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Morin et al.

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[54] **POWER TOOL TOYS**

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[52] **U.S. Cl.** **46/39,** 46/175

[51] **Int. Cl.** **A63h 33/30**

[58] **Field of Search** ..... 46/39, 175, 211, 189, 117, 46/207, 206, 1 R, 247

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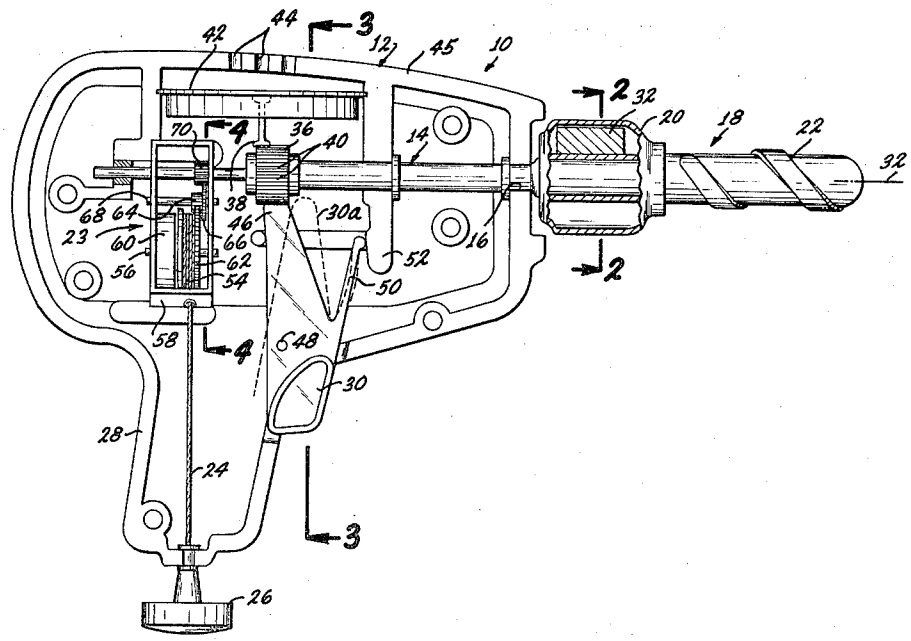
[57] **ABSTRACT**

Toys that simulate power tools, including pull-string motors that drive mechanisms which vibrate the housing and make noises. One toy has a housing representing an electric drill and a rotatable shaft in the shape of a drill chuck and drill. An eccentric weight is mounted in the chuck to vibrate the drill when the output shaft is rapidly rotated.

8 Claims, 12 Drawing Figures



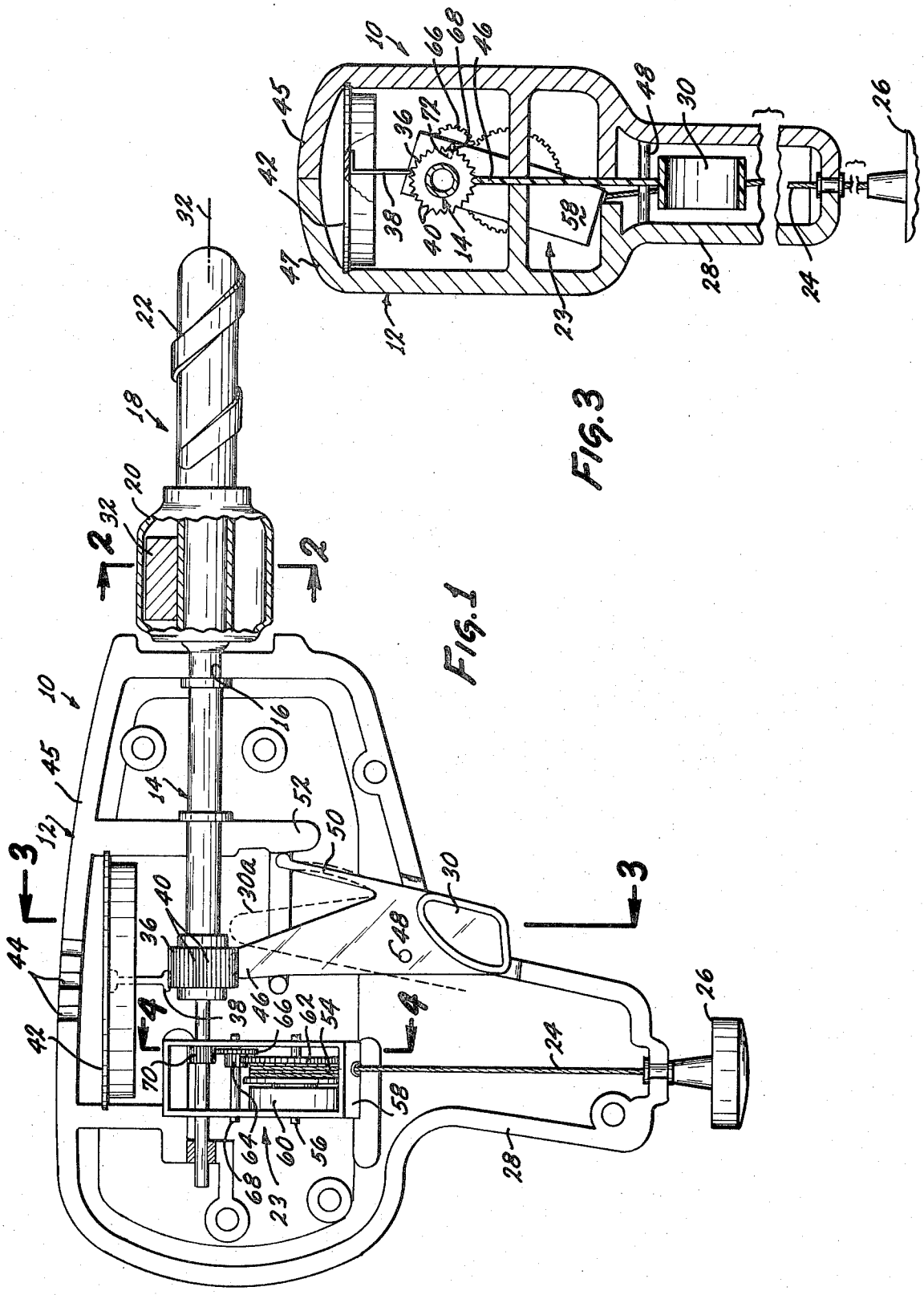

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Fig. 1

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Fig. 3

FIG. 2

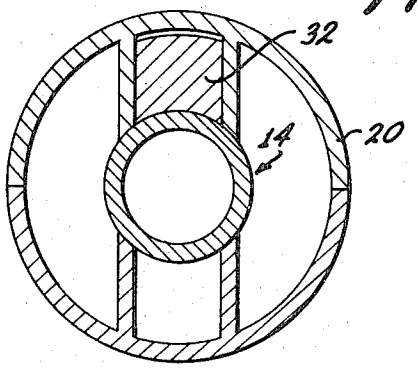
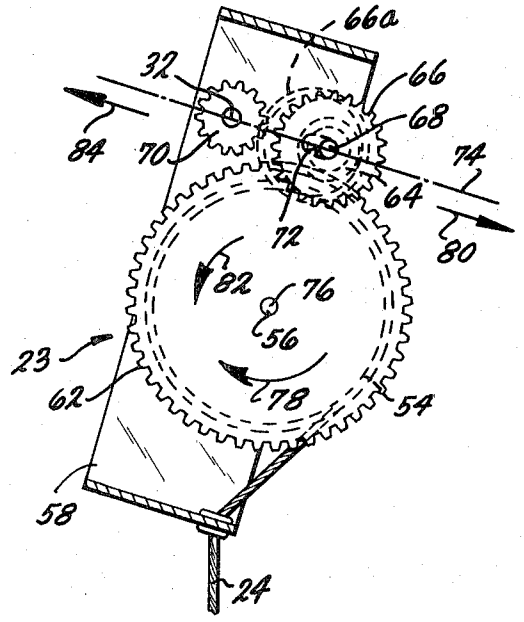


FIG. 4



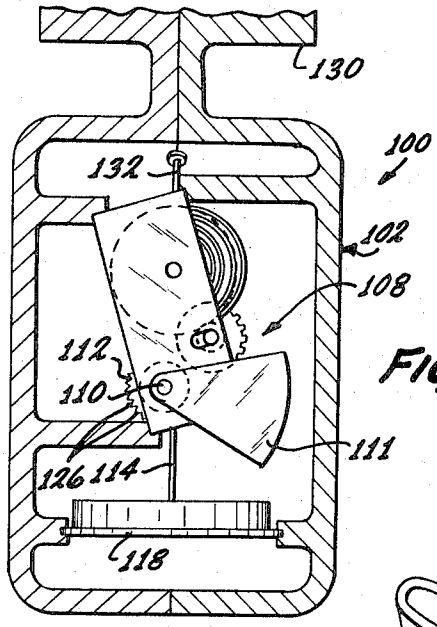


FIG. 6

FIG. 5

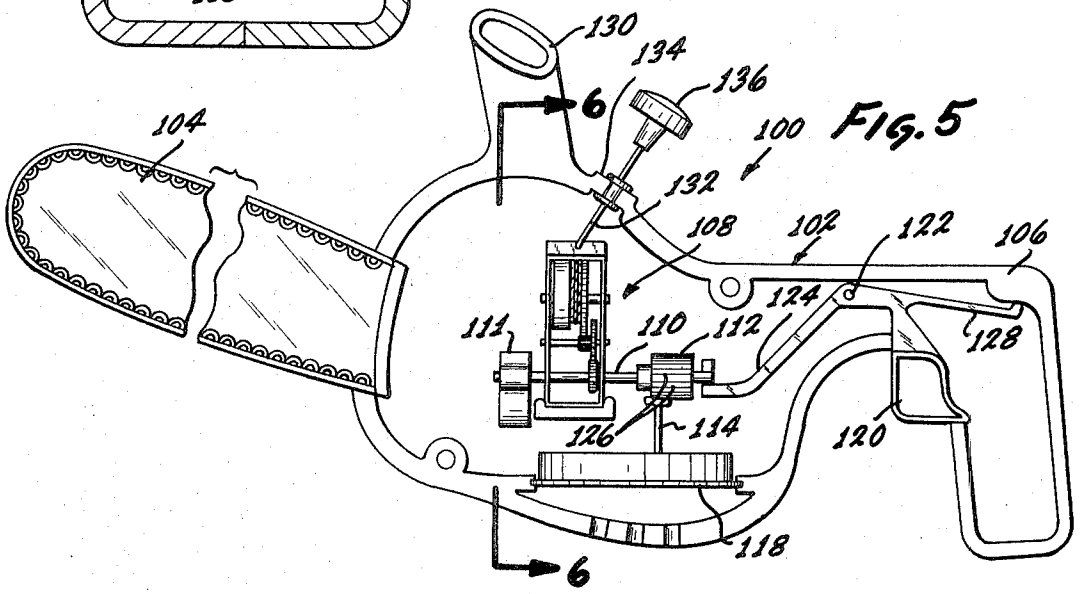


FIG. 7

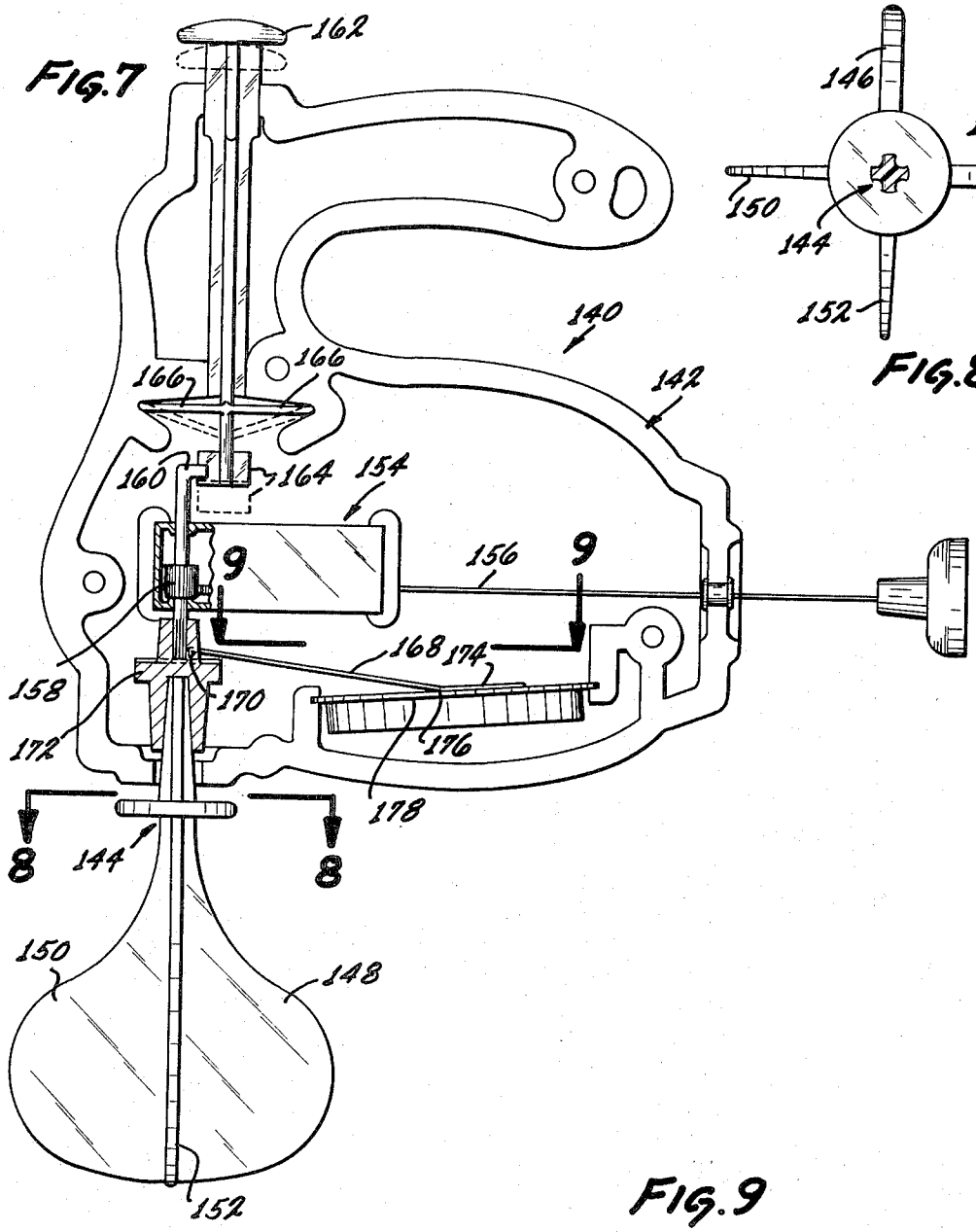
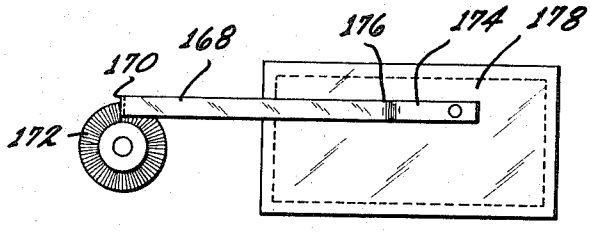


FIG. 8

FIG. 9



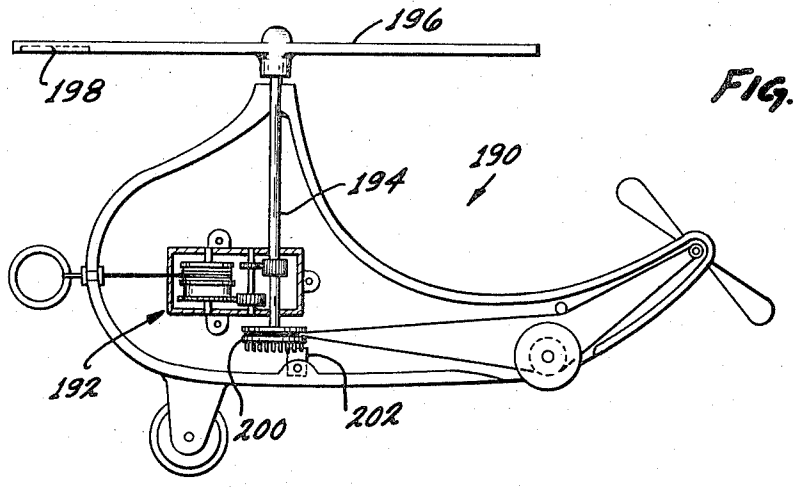


FIG. 10

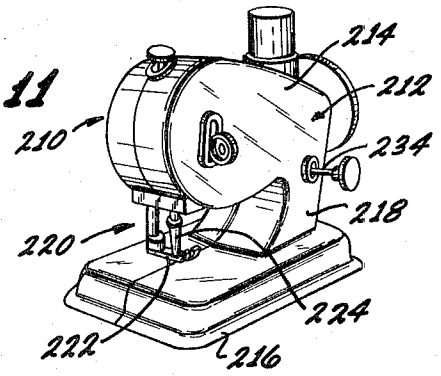
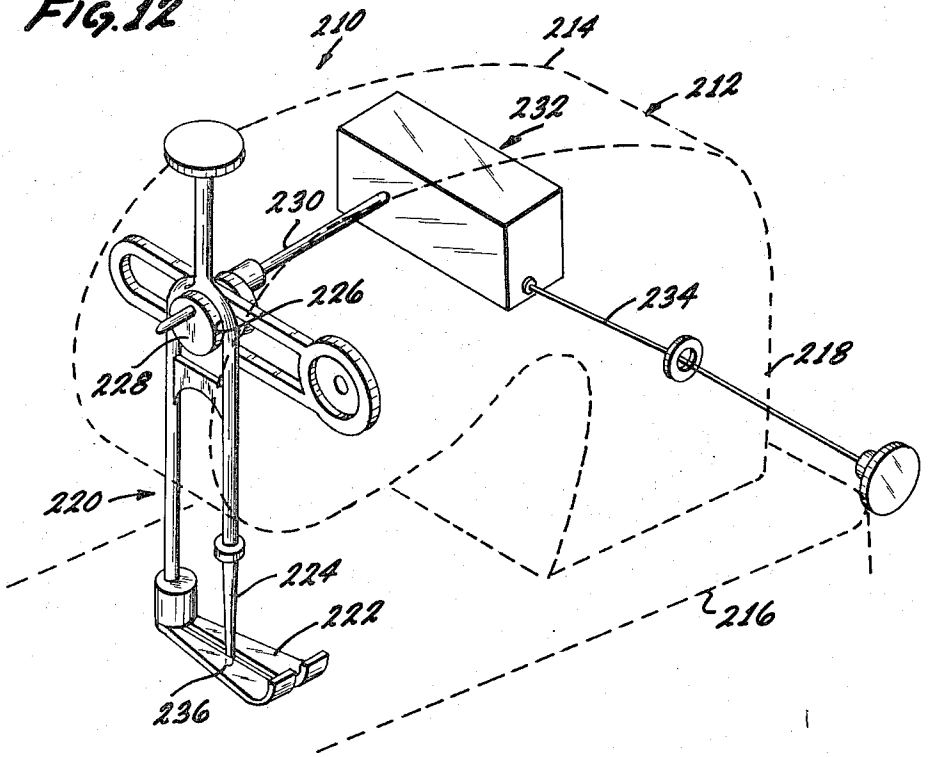


FIG. 11

FIG. 12



POWER TOOL TOYS

BACKGROUND OF THE INVENTION

This invention relates to toys that simulate power driven equipment.

Toys that simulate common tools and appliances that children are generally not allowed to use, often make entertaining playthings. Common power driven devices such as electric drills and electric mixers are often very interesting to children not only because they are used only by adults, but also because they have rapid movements and make noise. Toys that simulate such articles can be made especially interesting by including apparatus for making noises and movements appropriate to the simulated tool and even in an exaggerated amount.

SUMMARY OF THE INVENTION

In accordance with one ambodiment of the present invention, a toy simulating "real life" power driven equipment is provided, which simulates movements and noises created by the real life equipment as well as having a similar appearance. The toy includes a pull-string motor that drives an output shaft with an eccentric weight thereon that vibrates the toy housing. A multi-tooth wheel fixed to the shaft is engaged by a leaf spring that extends to an acoustical amplifier for making noise as the shaft rotates and the toy housing vibrates. A manually controlled trigger can engage a toothead wheel on the output shaft to prevent shaft rotation until a child operates a trigger or the like that simulates the switch on the real life tool.

In one toy, which simulates an electric drill, the output shaft has an outer portion that has the shape of a drill chuck and drill bit. A weight is mounted in the drill chuck at one side of the axis of rotation to vibrate the drill. The location of the weight in the chuck results in wobbling of the drill bit that simulates movements of real drills due to torques often encountered in drilling.

Another toy represents an electric mixer wherein at least one of the mixing blades is thicker than the others to create vibrations when the blades rotate. Still another toy represents a chain saw, and includes an enclosed shaft carrying a large eccentric weight to vibrate the housing. The pull-string of the chain saw motor extends with a rearward directional component to simulate the starting cord on a real gasoline engine chain saw. Another toy represents a helicopter with an unbalanced rotor for vibrating the helicopter housing. Yet another toy represents a sewing machine with a pressure foot and needle that oscillate up and down and which hit the housing on every downstroke to generate noise.

The novel features of the invention are set forth with particularity in the appended claims. The invention will best be understood from the following description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a partially sectional side view of a toy electric drill constructed in accordance with a first embodiment of the present invention;

FIG. **2** is a view taken on the line **2—2** of FIG. **1**;

FIG. **3** is a view taken on the line **3—3** of FIG. **1**; FIG. **4** is a view taken on the line **4—4** of FIG. **1**;

FIG. **5** is a partially sectional side view of a toy chain saw constructed in accordance with another embodiment of the invention;

FIG. **6** is an enlarged, cross-sectional view taken on the line **6—6** of FIG. **5**;

FIG. **7** is a partially sectional side view of a toy electric mixer constructed in accordance with still another embodiment of the invention;

FIG. **8** is an enlarged, cross-sectional view taken on the line **8—8** of FIG. **7**;

FIG. **9** is a view taken on the line **9—9** of FIG. **7**;

FIG. **10** is a sectional side view of a toy helicopter constructed in accordance with yet another embodiment of the invention;

FIG. **11** is a perspective view of a toy sewing machine constructed in accordance with a still further embodiment of the invention; and

FIG. **12** is a partial, enlarged perspective view of the sewing machine of FIG. **11**, showing the operating mechanism thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. **1–4** illustrate a toy drill **10** which includes a housing **12** representing that of a common electric drill, and an output shaft **14**. The output shaft **14** projects through a hole **16** in housing **12**, and has an outer portion **18** in the shape of a drill chuck **20** with a drill **22** therein. A motor **23** mounted within the housing is coupled to the output shaft **14** to rapidly rotate it. The motor is of the pull-string type which is operated by pulling and releasing a string **24**.

A child can operate the drill by pulling a knob **26** attached to the string **24** to wind the motor **23**. The child then grasps a handle **28** formed on the housing, and places his index finger around a trigger switch or trigger **30**. When the child depresses the trigger **30**, the trigger releases the shaft **14** to permit it to rapidly rotate. When the shaft rotates, the tool provides a realistic, if not exaggerated, simulation of an operating drill. The drill chuck **20** and drill **22** are seen to rapidly rotate while large vibrations can be felt and considerable realistic noise is heard.

Vibrations of the toy are produced by a weight **32** that is mounted in the drill chuck **20** near the radially outer portion thereof. The chuck **20** provides a good mounting location for the eccentric weight **32** because the chuck is an enlarged portion of the output shaft that must be provided anyway for a realistic appearance. In addition, vibrations induced at the location of the chuck **20** provide an especially realistic movement, because the weight **32** at an overhanging shaft location urges the output shaft **14** to rapidly wobble as it rotates. The drill **22** and chuck **20** therefore appear to rapidly vibrate in a manner simulating vibrations resulting from operation of a real electric drill.

A realistic noise is generated by a multitoothed wheel **36** which is fixed to the output shaft **14**. A resilient member **38**, of a material such as spring steel, has an outer end in the path of the teeth **40**, so that the resilient member is rapidly vibrated when the shaft rotates. The resilient member **38** has an opposite end fixed to a thin and wide-area diaphragm or speaker **42** which vibrates a considerable volume of air so that a loud noise is created. Holes **44** are formed in the housing to facilitate transmission of the noise. The housing **12**, which is formed in two sections **45** and **47**, is con-

structed of a material which is easily formed by injection molding, such as polyethylene foam. This material tends to dampen vibrations, and the separate speaker **42** is therefore utilized to amplify vibrations instead of attaching an end of the resilient member **38** to the housing. The trigger **30**, which can start and stop the tool, has an arm **46** which engages the multi-toothed wheel **36** to normally prevent output shaft rotation. The trigger **30**, which is pivotably mounted at **48** on the housing, has a spring arm **50** that bears against a flange **52** of the housing. The trigger can be pivoted to the position **30a** when a child operates the trigger, to disengage the arm **46** from the multi-toothed wheel and permit the motor **23** to rapidly rotate the output shaft.

The motor **23** which drives the output shaft includes a string drum **54** on which an inner end of the pull-string **24** is mounted. The drum **54** is fixed to a motor shaft **56** that is rotatably mounted on a motor frame **58**. A coil spring **60**, which has opposite ends respectively fixed to the shaft **56** and to the frame **58**, is wound when the pull-string **24** is pulled. The wound spring then urges the shaft **56** to rotate in an opposite direction to rewind the string on the drum **54**.

The motor shaft **56** is coupled to the output shaft **14** through a motor gear **62** fixed to the motor shaft **56**, an idler gear assembly including an idler pinion **64** and idler gear **66** that are both fixed to an idler shaft **68**, and an output gear **70** that is fixed to the output shaft **14**. If all of the gears of this gear train were constantly engaged, then the output shaft **14** would be rotated when the pull-string **24** were pulled. This would be undesirable because it would make pulling of the string more difficult and because the trigger **30** would then have to be held depressed while the string were pulled. To prevent constant engagement of the gears, the motor housing **58** is provided with a pair of slots **72** (FIG. **3**) which the idler shaft **68** can slide along. This permits the idler shaft **68** to slide from a first position wherein the idler gear **66** is disengaged with the output gear **70**, to a second position wherein the idler gear at **66***a* (FIG. **4**) is engaged with the output gear **70**.

The slot **72** which receives the idler shaft **68**, is oriented along an imaginary line **74** which extends along a radius to the axis of rotation **32** of the output gear **70** and circumferentially about the axis **76** of the motor gear **62**. Accordingly, the idler pinion **64** is always engaged with the motor gear **62**, but the idler gear **66** can move into and out of engagement with the output gear **70**.

The direction in which the pull-string **24** is wound about the pulley **54** is chosen so that, when the pull-string is pulled, the motor gear **62** rotates in the direction of arrow **78**. The teeth of motor gear **62** then move past the idler pinion in the direction of arrow **80** to urge the idler gear **64** away from the drive shaft gear **70**. When the string **24** is released, the coil spring **60** rotates the motor gear **62** in the direction of arrow **82**, which results in the teeth of the motor gear **62** moving past the idler pinion **64** in the direction of arrow **84**. This causes the idler shaft **68** to shift its position so that the idler gear **66** engages the drive shaft pinion **70** to rotate the drive shaft. Thus, the motor is automatically disengaged and engaged with the output shaft **14** to facilitate motor winding. The idler shaft and gear assembly therefore acts not only as a speed increasing gear train but also as a direction sensitive clutch.

FIGS. **5** and **6** illustrate a toy chain saw **100** which simulates a real chain saw not only in appearance, but in the generation of realistic noises and the creation of realistic vibrations. The toy includes a housing **102** largely simulating that of a chain saw, including a forwardly extending simulated chain **104** and a rearwardly extending handle **106**. A pull-string motor **108** is mounted in the housing to drive a shaft **110**. A large weight **111** is mounted eccentrically on the shaft **110** to vibrate the housing when the shaft rapidly rotates. A toothed wheel **112** is also mounted on the shaft, and a resilient member **114** that extends to a speaker **118** engages the toothed wheel to generate noise. A trigger **120**, pivotably mounted on the housing at **122**, has a brake arm **124** normally engaging a projection on shaft **110** normal thereto. This prevents rotation of the output shaft. When the trigger is squeezed against the biasing of a spring arm **128**, the output shaft is freed for rotation by the motor **108**.

The housing is provided with an upstanding handle **130** of a type which is often found on chain saws. The pull-string **132** of the motor extends with a rearward directional component from the location **134** where it passes through the housing. This is a direction simulating the direction in which a starting cord generally extends from the gasoline engine of a chain saw. A child can wind the motor by pulling on a knob **136** attached to pull string **132** while holding the handle **130** of the chain saw, in a manner simulating the starting of the gasoline engine of a real chain saw. The child may then hold the top handle **130** in one hand and the rearward handle **106** in his other hand and squeeze the trigger **120** to cause the chain saw to operate. The toy chain saw then vibrates and makes considerable noise.

FIGS. **7–9** illustrate a toy electric mixer **140** which simulates a real mixer. The toy mixer **140** includes a housing **142** representing an electric mixer housing, and an output shaft **144** projecting through the housing. The output shaft **144** has an inner portion within the housing, which is motor driven, and an outer portion representing multiple mixing blades. As illustrated in FIG. **8**, some of the blades **146, 148** are of greater mass than other blades **150, 152**. These heavier blades **146, 148** are concentrated on one side of the output shaft to form an eccentric weight that unbalances the shaft. The mixer includes a motor **154** similar to that of the motor **23** in FIG. **1**, with a drawstring **156** extending through the housing. The motor drives an output gear **158** on the output shaft to rotate it.

The upper end of the output shaft has a single tooth **160** extending therefrom which can be engaged to prevent output shaft rotation. A manually operated switch button **162** is slideably mounted on the housing and has a toothed wheel **164** at its lower end for engaging the tooth **160** of the output shaft. When the button **162** is depressed against the biasing of a pair of leaf springs **166**, the teeth at **164** move down and out of engagement with the tooth **160** of the shaft to permit output shaft rotation. Noise is made by a resilient member **168** which has an end portion **170** biased against a multi-toothed wheel **172** on the output shaft. The resilient member **168** has an inner end **174** fixed to the housing and a middle portion **176** biased against a speaker **178** that amplifies vibrations.

FIG. **10** illustrates a toy aircraft **190** with a pull-string motor **192** and an output member **194** which includes a shaft with a rotor **196**. The rotor has a plurality of

blades of lightweight material, and also includes a weight **198** in one of the rotors for unbalancing the output member to make the craft vibrate when the output member rotates. The toy also includes a multi-toothed wheel **200** and a leaf spring **202** for engaging the teeth of the wheel to create noise.

FIGS. **11** and **12** illustrate a toy sewing machine **210** which produces movements, vibrations, and noise simulating a real sewing machine. The sewing machine includes a housing **212** with an upper housing portion **214**, a lower housing portion **216**, and a column **218** joining the upper and lower housing portions. A reciprocal member **220** is moveably mounted in the housing and has a lower portion representing a pressure foot **222** and a needle **224**, the foot **222** and needle **224** being integral. The reciprocal member **220** has a large bearing hole **226** which receives an eccentric portion **228** of a drive shaft **230**. The drive shaft **230** is driven by a pull-string member **232** which is of the type shown at **23** in FIG. **1** and which is mounted in the housing. Motor **232** has a pull-string **234** extending through the column portion **218** of the housing. When the motor rotates the drive shaft **230**, the eccentric portion **228** moves the middle portion of the reciprocal member **220** in a circle. This causes the pressure foot **222** and needle **224** to move, and some of the movement is in an up and down direction. At each rotation of the drive shaft **230**, the reciprocal assembly **220** moves down low enough so that it strikes the lower portion **216** of the housing to create a tapping sound. The lower end or tip **236** of the needle **224** is the portion that actually contacts the lower housing portion **216**, and a relatively sharp sound is made. The rapid movement of the reciprocal member **220** creates vibrations, and these vibrations and the tapping sound simulate the operation of a real sewing machine.

Thus, the invention provides toys that simulate power driven devices not only in appearance, but in the creation of vibrations and noise. Those devices such as drills, mixers, and airplanes which have rotary outputs can be made to vibrate by unbalancing the rotary output member. A device with a reciprocal output, such as a sewing machine, can be made to vibrate by rapid oscillation of a needle and other apparatus fixed to it, such as a simulated pressure foot. Noise can be created by the use of a resilient member that is repeatedly flicked by a multi-toothed wheel fixed to the drive shaft, and the sounds can be amplified by the use of a wide area acoustic amplifier or speaker that is coupled to the resilient member. In the case of a reciprocal device such as a sewing machine, noise can be created by permitting the reciprocal member to bottom-out on the housing.

Although particular embodiments of the invention have been described and illustrated herein, it is recognized that modifications and variations may readily occur to those skilled in the art and consequently it is intended that the claims be interpreted to cover such modifications and equivalents.

What is claimed is:

1. A toy simulating a power driven device with a moveable output member, comprising:

1. a housing of substantially the same shape as that of said power driven device;

2. a motor mounted in said housing;

3. an output member moveably mounted on said housing and projecting therethrough, the output portion projecting out of the housing representing said output member in said useful power driven device and the output portion within the housing being coupled to the motor for movement thereby, at least one of said output portions including means for vibrating said housing when said output portions are moved, at least one of said output portions being rotatably mounted and carrying an eccentric weight for vibrating said housing;

4. a toothed member fixed to said output member within said housing; and

5. a manually operable trigger pivotably mounted on said housing and having a catch arm moveable into and out of engagement with said toothed member to control rotation of said output member, sais motor including:

A. a rotatably mounted string drum;

B. a pull string having an inner end on the drum and an outer end projecting through the housing;

C. a coil spring coupled to the drum; and

D. means coupling the drum to said output member, so that when the string is pulled and released the spring can rotate at least a portion of said output member.

2. The toy described in claim **1** including:

a speaker member having a thin and large area portion for vibrating a large volume of air; and

a resilient member having a first portion engaged with the speaker member and a second portion biased into engagement with said toothed member for actuation thereby.

3. A toy simulating a power driven device with a moveable output member, comprising:

1. a housing of substantially the same shape as that of said power driven device;

2. a motor mounted in said housing, said motor including:

A. a rotatably mounted string drum;

B. a pull string having an inner end on the drum and an outer end projecting through the housing;

C. a coil spring coupled to the drum;

D. a motor gear and an output gear respectively coupled to said string drum and to said output member;

E. an idler shaft;

F. an idler gear assembly mounted on said idler shaft; and

G. means defining an idler bearing slot extending substantially along a radius to the axis of rotation of said output gear and circumferentially about the motor gear, said idler shaft slideable along said slot so the idler gear assembly remains constantly engaged with the motor gear but may engage or disengage the output gear, said string being wound in a direction on the drum so that when the string is pulled off the drum the teeth of the motor gear move past the idler gear assembly in a direction to urge the idler gear assembly away from the output gear, and when the string rewinds onto the drum the teeth of the motor gear move past the idler gear assembly in a direction to urge the idler gear assembly towards the output gear, whereby to enable pulling of the string without rotating the output gear; and

3. an output member moveably mounted on said housing and projecting therethrough, the output portion projecting out of the housing representing

said output member in said useful power driven device and the output portion within the housing being coupled to the motor for movement thereby, at least one of said output portions including means for vibrating said housing when said output portions are moved.

4. A toy simulating an electric drill comprising:
a housing in the form of an electric drill housing;
an output shaft assembly rotatably mounted on the housing and having inner and outer portions respectively inside and outside the housing; and
a motor coupled to the shaft assembly to rotate it;
said outer portion of said shaft assembly being in the shape of a drill chuck with a drill extending therefrom, and said outer portion having a weight mounted eccentric to the axis of rotation of the shaft assembly.

5. The toy described in claim 4 wherein:
said weight is mounted in said drill chuck.

6. The toy described in claim 4 wherein:
said housing has a handle extending perpendicular to the drive shaft assembly;
said motor includes a coil spring coupled to said output shaft assembly, a string drum, means for coupling the string drum to the output shaft assembly, and a string extending through the handle and having a knob thereon; and
said output shaft assembly includes a toothed wheel; and including
a trigger pivotally mounted on the housing and having an arm moveable between first and second positions respectively engaged and disengaged with the output shaft assembly;
a large area speaker; and
a resilient leaf extending between the speaker and the toothed wheel.

7. A toy simulating a power tool comprising:
a housing simulating the housing of a power tool, said housing being constructed of lightweight foam material and having at least one hole therein;
a wind up motor mounted in the housing, including a string drum, a pull string having an inner portion coupled to the drum and an outer portion extending through the housing, a spring coupled to the drum, and an output shaft coupled to the spring to be rapidly rotated by it;
an eccentric weight coupled to the shaft to vibrate the housing;
a manually operable member biased towards a first position in engagement with the shaft to prevent shaft rotation when the string is pulled to wind the spring, and manually moveable to a second position out of engagement with the shaft to permit its rotation;
a toothed wheel coupled to the shaft to be rotated by it;
a thin and large area speaker member mounted in said housing and facing the hole; and
a leaf spring member extending between the speaker member and the toothed wheel, to be alternately deflected and released thereby.

8. A toy simulating a power tool comprising:
1. a housing simulating the housing of a power tool;
2. a wind up motor mounted in the housing, including a string drum, a pull string having an inner portion coupled to the drum and an outer portion extending through the housing, a spring coupled to the drum, and an output shaft coupled to the spring to be rapidly rotated by it, said spring being constantly connected to said string drum, said motor including:
A. motor and output gears respectively coupled to said string drum and to said output shaft;
B. an idler gear assembly which includes an idler shaft and an idler gear mounted on said idler shaft; and
C. means defining an idler bearing slot extending substantially along a radius to the axis of rotation of said output gear and along a circumferential imaginary line concentric with the first gear, said idler shaft slideable along said slot so the idler shaft assembly remains constantly engaged with the motor gear but can engage or disengage the output gear, said string being wound in a direction on the drum so that when the string is pulled off the drum the teeth of the motor gear move past the idler gear in a direction to urge the idler gear away from the output gear, and when the string rewinds onto the drum the teeth of the motor gear move past the idler gear in a direction to urge the idler gear towards the output gear, whereby to enable pulling of the string without rotating the output shaft;
3. an eccentric weight coupled to the shaft to vibrate the housing; and
4. a manually operable member biased towards a first position in engagement with the shaft to prevent shaft rotation and manually moveable to a second position out of engagement with the shaft to permit its rotation.

* * * * *