

March 10, 1953

T. R. DUNCAN
MUSICAL TOY VEHICLE

2,630,655

Filed June 5, 1948

2 SHEETS—SHEET 1

Fig. 1.



Fig. 2.

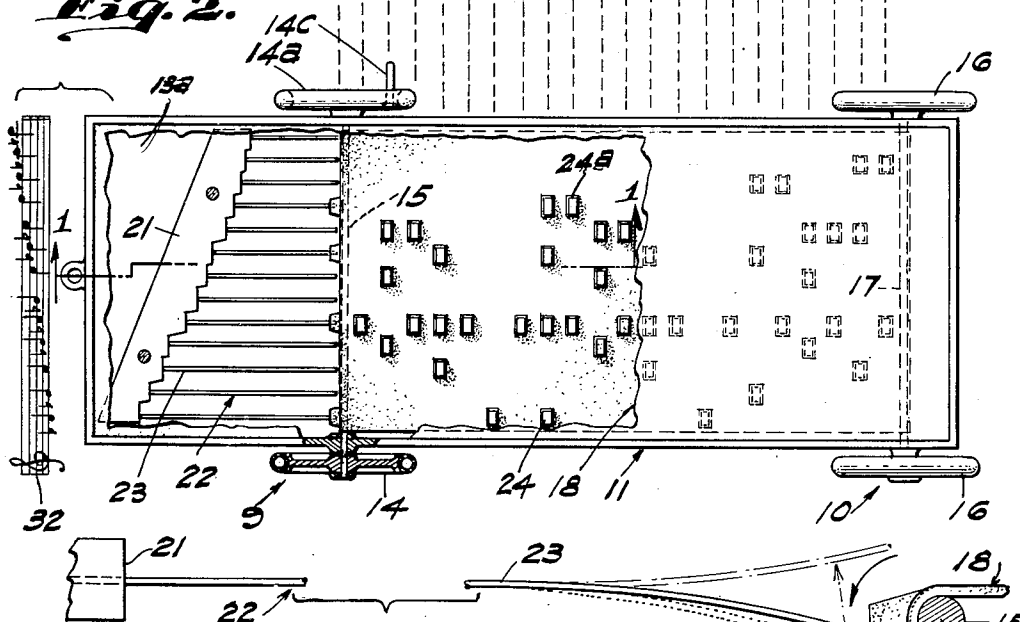


Fig. 3.

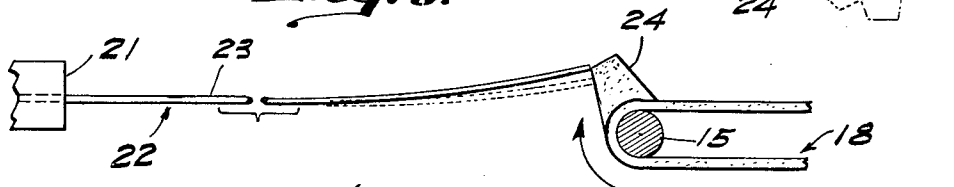


Fig. 4.

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2 SHEETS—SHEET 2

Fig. 5.

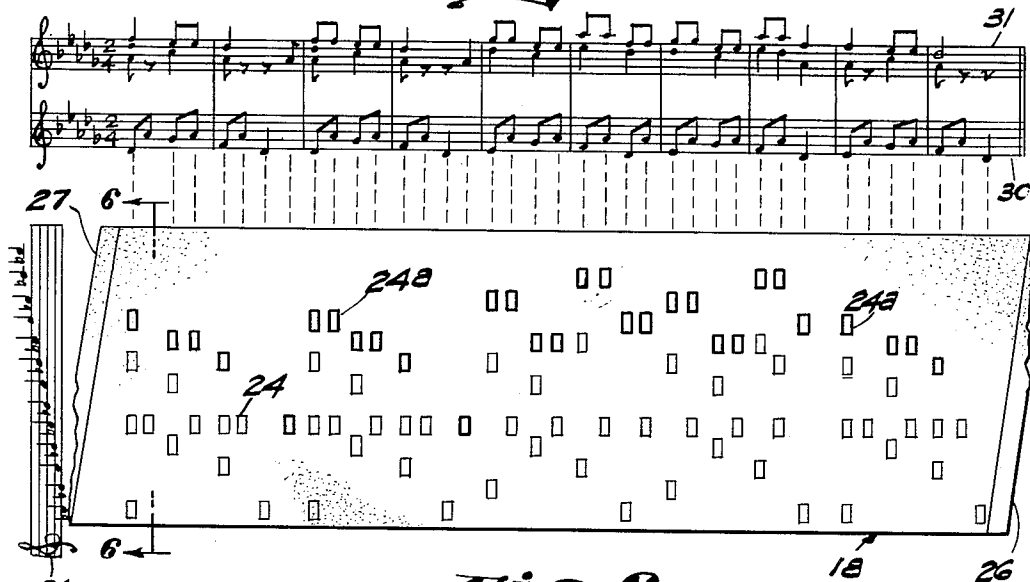


Fig. 6.

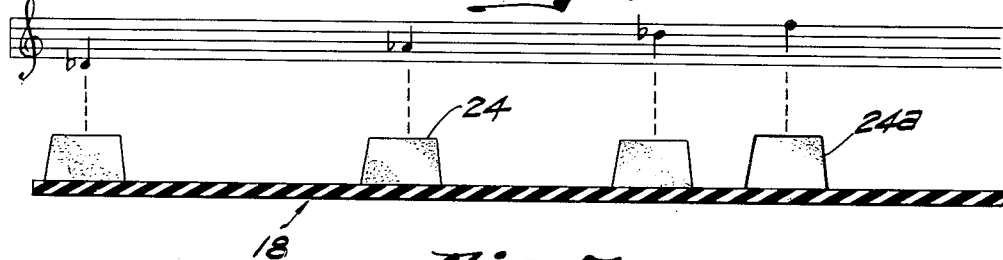


Fig. 7.

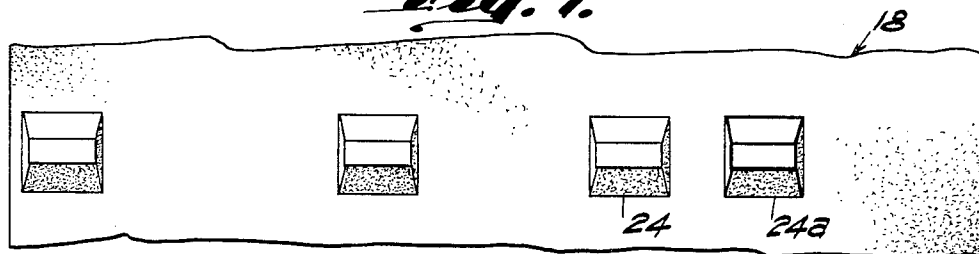
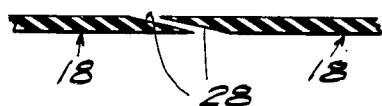


Fig. 8.



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2,630,655

MUSICAL TOY VEHICLE

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9 Claims. (Cl. 46—111)

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This invention relates to a musical toy vehicle. More specifically speaking the invention pertains to a wheel-mounted chassis carrying a melody comb the teeth of which are arranged to be plucked by protuberances extending outwardly from an endless belt extending around the rotatable axles of the vehicle.

Among important objects of the invention are: To provide a novel combination of music box and toy vehicle; to provide novel means attached to a running gear of said vehicle for accentuating efficiently the melody produced by the teeth of the comb and by certain teeth in particular plucked by such means during the movement of the running gear in one direction and to render silent the melody when plucked during the reverse operation of the mechanism; to provide new means for increasing the volume of tone of the tooth plucked; to provide in a toy wagon a musical comb the teeth of which are adapted to be plucked to play a melody by new means operable by traction wheels forming a part of the running gear for the wagon; to provide in a device of the kind described novel means for plucking the teeth of a musical comb mounted in a wagon, whether the wagon is being trailed or is held in the hand; and to provide, more specifically speaking, a wagon mounted melody comb the teeth of which are adapted to be plucked by protuberances upstanding from an elastic belt stretched over the axles of the wheels of the toy vehicle.

Other objects, advantages and features of invention will hereinafter appear.

Referring to the drawings wherein is shown what at present is deemed to be a preferred embodiment of the invention,

Fig. 1 is a view, partly in longitudinal side elevation and partly in vertical section, of the complete musical toy, the sectioned portion of the view being on the plane indicated by line I—I on Fig. 2.

Fig. 2 is a plan view of the complete toy, the forward portion of the upper floor structure being broken away in order to disclose underlying structure. In this view the tune played by plucking the comb teeth by the plucking fingers or protuberances carried by the belt is indicated by the notes on the staff in the upper part of the view, and the particular notes of the teeth of the comb are indicated by the staff shown at the left end of the view.

Fig. 3 is an enlarged detail diagrammatically illustrating the manner in which a particular comb tooth is being plucked by one of the fingers of the belt.

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Fig. 4 is an enlarged diagrammatic view illustrating the manner in which the plucking fingers of the belt avoid sounding of the notes when the belt is rotated in a direction the reverse of that assumed in Fig. 3.

Fig. 5 is a plan of the complete belt shown in an extended condition, with the complete tune produced by the belt indicated by the staff in the upper portion of the view, and the notes to be sounded by the fingers of the belt are shown in the staff at the left side of the view. Also, in this view the accented melody notes are shown in thicker lines than the remaining notes.

Fig. 6 is a section taken on line 6—6 of Fig. 5, indicating diagrammatically the tone produced by each protuberance shown.

Fig. 7 is a top plan view of the structure shown in Fig. 6.

Fig. 8 is a fragmentary enlarged section taken through the lapped portion of the belt where it is spliced.

Referring in detail to the drawings, therein is shown a music-producing vehicle comprising a front running gear 9 and a rear running gear 10, said running gears supporting a chassis or wagon bed 11 having a bottom 12 and a floor 13 superjacent said bottom and forming a false bottom space 13a therebetween.

The front running gear comprises wheels 14, 14a and an axle 15 connecting said wheels and the rear running gear comprises wheels 16 connected by a rear axle 17. Both of said axles 15 and 17 extend transversely through the false bottom space 13a and have mounted upon them an endless belt 18 preferably made of elastic material.

In the forward portion of the false bottom space the bottom 12 and floor 13 have adjacent, parallel thickened portions 19 and 20 respectively, between which is left space enough in which to mount the body portion 21 of a melody producing comb 22. Said comb 22, which is disclosed in detail in my co-pending application, Serial Number 28,767, filed May 24, 1948, now Patent No. 2,504,666 carries a series of pluckable teeth 23 constructed to produce when plucked different tones of a melody, said belt 18 carrying a multiplicity of outwardly projecting protuberances 24, which function as plucking fingers, and which are positioned to sweep across and pluck said comb teeth 23 thus producing a melody as the music-producing vehicle is trailed over a plane surface by means (not shown) connected to the eye 25 carried by the front end of the vehicle.

In Fig. 2 it will be noted that the tooth-holding

portion of the comb has its edge opposite the points of the teeth sloped and the thickened portions 19 and 20 of the bottom and floor also conform to this slope. The thickened portion 19 as shown in Fig. 1 is thicker than the portion 20. This construction is provided in order to properly space the ends of the teeth of the comb in relation to the axle 15 over which the front end of the belt travels in order that when the teeth are plucked as shown in Fig. 3 the proper sounding tone will be produced.

The projections or protruding plucking fingers are cast on the exterior surface of the rubber or "polyethylene" belt at the desired intervals. As seen particularly in Figs. 6 and 7 said projections are wider at the bottom than at the top. This manner of constructing them gives them strength to pluck the comb teeth and distributes the strain over the belt. The base of each projection is desirably made equal to the diameter of the front axle 15 plus twice the thickness of the belt. In other words, as also seen from Fig. 3 of the drawings, the base of each protuberance is preferably of a width, circumferentially of the axle 15, greater than the diameter of said axle. This feature causes the bases of the projections to be stretched around the axle at the moment the teeth are engaged, causing the belt to firmly grip the axle and in turn provide increased traction at the time and place needed. As also seen from the drawings the average height of the protuberances is of the same order of magnitude as the diameter of the driving shaft and the protuberances are generally rectangular in plan view with their long axes paralleling the axes of the axles, the protuberances being tapered from their bases to their outer ends, having outer end surfaces of a width approximating the diameter of the axle.

In Fig. 5 it will be noted that the belt 18 is cut on the bias at points 26 and 27 and in Fig. 8 the overlapping ends are tapered longitudinally as indicated by the numeral 28 where the overlapping ends are spliced.

The front ground wheel 14a is shown provided with a crank handle 14c, and, owing to the fact that said wheel, as well as the remaining ground wheels, is made fast to an axle, the user of the device may, while holding it in one hand, turn said wheel 14a and in turn said axle with his other hand and thus play the tune upon the teeth of the comb.

The drive shafts of this music box toy are only $\frac{1}{8}$ " in diameter. Experiment shows this design is preferable because:

(1) Width of belt provides ample traction surface, while each projection's base gives positive grip where needed. From one to four comb teeth are plucked at any one time, yet the entire width of belt helps to provide traction to do this work.

(2) Small diameter axle does the same work as if reduction gears are used. A child cranking this box or pulling the toy at a trot cannot play the tune too fast.

(3) Small diameter of axles means less power is needed to move the belt a given distance.

In Fig. 2 it will be seen that there are four fingers plucking four teeth of the comb. Said four fingers designate sounding of the four notes *d*, *a*, *d*, *f* on the staves 30 and 31, while the tones of the teeth being plucked by said fingers are denoted on the adjacent staff 32 at the left end of the view. In the latter staff the comb teeth being sounded are designated by the notes on the staff which they represent, such notes being

duplicative of the notes *d*, *a*, *d*, *f*, as described in relation to the staves 30 and 31. As the belt advances and brings additional plucking projections into engagement with different teeth of the comb there will be one or a number of fingers which pluck respective teeth, equal to the number of notes on the two staves 30 and 31.

In Fig. 2 the complete succession of the procession of advancing plucking projections, as well as the notes produced from the various teeth of the comb are indicated, both transversely and longitudinally, by the staves shown.

In Fig. 5 the extended view of the belt indicates transversely and longitudinally the tune which will be produced when the procession of plucking projections moves leftward and successively plucks the teeth of the comb from the starting point indicated in Fig. 2.

In Fig. 6 the four plucking fingers which start the playing of the tune represented by the chord *d*, *a*, *d*, *f*, are shown on an enlarged scale with the plucking finger 24a extending outwardly from the belt a greater distance than the remaining plucking fingers, in order to accentuate the note *f* on the tooth of the comb when it is struck by such finger.

The four wheel drive insures plenty of power to move the belt, because all four wheels are attached to the axles. It also provides a wheeled toy requiring but little traction to pull it. The wheels should have rubber tires with tread adapted to grip smooth hardwood or rough carpeted floors.

The plucking of the comb teeth may be briefly described as follows:

The leading side of the outer end portion of each projection first engages the wire tooth and then advances to the full line position of Fig. 3. As the end of said wire tooth presses against the surface of such projection the belt yields slightly to accommodate said wire tooth. At the instant the point of release of the tooth is approached the outer end portion of the protuberance is compressed, as indicated in dotted lines in Fig. 3, while the lower portion or side of the projection is stretched. At the moment of release the tooth springs free as indicated by phantom lines in Fig. 3 and said projection leaps forward out of the way of the tooth and the releasing projection is traveling away from the free end of the tooth with the bottom or return run of the belt, and the next succeeding or approaching projection will be spaced from the released one about the small radius arc of the belt about the axle, so that even though the longitudinal spacing of the projections may be relatively small, the approaching projection will be disposed free or out of the vibratory path of the released tooth. This sudden release of the tooth gives the tone of the tooth a noticeable ictus, simulating that provided by the skilled harpist, thus enhancing the brilliancy of the tone. The ictus effect is caused by the projection pulling the wire tooth somewhat beyond the normal amplitude of vibration, then releasing it suddenly. As a result the first vibration has greater than normal amplitude. The "polyethylene" or rubber belt, having a resiliency similar to that of the human fingers, permits this effect to be achieved without injury to the wire teeth. Likewise it will be obvious from the drawings and description herein that the movement of the belt in its flat portion will be relatively slower than the movement of the tips of the projections as they turn around the axles, further enhancing the plucking effectiveness or

ictus. The strength of the plucking action will also be favorably affected by moving the general plane of the comb to an offset position relative to the plane of the axles or belt so long as the comb continues to lie in the general plane of the belt within the effective plucking range of the teeth. This is most clearly observed by a comparison of Figs. 3 and 4 in the former of which the tooth 23 is plucked downwardly to the lower dotted outline position thereof representing thereby a significantly greater amplitude than the corresponding plucking action of the same tooth in Fig. 4 occasioned by a reverse rotation of the belt as indicated by arrows in said figures. Manifestly the belt will be plucked to some extent in either view and to a somewhat larger extent in the first case and lesser extent in the second case where the general plane of the comb is adjusted downwardly as illustrated relative to the general plane or effective plucking range of the belt. Also as stated a small axle has been found advantageous in permitting slow belt movement for playing long pieces of music while nevertheless permitting a fast moving plucking action. The ratio of height of the protuberance to axle diameter, the belt thickness in any case being relatively negligible, has been found to be at an optimum when the two are approximately in correspondence.

If, for any reason, the rotation of the belt is reversed, I provide for at such time silencing the device. In that case, when each plucking projection passes a comb tooth, (see arrow in Fig. 4) the extremity of the tooth sweeps over the outer end portion of the projection and then grazes the trailing side of the projection in such a manner that the tooth is released in a non-vibratory, inaudible manner.

In using the device the child will ordinarily produce the tune by drawing the toy vehicle across a plane surface by means of a cord attached to the eye 25. Owing to there being room in the wagon to place toys or other articles, this may be done adding to the weight thereof, thus increasing the tractive force of the wheels.

I claim:

1. In a musical toy comprising a frame, a pair of parallel axles supporting said frame, at least one of which is freely rotatable thereon, ground engaging wheels mounted on opposite ends of said axles, at least one of which is non-rotatably secured to the rotatable axle, and adapted to rotate said axle upon progress of said toy over a ground surface, the feature of novelty comprising an endless resilient and flexible belt trained over said rotatable axle for rotation thereby, said belt being formed with a plurality of resiliently deformable rubber-like protuberances extending outwardly therefrom in preselected sequence and a musical comb having outwardly extending pluckable teeth secured to said frame with the ends of said teeth in such spaced relation with respect to said belt, as it traverses around said rotatable axle, that said protuberances pluck said teeth in said preselected sequence.

2. In a musical toy comprising a frame, a pair of parallel axles supporting said frame, at least one of which is freely rotatable thereon, ground engaging wheels mounted on opposite ends of said axles, at least one of which is non-rotatably secured to the rotatable axle, and adapted to rotate said axle upon progress of said toy over a ground surface, the feature of novelty comprising an endless resilient and flexible belt trained over said axle for rotation thereby, said belt being

formed with a plurality of resiliently deformable rubber-like protuberances having sloping sides, said protuberances extending outwardly therefrom in preselected sequence and a musical comb having outwardly extending pluckable teeth secured to said frame with the ends of said teeth in such spaced relation with respect to said belt, as it traverses around said rotatable axle, that said protuberances pluck said teeth in said preselected sequence, the plane defined by said axles being generally parallel to, but slightly off-set from, a plane defined by the teeth of said musical comb.

3. In a musical toy, a body, vibratory sound producing teeth secured at one end to the body and each having a resiliently flexible free end, means for directly plucking the free ends of said teeth in a manner to produce harp-like sound effects, comprising soft, resiliently deformable, rubber-like plucking members, support means rotatably carried by said body immediately adjacent the free ends of said teeth and supporting said members in preselected order in position to directly pluckably engage said teeth in said order in response to rotation of said support means, and means for rotating said support means.

4. The device of claim 3 wherein said plucking members are soft enough to yield in compression and in a direction opposite the direction of rotation of said support means upon engagement with the free ends of said teeth, and are resilient enough to resume their normal, undeformed shape and flex away from said teeth upon disengaging therefrom.

5. The device of claim 3 wherein some of said plucking members are longer than others.

6. A musical toy comprising a body, a musical comb mounted on the body and having sound producing teeth presenting pluckable free ends, means for plucking said teeth in selective order, comprising a flexible, continuous belt, resiliently deformable rubber-like protuberances disposed in predetermined sequence on said belt, means movably supporting said belt in position to cause said respective protuberances to directly pluckably engage the free ends of said teeth in response to movement of the belt, comprising a pair of belt supporting members rotatably carried by the body and over which said belt is trained in tension, the first of said belt supporting members being disposed immediately adjacent the free ends of said teeth, and means for rotating one of said belt supporting members.

7. The device of claim 6 wherein said belt is elastic and wherein said protuberances are integral with the belt.

8. The device of claim 6 wherein said teeth are disposed in the general plane of one run of said belt.

9. In a musical toy, a body, a continuous flexible belt, transversely spaced rows of resiliently deformable protuberances spaced apart longitudinally of the belt in preselected relationship, means movably supporting the belt in tension in a manner to provide advancing and return runs thereof, comprising a pair of parallel belt supporting members rotatably mounted on the body, and a musical comb having a row of spaced sound producing teeth which terminate in aligned, pluckable, vibratory free end portions, said comb being mounted on the body in position to dispose said free ends of said teeth immediately adjacent the first of said belt supporting members and in the path of movement of said rows of protuberances as said belt moves about said first

belt supporting member, whereby to cause said protuberances to pluckably engage said teeth in preselected order in response to said movement of said belt, and means for rotating one of said belt supporting members; said first belt supporting member being of such small diameter in relation to the thickness of the belt, the length, spacing and deformability of said protuberances and the vibratory limits of the free end portions of said teeth that at the moment each protuberance disengages from one of said teeth in response to said movement of the belt, it will be moving away from the free end of said disengaged tooth with the return run of said belt in a direction substantially axially of said released tooth, and the next succeeding protuberance in the same row will be sufficiently arcuately spaced from said disengaged protuberance as to be out of the path of vibration of said disengaged tooth.

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