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E. W. FILEGER ET AL

3,411,236

MOTOR SOUND UNIT

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FIG. 1

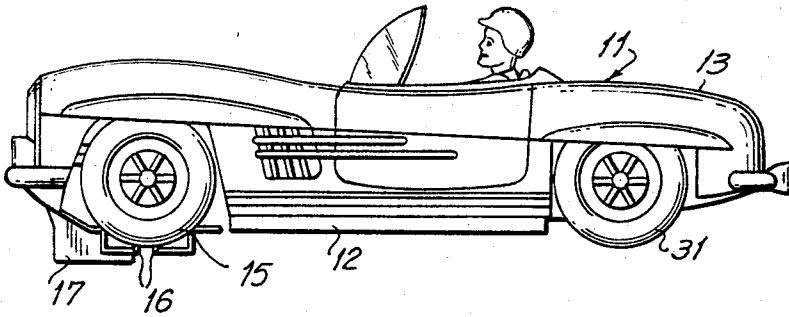


FIG. 2

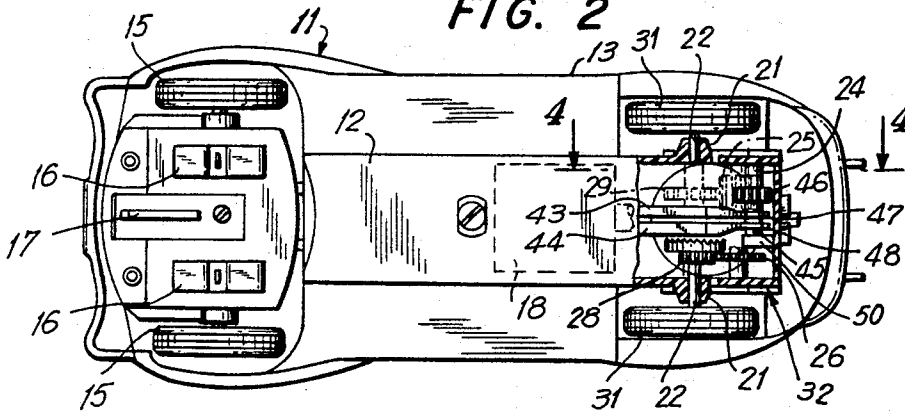


FIG. 3

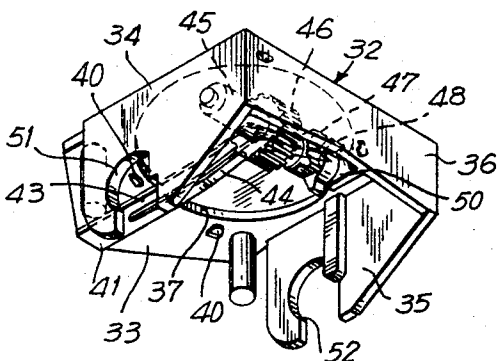
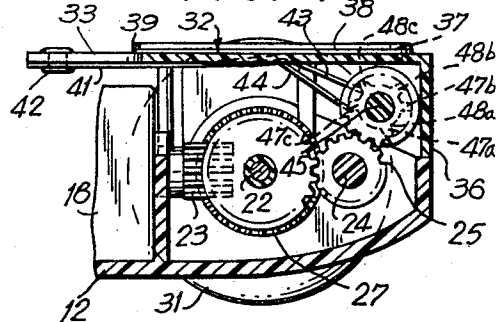


FIG. 4



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1

3,411,236

MOTOR SOUND UNIT

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ABSTRACT OF THE DISCLOSURE

A motor sound unit for a toy vehicle in which a sounding board is adapted to be struck by a pair of resilient fingers controlled by multi-lobe cams operated in response to driving action of the toy vehicle with at least one lobe on two adjacent cams being in alignment for concurrent actuation of the noise producing fingers with other lobes being out of alignment so that irregular sounds are produced which more nearly simulate the sounds produced by an internal combustion engine.

This invention relates generally to a motor sound unit and is more specifically related to a motor sound unit for a toy vehicle adapted to provide a sound simulating that of an internal combustion engine as the vehicle is propelled along a surface.

A principal object of the invention is to provide improved and simplified means for generating a sound simulating that of an internal combustion engine which is operated in response to driving of the driven axle of a vehicle or the means for driving same.

Still other objects and advantages of the invention will in part be obvious and will in part be apparent from the specification.

Generally speaking, in accordance with the invention, multiple spring fingers are provided proximate to a sounding board with cam means driven in response to driving of the vehicle provided for deflecting and releasing the spring fingers in a random or irregular cycle to permit the fingers to impinge on the sounding board to generate sharp noises. The random cycle more closely simulates an internal combustion automobile engine for greater authenticity.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the invention, reference is had to the following description taken in connection with the accompanying drawing, in which:

FIG. 1 is a side elevational view of a toy vehicle in which the motor sounding unit of the instant invention may be mounted;

FIG. 2 is a bottom plan view thereof with certain portions being broken away for the sake of clarity;

FIG. 3 is a perspective view of the motor sound unit, constructed in accordance with a preferred embodiment of the instant invention; and

FIG. 4 is a sectional view taken along line 4—4 of FIG. 2.

The motor sound unit of the instant invention may be incorporated in any type of toy vehicle to produce a sound simulating the sound of an internal combustion engine when the vehicle is propelled along a surface. The means for propelling a vehicle can be either mechanical or electrical and, if electrical, the current source may be either internal or external. By way of example, a toy car is shown in FIG. 1 which is of the type for use in slot racing wherein the vehicle is propelled along a surface, is guided by a guide finger and is propelled by a self-con-

2

tained electric motor driven by externally supplied electrical energy whose input to the car is through current pickup members which contact suitable conductors along the track surface.

Referring to the drawings, the vehicle 11 comprises a chassis 12 on which is mounted a body 13. A front chassis member 14 may be formed as part of chassis 12 or, if the vehicle is to be steerable, may be formed as a separate member. Front chassis member 14 carries rotatable front wheels 15, current pickup shoes 16 and a guide finger 17. Chassis 12 carries an electric motor 18 provided with suitable connections (not shown) for connecting the motor poles to the current pickup shoes 16. Since the foregoing forms no part of the instant invention, a further description thereof is deemed unnecessary.

Chassis 12 is provided, at the rear end thereof, with a pair of bosses 21 through which pass a rear axle shaft 22. The bosses act as journals for the axle shaft. The projecting shaft of motor 18 has secured thereon a drive gear 23 which, preferably, does not directly drive axle shaft 22 because of the high r.p.m. of motors of this type. Instead, an idler shaft 24, rotatably mounted in chassis 12, carries idler gears 25 and 26 for stepdown to the rear axle shaft. Drive gear 23 meshes with a crown gear 27 which has fixed thereto a gear 28. Gears 27 and 28 are rotatable on axle shaft 22 and rotate, through gear 26, idler shaft 24. Idler gear 25 rotates with the idler shaft and in turn rotates a gear 29 mounted fast on axle shaft 22 to thereby rotate the rear axle shaft and wheels 31 mounted at the outer ends thereof. The aforesaid gear train for driving the rear wheels from the electric motor is described for environmental purposes only and does not form part of the instant invention.

The motor sound unit generally indicated at 32 is best seen in FIG. 3. The housing for the unit is preferably molded of plastic material and includes a top wall 33, depending side walls 34 and 35 and a rear wall 36. A relatively large opening 37 is provided in top wall 33. Referring to FIG. 4, a fiber sounding board or diaphragm 38 overlies opening 37, the periphery of the diaphragm being held in contact with the surface of top wall 33 around opening 37 so that the major area of the diaphragm is unobstructed. Any suitable means for securing the periphery of the diaphragm to top wall 33 may be provided, such as a ring 39 having tabs 40 projecting through the top wall.

A resilient striker 41 in the form of a bifurcated spring is secured at one end to the inner side of wall 33 such as by means of a rivet 42. As stated, the striker is bifurcated to form a pair of spring fingers 43 and 44 which have outer ends bent away from diaphragm 38 and which have intermediate portions normally biased toward the inner surface of the diaphragm.

A shaft 45 is journaled between side wall 34 and an intermediate wall 50 and has mounted fast thereon a gear 46. Also mounted fast on shaft 45 are two multilobed cams 47 and 48 respectively aligned with and adapted to be engaged by the outer ends of fingers 43 and 44. Each of cams 47 and 48 is provided with a plurality of lobes, three lobes being shown for the preferred embodiment, for deflecting the respective fingers 43 and 44 away from the diaphragm and permit the fingers to forcibly and sharply strike the diaphragm to generate a sound having the pitch of an internal combustion engine.

An important part of the instant invention resides in the lobe spacing. The lobes on cams 47 and 48 are unequally spaced in order to provide an unequal rhythm in the generated sounds, thus assuring greater authenticity. As best shown in FIG. 4, the lobes on cam 47 are 47a, 47b and 47c while the lobes on cam 48 are 48a, 48b and 48c. Note that lobes 47a and 48a are the only lobes in alignment between the two cams. In operation, shaft 45 ro-

tates in the counterclockwise direction (FIG. 4) and each lobe, as it approaches the end of an associated finger, deflects the finger and thereafter releases it to strike the diaphragm. Due to the unequal spacing of the lobes, an uneven sound will be produced. When lobes 47a and 48a concurrently deflect the associated fingers, the resultant noise will be sharper than the noise from a single deflected finger, thereby resulting in even greater authenticity from the sharp beat.

The greater the number of fingers on the resilient striker, the more authentic will be the sound produced. For each finger, there would be a cam mounted for rotation with shaft 45, with each cam having a plurality of lobes preferably spaced randomly with respect to the lobes of all other cams.

The rotation of shaft 45 is effected through the gear train which drives the vehicle wheels. Side walls 34 and 35 are provided with suitable cutouts 51 and 52, respectively, to snap over bosses 21 to thereby secure the motor sound unit to the vehicle chassis. In the assembled position, gear 46 meshes with idler gear 25. Thus the speed of rotation of shaft 45 will be proportional to the driven speed of the vehicle to increase the frequency of the audible impacts as the speed of the vehicle increases.

The various posts and guides forming part of the motor sound unit as shown in FIG. 3 are provided for locating the motor sound unit with respect to the chassis and thereby depend on the particular configuration of the chassis.

It is to be noted that the aforesaid motor sound unit is adaptable for use with any toy vehicle, regardless of whether the vehicle be driven by an electric motor from an externally or internally supplied power source or a mechanical motor including windup and friction drive motors.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above construction without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed is:

1. A motor sound unit for a toy vehicle comprising a frame, sounding board carried by said frame, a resilient striker carried by said frame, said striker having at least

two fingers having portions thereof proximate to said sounding board, a shaft rotatable in said frame, means for rotating said shaft, and at least two multi-lobed cams carried by said shaft, one cam being associated with each of said fingers for sequential engagement between the lobes thereof and its associated finger to cyclically deflect said finger away from said sounding board and thereafter allow it to impinge on said sounding board, at least one lobe on one cam being in alignment with at least one lobe on an adjacent cam and at least another lobe on said one cam being out of alignment with at least another lobe on said adjacent cam.

2. A motor sound unit as claimed in claim 1 wherein said resilient striker comprises a spring element having one end secured to said frame, said spring element being bifurcated at the other end thereof and for substantially the entire length to divide said spring element into two resilient fingers, each of said fingers being bent proximate to said other end in a direction away from said sounding board whereby said fingers, substantially at said bends, are adapted to make contact with said sounding board, said other ends of said fingers being proximate to said multilobed cams.

3. A motor sound unit as claimed in claim 1 wherein said shaft is provided with two cams, each of said cams having three lobes.

4. A motor sound unit as claimed in claim 3 wherein one lobe on one of said cams is in alignment with one lobe on the other of said cams, the other lobes on said two cams being non-aligned.

5. A motor sound unit as claimed in claim 1 wherein said frame includes a planar element having an opening therethrough, said sounding board overlying said opening, and including means for securing the periphery of said sounding board to said planar element.

6. A motor sound unit as claimed in claim 5 wherein said resilient striker is secured to said planar element and overlies same on the side opposite the side carrying said sounding board, the fingers of said striker projecting over said opening whereby said resilient striker is spaced from said sounding board by the thickness of said planar element.

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