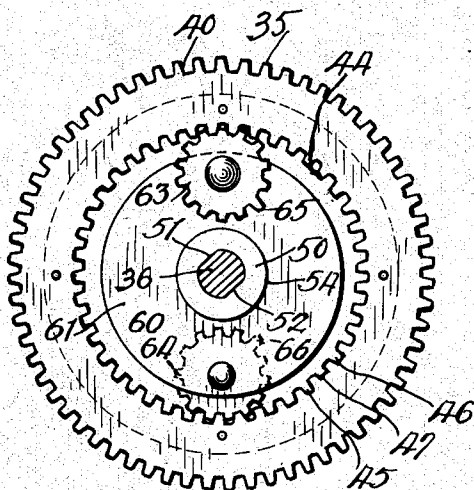


Fig. 3

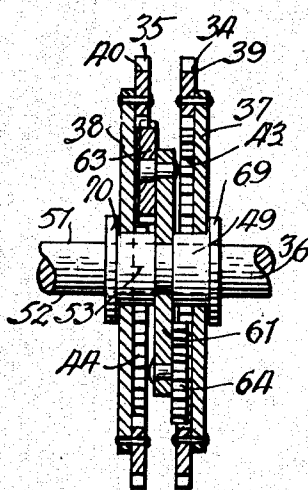


Fig. 4

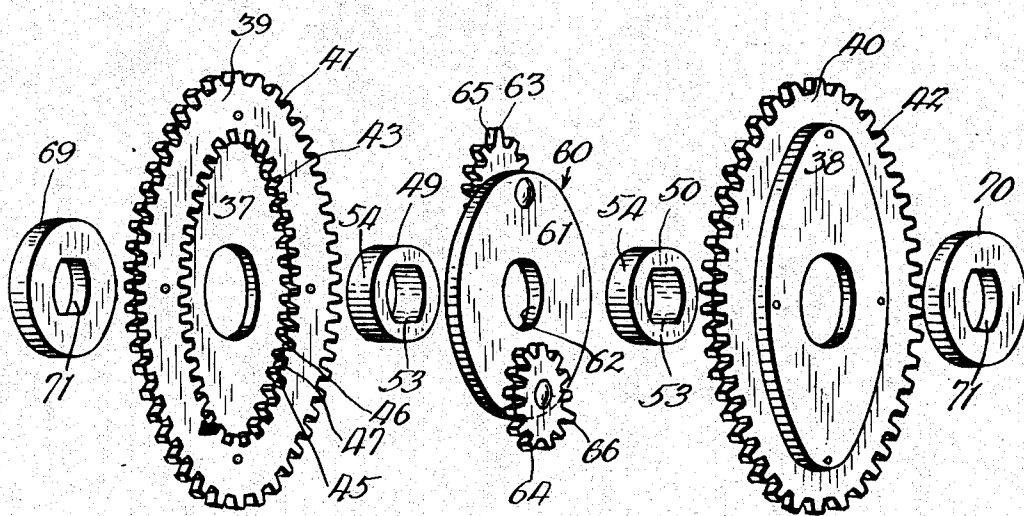


Fig. 5

Inventors
Elof B. Olson.
and Edward J. Mastroy.
By: Robert L. Kalue *Attorney*

UNITED STATES PATENT OFFICE

2,293,355

PRESELECTING MECHANISM

Elof B. Olson, Chicago, and Edward J. Mastney,
Berwyn, Ill., assignors to Oak Mfg. Co., a cor-
poration of Illinois

Application July 12, 1941, Serial No. 402,104

8 Claims. (Cl. 74-10)

This invention relates to a preselecting mechanism and has particular application to such devices as tuning elements of radio communication systems and other similar devices. In general, this invention may be used where any mechanism or movable member is to be moved quickly and accurately to a preselected position within a range of travel. The invention may be used either with local or remote control and may have a wide range of application.

The invention disclosed herein is a modification of that disclosed in the copending application of John Williams and Edward J. Mastney, Serial No. 390,514, filed April 26, 1941 and is an improvement upon the inventions disclosed and claimed in United States Patent 2,281,640 to Ten Cate and Patent No. 2,161,183 to Mastney, particularly the latter. As disclosed in the Mastney patent, a member to be indexed is positioned by the action of opposing forces set in motion by oppositely revolving gears or the like and communicated to said indexed member through a plurality of coupling means.

In order to increase the accuracy of preselection, it is possible to gear up the preselecting control with relation to the finally preselected shaft. Assuming that a gang condenser in a radio receiver is to be controlled, the finally preselected shaft range is practically 180°. By gearing up the control members, as for example, 10 to 1 so that the preselecting members turn over an 1800° range and choosing positions on a geared up shaft, the accuracy of the system may be greatly increased. Thus if the geared up shaft can be preselected to within 1° then the condenser shaft may be controlled to within one-tenth of 1°, assuming of course that the gearing system is accurate.

In the Mastney patent referred to above, the preselecting angular range can be increased as disclosed therein. For moderate increases of the order of as much as 3 or 4 to 1, the means disclosed in said patent is effective and simple. However, if the gearing up factor is to be larger, then the system becomes rather bulky and somewhat cumbersome, requiring excessive plunger travel.

In order to devise a simple and effective means for increasing the travel range of the preselecting members the invention herein has been provided.

Referring now to the drawings:

Figure 1 is an end view partly in section of a mechanism utilizing the invention;

Fig. 2 is an isometric detail of one of the pre-selector assemblies;

Fig. 3 is a sectional elevation of one of the pre-selector assemblies minus the driving gears;

Fig. 4 is a view along 4-4 of Fig. 3; and

Fig. 5 is an exploded view of a preselector assembly minus shaft and drive gears.

The mechanism shown in Fig. 1 contains three banks of preselector groups, the banks being similar and the group consisting of a plurality of similar preselector units. An electric motor 10 shown in dotted line, is utilized as a source of power. Motor 10 drives a shaft 11 carrying a pinion 12 around which banks 13, 14 and 15 are grouped. The number and arrangement of banks is unimportant. It is understood that the apparatus may be supported from rigid supports.

Thus referring to one bank, as 13, a plurality of preselecting units are mounted in tandem. Only one unit will be described in detail since the units are duplicated. The motive power for one complete bank is communicated from pinion 12 to a gear 17 which is rigidly fastened to a length of gear stock 18 extending the length of the bank. Inasmuch as gear stock 18 is one continuous length only for convenience and could easily be a single gear for each preselector unit, it will be referred to as gear 18. It is understood that the various members referred to herein are suitably journaled in end plates.

Gear 18 is adapted to be engaged by a pinion 20 rotatably mounted on a bracket 21 pivotally mounted on a rod 22. Rod 22 extends the full length of the bank while bracket 21 and pinion 20 are provided for each preselector unit. It will be noted that bracket 21 has an armature portion 24 adapted to be attracted toward pole piece 25 of an electromagnet 26. Bracket 21 is normally biased away from the electromagnet by spring 27. The angular travel of bracket 21 around rod 22 is determined by a slotted tail piece 28 cooperating with a rod 29.

Rotatably mounted on rod 22 is a gear 31 which is preferably always in mesh with pinion 20 so that when pinion 20 moved into engagement with gear 18, rotation of gear 31 will result upon motor operation. Gear 31 also meshes with a gear 32 rotatably mounted on a rod 33. Gears 31 and 32 are offset along the axis of rotation so that only the adjacent gear sections engage. Each preselector unit has a pair of gears 31 and 32.

Gears 31 and 32 each engage large gears 34 and 35 rotatable around a preselecting shaft 36. The relative gear ratios and gear sizes are of no great consequence. It is desired, however, to turn gears 34 and 35 from motor 10 at equal and opposite speeds.

Large gears 34 and 35 are similar and consist of apertured supporting discs 37 and 38 carrying ring gears 39 and 40, as by riveting or the like. Ring gears 39 and 40 have a series of outer teeth 41 and 42 and inner teeth 43 and 44. Outer teeth 41 and 42 are normal gear teeth and mesh with drive gears 31 and 32 in a normal manner. Inner series 43 and 44 have normal teeth except that between two teeth, as 45 and 46 respectively, a shallow locking section 47 is provided. This may be obtained by incomplete tooth cutting. Any other kind of locking means may be used instead.

In order that discs 37 and 38 with their ring gears may rotate freely around shaft 36, a pair of sleeves 49 and 50 are provided respectively. Shaft 36 is preferably provided with flats 51 and 52 and the inner surface 53 of sleeves 49 and 50 is shaped to match the shaft section. Thus sleeves 49 and 50 may slide along shaft 36 but cannot rotate. The outer surface 54 of each sleeve is smooth to provide a rolling surface for discs 37 and 38.

Ring gears 39 and 40 preferably face each other and between them is a coupling member 60. Coupling member 60 consists of a supporting disc 61 having a central round aperture 62 and carrying a pair of spur gears 63 and 64 on opposite sides thereof in planes parallel to the disc. Any suitable supporting means as rivets may be used for spur gears 63 and 64. Gears 63 and 64 each have a buck tooth 65 and 66 with the rest of the gear teeth being somewhat smaller than warranted by normal inner ring teeth 43 and 44. The relation of spur gear 63 to the inner series of teeth is such that every tooth on the spur gear will freely engage with all normal gear teeth of inner series 43. Buck tooth 65 however will not clear locking section 47. So that the meshing of buck tooth 65 between teeth 45 and 46 will result in jamming and cessation of all gear action. The same applies to gear 64 and its co-operating series 44.

As is apparent from Fig. 5, aperture 62 in coupling disc 61 is just large enough to permit rotation on shaft 36 providing sleeves 49 and 50 do not clamp disc 61 therebetween. Between adjacent assemblies, separating washers 69 and 70 having apertures 71 corresponding to the flattened shaft section may be provided. Preferably, sleeves 49 and 50 are long enough so that the ring gear assemblies may turn freely thereon, irrespective of whether central disc 61 is tightly clamped or not. Suitable clamping means may be provided, as disclosed for example in Mastney Patent No. 2,179,748. A simple clamping means may consist of a rigid sleeve 72 on shaft 36 co-operating with a movable sleeve 73, said sleeves both being disposed at the ends of the entire bank. Sleeve 73 may be moved to exert clamping force on the aligned sleeves of the entire bank after which locking sleeve 73 may be rigidly retained in position by a set screw 74.

In order to provide a large angular operating range for shaft 36, it would be inadvisable to have gear ratio of the inner series of teeth, as 43, to its cooperating spur gear 63, a whole number. A whole number as the gear ratio will make it necessary to position the spur with reference to its inner series of teeth. Thus if a whole number is used as a gear ratio, the buck tooth will have to be disposed so that it meets the locking section. With a non-integral number as the gear ratio, a locking action will occur no matter what the relative gear positions are. Fur-

thermore the range will be greatly increased since a locking engagement will occur less frequently.

Whatever the angular range of shaft 36 between two locking positions, increased accuracy of preselection may be obtained by having the final shaft range small. Thus shaft 36 may carry a pinion 75 meshing with a large gear 77 whose angular range will be the preselection range. This reduced range may be 180° if a condenser for a radio is to be operated upon. In practice, gears 75 and 77 should have means for avoiding all backlash, such as are used on condenser drives in radios now. Thus gear 77 may consist of two flat gears with a spring to cause one of the gears to be at an angle to the other.

It is understood that a preselected position for a control unit may be obtained by adjusting coupling disc 61 on shaft 36 in such a position that equal and opposite forces on the coupling member will result from the jamming of the two spur gears and their gears.

What is claimed is:

1. A preselecting mechanism comprising a shaft having a rotational range of over 360°, a coupling member normally rigid on said shaft, a drive member rotatable around said shaft on each side of said coupling member, means for rotating said drive members at equal speeds in opposite directions, a gear train between each driving member and coupling member, said gear train including a first gear mounted eccentrically to said shaft and a second gear meshing therewith, said second gear being rotatable around said shaft axis, and means on said two meshing gears for locking said gears together upon the engagement of predetermined gear teeth whereby said drive members will actuate said gear trains until both have reached locking positions and determine a stationary preselection point for said shaft.

2. The structure of claim 1 wherein said locking means on said two meshing gears include mutilated teeth sections on each gear and so designed that gear action occurs at all times except when said mutilated sections engage.

3. The structure of claim 1 wherein said locking means on said meshing gears include a buck tooth on one and a shallow intertooth section on the other.

4. The structure of claim 1 wherein the first-named gear is carried on said coupling member.

5. The structure of claim 1 wherein said first-named gear is carried on said coupling member and wherein the locking means include a buck tooth on one of said two meshing gears and a shallow intertooth locking section on the other gear.

6. A preselecting mechanism comprising a shaft having a rotational range of over 360°, a coupling member normally rigid on said shaft, a spur gear carried by said coupling member on each side thereof and rotatable about an axis eccentric to said shaft axis, a gear on each side of said coupling member rotatable around said shaft and meshing with said first-named spur gear, one of said meshing gears having a buck tooth and the other of said meshing gears having a shallow intertooth locking section, said meshing gears being adapted to have normal gear action at all times except when said buck tooth engages said locking section, and means for rotating said second gears in opposite directions until a preselection point is reached.

7. The structure of claim 6 wherein said shaft has a plurality of preselecting units, and wherein means are provided for adjusting the rotary

position of each coupling member with relation to said shaft.

8. A preselecting mechanism comprising a shaft having a rotational range of over 360°, at least one preselecting unit thereon, each preselecting unit comprising a coupling member 5 normally movable around said shaft, a pair of sleeves on said shaft and enclosing said coupling member and adapted to be pressed together tightly to grip said coupling member to determine 10 a rigid coupling member position on said shaft, a spur gear carried by said coupling member on

each side thereof and rotatable around an axis eccentric to said shaft axis, a gear for each spur gear meshing therewith, said second gear being freely rotatable around said sleeve, one of said two gears having a buck tooth and the other having a shallow intertooth locking section adapted to lock only when said buck tooth and locking section engage, and means for rotating said second gears around said sleeve at equal speeds in opposite directions.

ELOF B. OLSON.
EDWARD J. MASTNEY.