April 10, 1951 E. A. HALLSTRAND 2,548,603

ZERO BACKLASH GEAR DRIVE

Filed Nov. 28, 1947

Fig. 1.

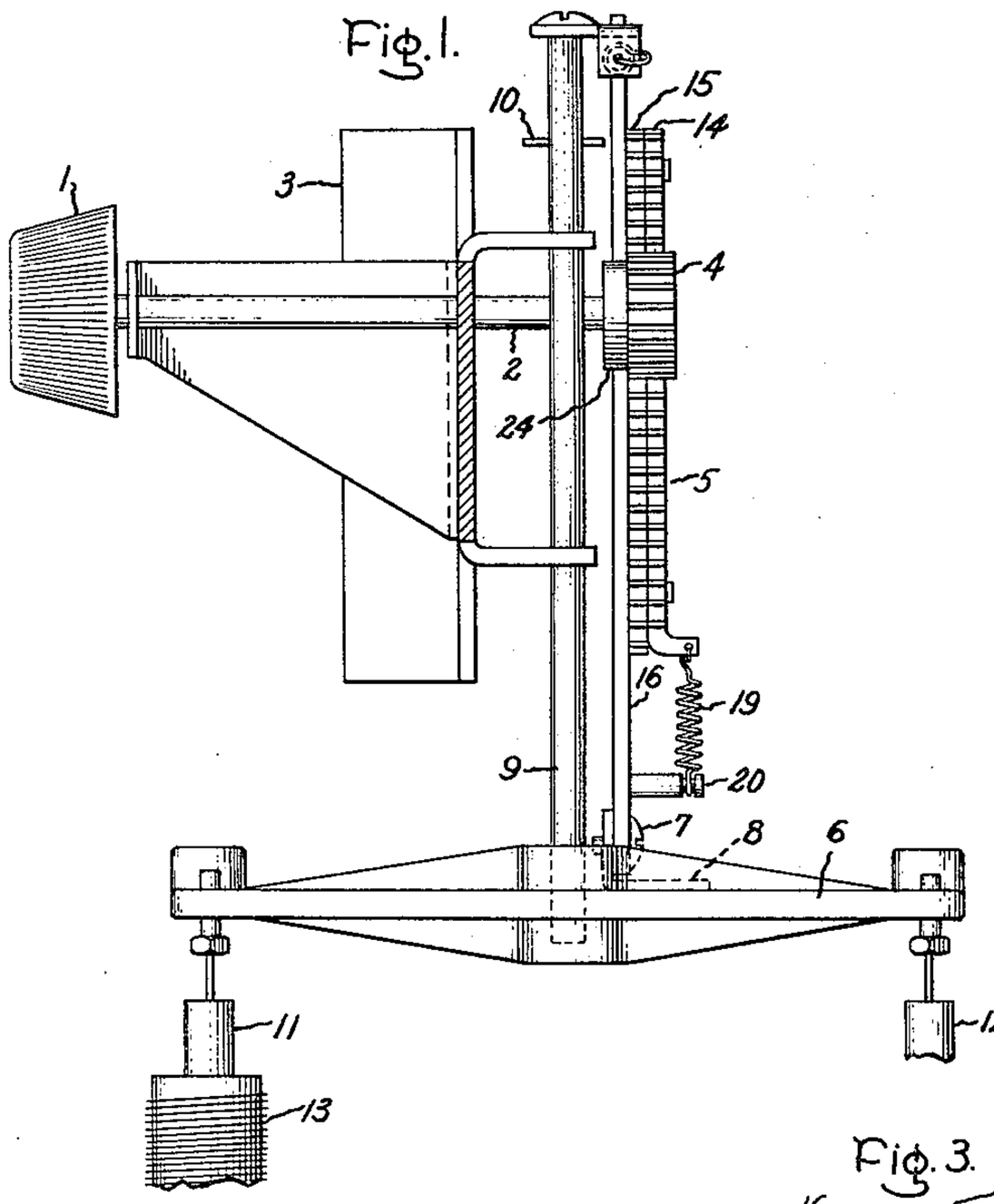


Fig. 2.

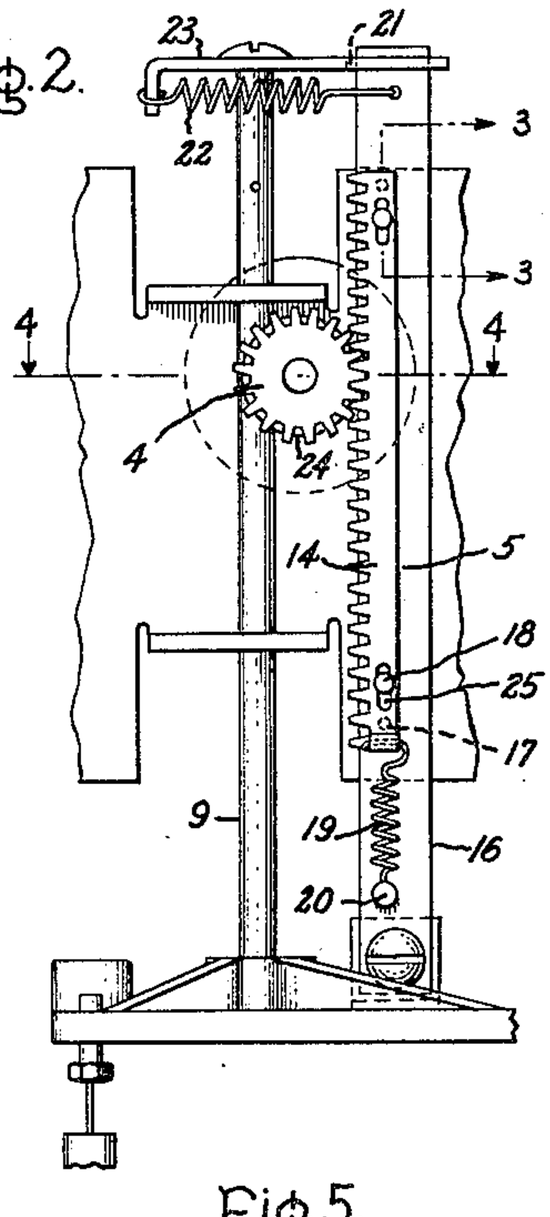


Fig. 3.

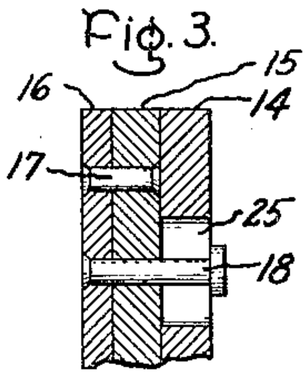


Fig. 5.

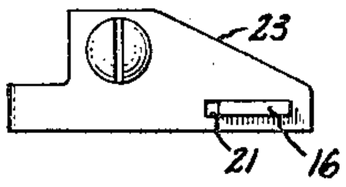
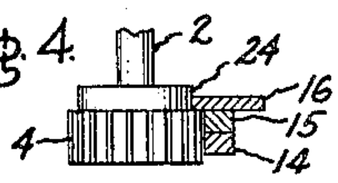


Fig. 4.



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UNITED STATES PATENT OFFICE

2,548,603

ZERO BACKLASH GEAR DRIVE

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2 Claims. (Cl. 74—440)

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This invention relates to gear trains and more particularly to gear drives for radio tuning systems and similar apparatus wherein it is required that the gears operate smoothly and with a minimum amount of backlash.

It is an object of this invention to provide a relatively inexpensive and simply constructed gear drive which operates smoothly and in which backlash is substantially eliminated.

Another object of this invention is to provide a smoothly operating rack and pinion gear train in which the use of accurately meshed gears is obviated and which operates with a minimum amount of backlash in translating rotary motion to straight line motion or vice versa.

A further object of this invention is to provide means in a gear train for accurately maintaining the correct center distances between the individual gears which make up the system.

Yet a further object of this invention is to provide an anti-backlash rack and pinion drive including a pivoted rack which is held in engagement with the pinion gear by means of a spring and in which means are provided for maintaining the correct spacing between the pitch-lines of the individual rack and pinion gears.

The features of this invention which are believed to be new are set forth with particularity in the appended claims. The invention itself, however, together with further objects and advantages thereof may best be understood by reference to the following description when taken in conjunction with the accompanying drawing wherein Fig. 1 shows one embodiment of the invention as applied to a rack and pinion drive for a radio tuning system; Fig. 2 shows an end view of the system illustrated in Fig. 1; Fig. 3 shows a view taken along the line 3—3 of Fig. 2; Fig. 4 shows a view taken along the line 4—4 of Fig. 2; and Fig. 5 shows the top view of the device of Fig. 2.

Referring now to the drawing and more particularly to Fig. 1, there is shown a tuning arrangement for a radio receiver wherein a pivoted rack is held in engagement with a pinion by means of a spring, and wherein further means are provided for maintaining the correct distance between the rack and pinion for smooth operation of the system. In this arrangement a tuning knob 1 is mounted on a shaft 2, the shaft 2 being supported by a bracket 3 which is rigidly fixed to the radio receiver. Pinion 4 is mounted on the shaft 2 and pinion 4 drives a rack 5, rack 5 being pivoted at one end by a screw 7 and an L bracket 8. The arm 6 is carried by a shaft 9, bracket

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3 acting as a guide for this shaft, as shown. A pin 10 is driven through shaft 9 to serve as a stop. The arm 6 carries magnetic cores 11 and 12 which may tune the tuning coils 13 of a radio system in a conventional manner.

The rack 5 is shown in Fig. 1 as being of the split, spring loaded type comprising two sections 14 and 15. This type of rack is preferred over the simple single element rack although the invention is not to be construed as limited thereto. Section 15 is rigidly fixed to a member 16, and section 14 is slidably mounted on this member, member 16 being pivoted at 7 as previously described.

Referring now to Fig. 2 there is shown another view of the tuning mechanism of Fig. 1. It can be seen from this figure that the section 14 is free to move longitudinally over a distance defined by the length of a slot 25 therein. Stud 17 rigidly fixes the section 15 of Fig. 1 to member 16, and a stud 18 fixes section 14 to the member 15 through slot 25, as is more clearly shown in Fig. 3. Section 14 is spring loaded by means of a spring 19 carried by member 16 on stud 20, the spring 19 urging teeth of section 14 into close engagement with the teeth of pinion 4. The member 16 as previously described, is pivoted at 7 and free to move a limited distance in a slot 21 as more clearly shown in Fig. 5. The member 16 and hence rack 5 are brought into engagement with pinion 4 by means of a spring 22 fixed to a bracket 23, bracket 23 being carried on shaft 9, as shown, and containing slot 21.

To maintain the correct distance between the rack and pinion and to insure smooth running of the tuning mechanism, there is provided a disk-like rolling member 24 mounted on shaft 2 which makes a rolling contact on the edge of member 16, as is clearly shown in Fig. 4. The dimensions of member 24 and of member 16 are such that the rack and pinion are spaced to such a distance that the teeth of these gears mesh substantially on the pitch line of the gear teeth.

It has been found that with such an arrangement the tuning mechanism operates smoothly and that backlash in the gears is substantially eliminated.

While the invention has been described in conjunction with spring loaded, split gears and racks, it is not to be limited thereto as when gear clearances are required between other types of gears, the rolling contact members will eliminate binding in these gears and the necessity of accurately determining center distances between the respective gears.

Therefore, while a specific embodiment of the invention has been shown and described, it will of course be understood that various modifications may be made and it is intended in the appended claims to cover any such modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A gear mechanism comprising a shaft, a pinion mounted on said shaft, a rack pivoted at a point remote from said pinion, said pinion and said rack having meshing teeth, spring means engaging said rack at a point remote from said pinion in a direction opposite that of said pivot point for urging said rack into engagement with said pinion, and a disk-like rolling member carried by said shaft and adapted to make a rolling contact with a further member fixed to said rack when said rack and said pinion are brought into operative engagement by said spring means, said rolling member and said further member being so dimensioned that the teeth of said rack and said pinion mesh substantially on the pitch line of said teeth.

2. A tuning mechanism for a radio receiver and the like, comprising a shaft, a pinion mounted on said shaft, and a rack assembly pivoted at one end and spring urged into engagement with said pinion, said rack assembly comprising a pair of similar members having teeth adapted to mesh with said pinion and spring means tending to move one of said members longitudinally relative to the other member, a disk-like rolling member carried by said shaft and adapted to make a rolling contact with a further member fixed to said rack assembly when said rack assembly and said pinion are urged into engagement, said rolling member and said further member being so dimensioned that the teeth of said rack members and said pinion mesh substantially on the pitch line of said teeth, and tuning means carried by said rack assembly for tuning said receiver in response to movement of said rack assembly.

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