

May 3, 1955

A. S. BACKUS
COMMUTATOR ASSEMBLY

2,707,731

Filed March 13, 1952

FIG. 3

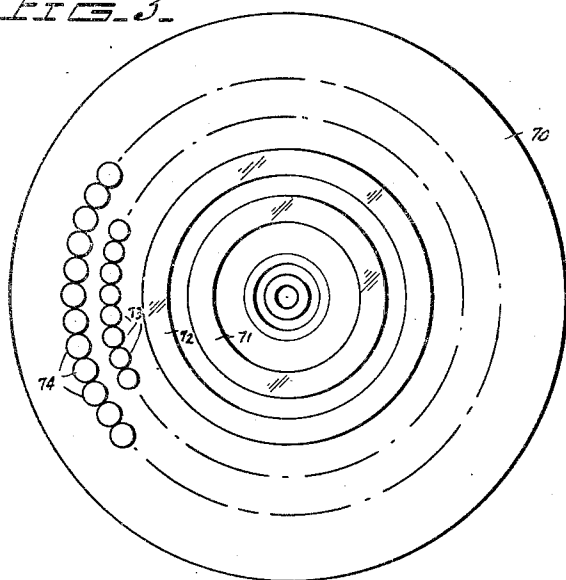


FIG. 1

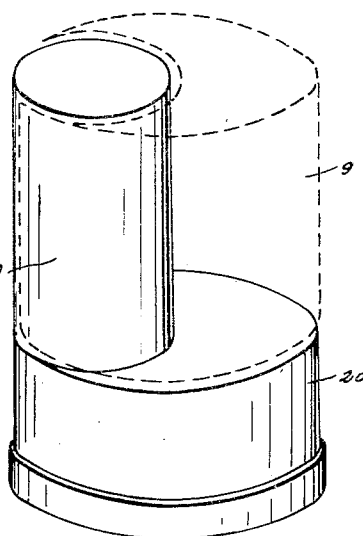
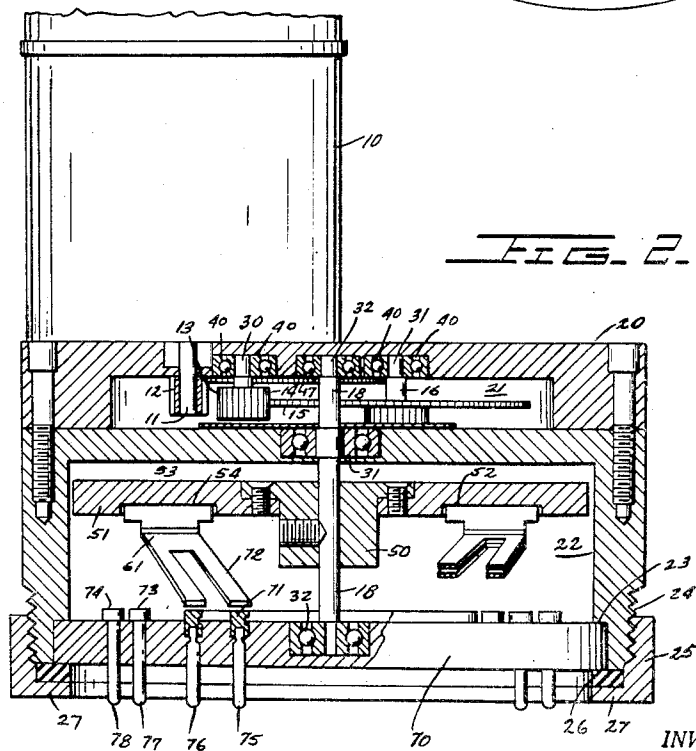


FIG. 2



INVENTOR.
ALFRED S. BACKUS

BY

Greene, Pinckel & Dunn
ATTORNEY

1

2,707,731

COMMUTATOR ASSEMBLY

Alfred S. Backus, Passaic, N. J., assignor to Mycalex Corporation of America, Clifton, N. J., a corporation of New York

Application March 13, 1952, Serial No. 276,321

3 Claims. (Cl. 200—37)

This invention relates to an improved commutator assembly especially suitable for use in the instrumentation of guided missiles, aircraft and similar devices where a minimum space is allowable for such instruments.

Among the objects of the invention is to provide a commutator assembly which takes up a minimum amount of space and is so constructed that the space which is saved is practically all utilizable for the addition of a complete R. F. transmitter or similar necessary equipment.

The assembly of the invention comprises a commutator head or disk, one or more contact elements or brushes, and means to rotate the brush elements with respect to the disk which includes a miniature motor and a reducing gear mechanism.

Guided missiles and improved types of aircraft travel with a speed which may be greater than or close to the speed of sound and the drag of a missile or aircraft increases in accordance with the approximate third power of the volume of the air frame. Accordingly economical utilization of the space therein is a significant factor in the construction of such devices.

Among other objects of the invention is to provide a smoothly operating commutator assembly adapted to be accurately driven at a uniform speed by a miniature motor.

These objects and others ancillary thereto are obtained by driving the contact arm through a gear train and a small motor which is off-center and situated so that an outer surface of the motor is approximately parallel to an outer surface of the commutator disk. Thus all of the space which is contained in a cylinder defined by the commutator disk or head as its base is available for use.

The foregoing and other objects of the invention will be best understood from the following description of an exemplification of the same when read in connection with the accompanying drawing in which:

Fig. 1 is a perspective view of the assembly of the invention in approximately its natural size.

Fig. 2 is an enlarged view showing the gear train and commutator disk portion in cross section.

Fig. 3 is an enlarged view of the commutator disk or head.

The combination device shown comprises a motor 10 and a housing 20 containing a space 21 for the gear train, a space 22 containing the brush contacts and rotatable disk for holding same and a seat 23 for positioning the commutator disk 70. The end of housing 20 also contains the threads 24 adapted to receive the threaded rim 25 containing the internal flange 27 and the gasket 26 for fixing the commutator disk 30 in place.

The motor 10 is a small or miniature low voltage motor operating at around 300–600 R. P. M. and a considerable reduction in angular speed is required. The reduction gearing, per se, is not an essential feature of the present invention but the gear train consists of the following elements in order, shaft 11, pinion 12, spur wheel 13, pinion 14, spur wheel 15, pinion 16, spur wheel 17 and drive

2

shaft 18. The shaft 30, 31 and 32 for rotatably holding the spur wheel-pinion combinations 13–14 and 15–16 respectively and the main driving shaft 18 are all mounted in miniature ball bearings 40. Shaft 18 is also rotatably supported by ballbearings at 31 and 32.

Mounted on shaft 18 is the hub 50 containing disk 51. This disk 51 is made of insulating material such as reinforced phenol formaldehyde condensation products, glass bonded mica and similar insulating materials and is made relatively thick so as to have somewhat greater strength than required and is then hollowed out at 52, 53 so as to hold the spring contact mountings. The blocks 54 fit into the depressions 52 or 53 and hold the contact elements 60 or 61. By hollowing out the depressions 52, 53 for fitting in the blocks 54 an additional saving in space is obtained since the disk 51 has to be strong enough to withstand a considerable amount of stress from the pressure of the spring contact elements, etc.

The commutator disk 70 comprises two solid contact rings 71, 72 and two concentric circular rows of contact elements 73, 74. As shown in Fig. 2, the rings 70, 71 each have a conducting pin 75, 76 which extends through the insulating disk which is preferably made of glass bonded mica. Each of the contact elements 73, 74 contains an integral pin 77 or 78 which extends through the insulating disk. To the projecting ends of the pins 75, 76, 77, and 78 the desired circuits of a measuring, indicating, controlling or recording device are to be attached.

As shown in dotted lines of Fig. 1 the construction of the invention provides additional space suitable for mounting of the normally associated circuit elements, for example, a complete R. F. transmitter can be located outside of the motor 10 but within the space of the cylinder 9 of Fig. 1. This saving is obtained by the novel arrangement of the parts in the assembly whereby the motor 10 not only takes up a minimum of space but is so located as to not block the space which is available.

I claim:

1. In a commutator assembly of the type which is suitable for guided missiles and aircraft and which comprises a rotatable brush means adapted to be driven through a gear-type speed reducing gear train by a substantially cylindrical motor having a diameter of a size which is of the order of the radius of the rotatable brush means, the improved construction comprising a cylindrical housing for said rotatable brush means and said speed reducing means, an end wall enclosing the cylindrical housing adjacent the end containing the speed reducing means, said end wall containing an opening substantially midway between the center and the periphery thereof, said opening coinciding with the location of the first driven gear of said reducing gear train, means for mounting the motor against said end wall and with its periphery at the periphery of said cylindrical housing and with its shaft connected to said first driven gear whereby the space above said wall not taken up by said motor is available for auxiliary electronic apparatus.

2. A commutator adapted for use in guided missiles and aircraft, comprising in combination a first cylindrical housing, a wall closing one end thereof and having a plane external surface normal to the axis of said first housing and adapted for mounting apparatus, a second cylindrical housing of substantially half the diameter of said first housing disposed against said end wall in such a manner that one generatrix of said first cylinder is co-linear with one generatrix of said second cylinder whereby axial projection of said first cylinder defines a volume of crescentiform cross-section substantially surrounding said second cylinder and adjacent to said wall, motor means disposed within said second housing having a drive shaft on the axis thereof transpiercing said wall and extending into said first housing, a speed-reducing gear train disposed

3

within said first housing in driven relationship with said drive shaft, a disk rotatable by said gear train and formed of glass-bonded mica and having a plurality of recesses formed in one face thereof, a plurality of resilient brushes mounted in said recesses, and a commutator plate formed of glass-bonded mica and having a plurality of contacts adapted to be swept by said brushes.

3. A commutator adapted for use in guided missiles and aircraft, comprising in combination a first generally right cylindrical housing, a first wall normal to the longitudinal axis of said first housing and closing one end thereof, said first wall having a bore therethrough substantially midway between said axis and the periphery of said housing, a second wall disposed within said housing parallel to said first wall and defining therewith a chamber within said housing, said second wall having a bore therethrough substantially on said axis, a gear train disposed within said chamber and having an output shaft extending through said bore of said second wall, a second right cylindrical housing having a diameter substantially half the diameter of said first housing, said second housing being disposed adjacent to said first wall and having its axis parallel with said axis of said first housing but displaced therefrom a distance substantially equal to the radius of said second housing, motor means disposed within said second housing having a drive shaft extending through said bore of said first wall and connected in driving

4

relationship to said gear train, brush-holding means mounted on said output shaft of said gear train and rotatable therewith, a commutator disk formed of glass-bonded mica disposed within said first housing concentric therewith and having a plurality of ring contacts and a plurality concentric circular rows of spaced contacts, a first bifurcated spring-pressed brush means mounted on said brush-holding means and having one prong in contact with one of said rings and the other prong adapted to make intermittent contact with one of said circular rows and comprising a conducting path between said ring and said row, and a second bifurcated spring-pressed brush means mounted on said brush-holding means and having one prong in contact with another of said rings and the other prong adapted to make intermittent contact with another of said circular rows and comprising a conducting path between said ring and said row.

References Cited in the file of this patent

UNITED STATES PATENTS

1,786,391	Grover	Dec. 23, 1930
2,302,626	Gallagher	Nov. 17, 1942

FOREIGN PATENTS

62,801	Netherlands	Apr. 15, 1949
--------	-------------	---------------