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Fig. 1.

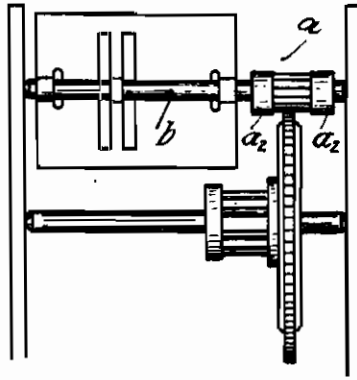


Fig. 2.

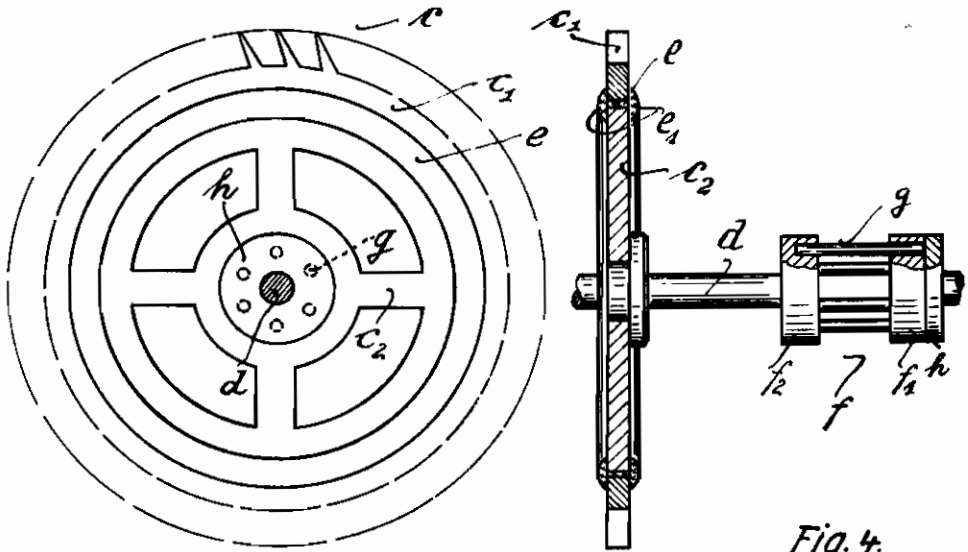
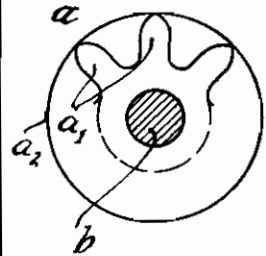


Fig. 3.

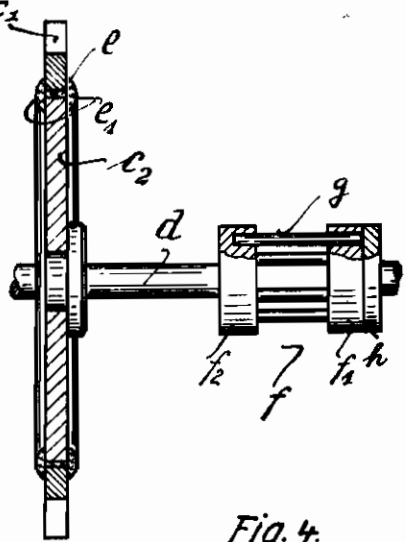


Fig. 4.

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Fig. 5.

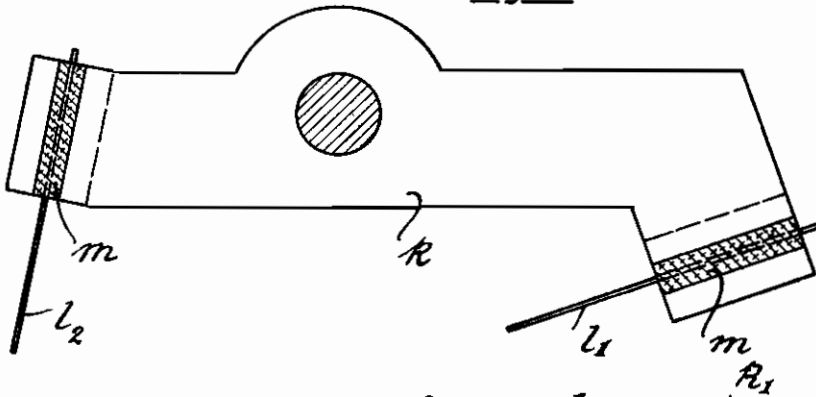


Fig. 6.

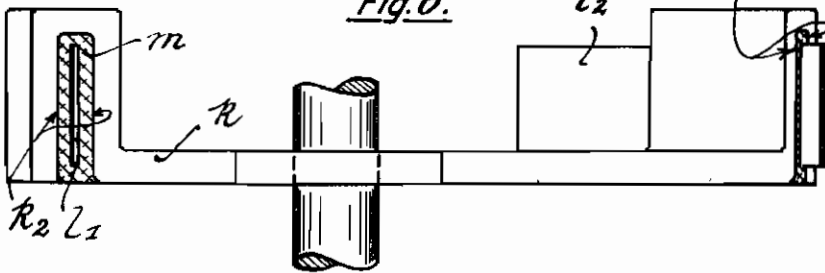
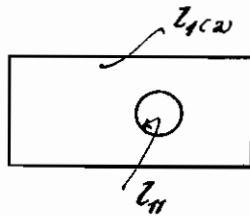


Fig. 7.



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# ALIEN PROPERTY CUSTODIAN

## GEAR MEMBERS

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Application filed October 14, 1940

This invention relates to gear members, such as pinions, toothed rims or intermediate elements interposed between the working and supporting parts of watches, clocks and similar precision instruments, and has for its object to provide gear members of the kind specified which either consist of sound dampening material or in which the propagation of sound produced on hard parts is prevented through the provision of sound dampening intermediate elements. The invention includes further the particular use of such gear members in watch and clock making.

It follows from the objects stated that a substance must be provided which is suited to serve as material for working gear members, as gear tooth systems, as well as for making therefrom sound insulating intermediate layers, etc. The substance should further be capable of meeting the requirement of being easily worked, for instance cast or sprayed, without needing special treatments of a chemico-technical nature which, as a rule, lie outside the sphere of precision mechanics. Furthermore, the substance should not be affected by oil and benzine and not age.

These demands are complied with by a material sold under the registered name "Guttasyn" which becomes plastic to liquid at temperatures between 100° and 200° C and can be cast, sprayed or pressed. In cold condition this material shows similar elastic properties as rubber and gutta-percha. Elasticity, strength and hardness are determinable within wide limits. It is further unaffected by oil, benzine and most acids, and non-combustible.

The invention proposes therefore to manufacture precision gear members comprising members like toothed wheels cooperating with hard, for instance metallic, parts as well as intermediate elements between working parts, as toothed rims, and supporting parts, as bosses, of a gear member from rubberlike synthetic gutta-percha, for instance "Guttasyn", to dampen sound.

In the clock and watch making art it has been tried many times to suppress for example the noise caused by the rapidly moving spur gearing which drives the flywheel of the striking mechanism. It has been found now that complete suppression of this noise is possible by employing a gearing made from "Guttasyn" or a similar product.

The rubberlike synthetic gutta-percha can be used also, according to the invention, for sound-insulating intermediate elements by producing for instance in a hollow or lantern pinion the shrouds from "Guttasyn" and the trundles from

steel as usual. Hollow pinions of this type as well as the above-mentioned solid pinions of "Guttasyn" have given excellent satisfaction in suppressing or dampening the noise of the wheels in flywheel drives.

In case of vertical wheels, particularly escapement wheels for escape gears, sound insulation can be effected according to the invention by interposing between the rim and the body of the gear a "Guttasyn" layer uniting both parts and preferably engaging the flanks of both the body and the rim.

In the anchors for the escape gears in chronometers the pallets or pins may be embedded, according to the invention, in "Guttasyn" insertions which may be framed also in metal and guided in the anchor body so as to permit adjustment of the pallet.

The invention is illustrated by way of example in the accompanying drawing, in which

Figure 1 is a side view of the flywheel drive of a striking mechanism of a clock;

Fig. 2, a section of a pinion;

Figs. 3 and 4 are, respectively, an elevation and a section of a spindle provided with anchor or lever escape wheel and pinion;

Figs. 5 and 6 are, respectively, a front and top view of an anchor of a clockwork; and

Fig. 7 is a detail view.

In the flywheel drives of clockworks spur gears are used as a rule which frequently cause unpleasant noises. In the construction shown in Fig. 1 these noises are suppressed by producing the solid pinion *a* on the flywheel shaft *b* from "Guttasyn" by pressure casting. The teeth *a*<sub>1</sub> pass at their ends into solid discs *a*<sub>2</sub>, Fig. 2, so as to provide a better hold against giving way. Cast "Guttasyn" shows a very smooth surface if worked in highly polished molds and is therefore well suited for pinions which have to transmit small forces. When "Guttasyn" pinions cooperate with hard toothed wheels, it is advisable to make the pinion teeth as strong as possible and the wheel teeth correspondingly weak, and to avoid also sharp edges, burr, etc.

In movements of clocks and watches it is particularly the ticking noise of the escape gear, as the lever escapement, cooperating with the regulator that has to be suppressed. Figs. 3 and 4 show how the sound insulation with respect to an escapement wheel and pinion is effected by employing sound dampening intermediate layers. The lever escapement wheel *c* is made of two parts, viz. the toothed rim *c*<sub>1</sub> and the body member *c*<sub>2</sub> which is firmly disposed on the staff or

shaft *d*. Both parts *c*<sub>1</sub> and *c*<sub>2</sub> are held together by a "Guttasyn" layer *e* which engages at *e*<sub>1</sub> the flanks of the parts *c*<sub>1</sub>, *c*<sub>2</sub> like a flange and thereby prevents axial displacement thereof. As "Guttasyn" and metal have been cast together and form a good bond, any relative rotation of the body and rim of the wheel *c* is normally out of the question. To provide for absolute safety in this respect both parts could be fitted with interengaging inward and outward bulges.

The pinion *f* of the escape wheel *c* is hollow, and the trundles *g* are inserted in "Guttasyn" discs *f*<sub>1</sub>, *f*<sub>2</sub>. The trundles can be protected against axial displacement by making them somewhat shorter if discs *f*<sub>1</sub> with through-going holes are used and closing the holes by passing over them a hot steel, or, as shown in the drawing, the disc *f*<sub>2</sub> may have blind holes and the other disc *f*<sub>1</sub> through-going holes before which a closing disc *h*, possibly of metal, is arranged.

The sound insulation according to Figs. 3 and 4 has been found to be effective and may be applied also, for example, to the wheel *t* driving the flywheel pinion *a*.

For the purpose of dampening sound it is advisable to embed also the anchor members, *l*<sub>1</sub>, *l*<sub>2</sub>

in clockwork anchors *k* in "Guttasyn" insertions *m*, as shown in Figs. 5 to 7. These insertions are placed in pockets *k*<sub>1</sub>, *k*<sub>2</sub> formed by repeatedly offsetting the anchor body. To avoid displacement of the members *l*<sub>1</sub>, *l*<sub>2</sub> holes *l*<sub>11</sub> are provided therein, as indicated in Fig. 7, through which "Guttasyn" can pass. It is further possible to provide the "Guttasyn" insertion with a metal frame in such manner that the frame, the sound insulating insertion and the pallet member form a unit which is guided in the anchor body and adjustable relative to the escape wheel.

The invention is not restricted to the use of the substance sold by the name of "Guttasyn" but covers all substances having similar chemical and technical properties, i. e., substances that are elastic like rubber, pourable and unaffected by oil and aging.

Guttasyn is a thermoplastic substance on the basis of vinylpolymeric, e. g. of polyvinylacetate or of the polyvinylester of the acrylic acid, or of the polyvinylester of the methacrylic acid or of chlorid of polyvinyl or mixtures of same, with addition of plastifiers and fillers.

HELMUT JUNGHANS.