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FLYING TOY WITH VIBRATING STRANDS

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FIG. 1.

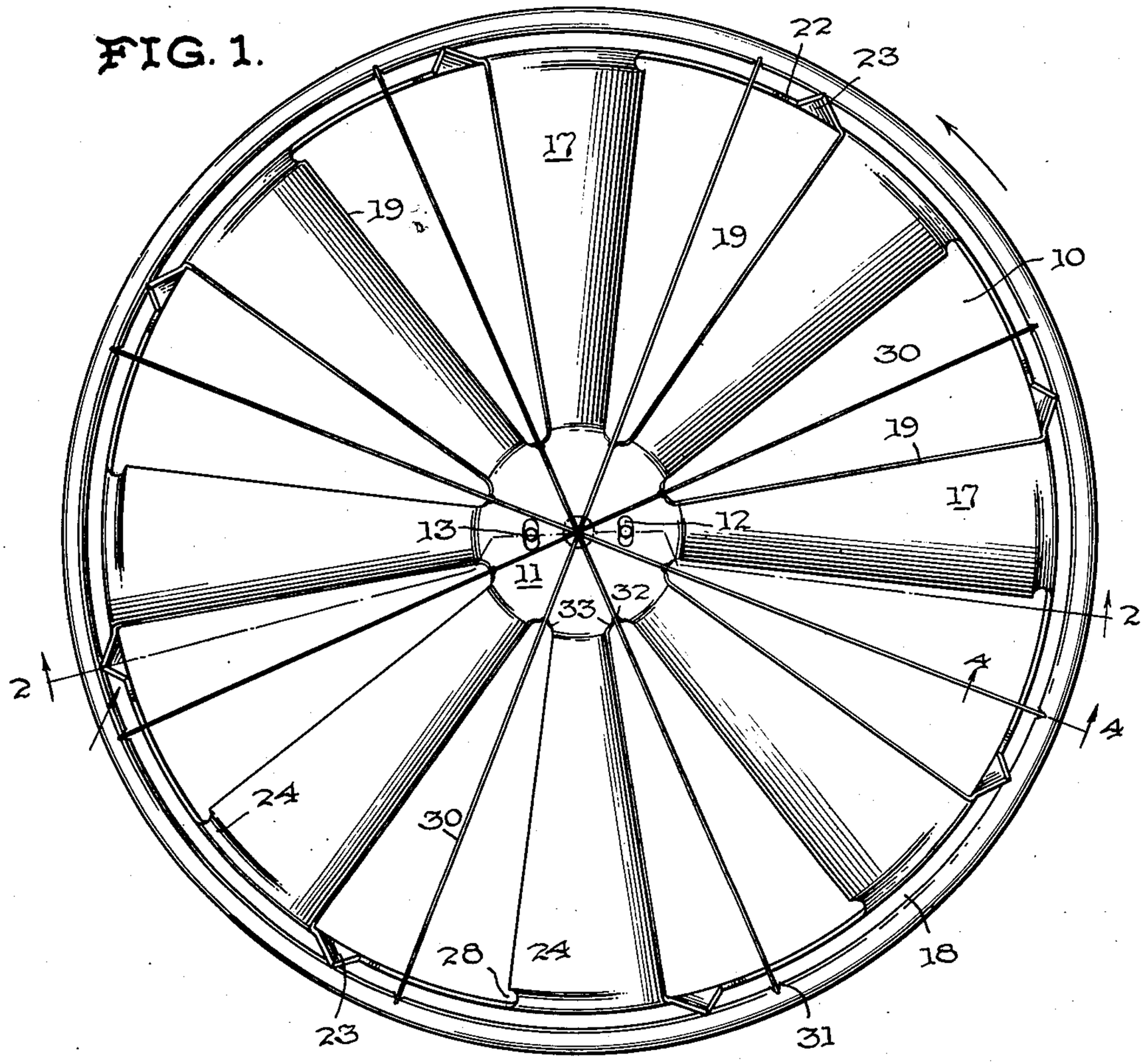


FIG. 2.

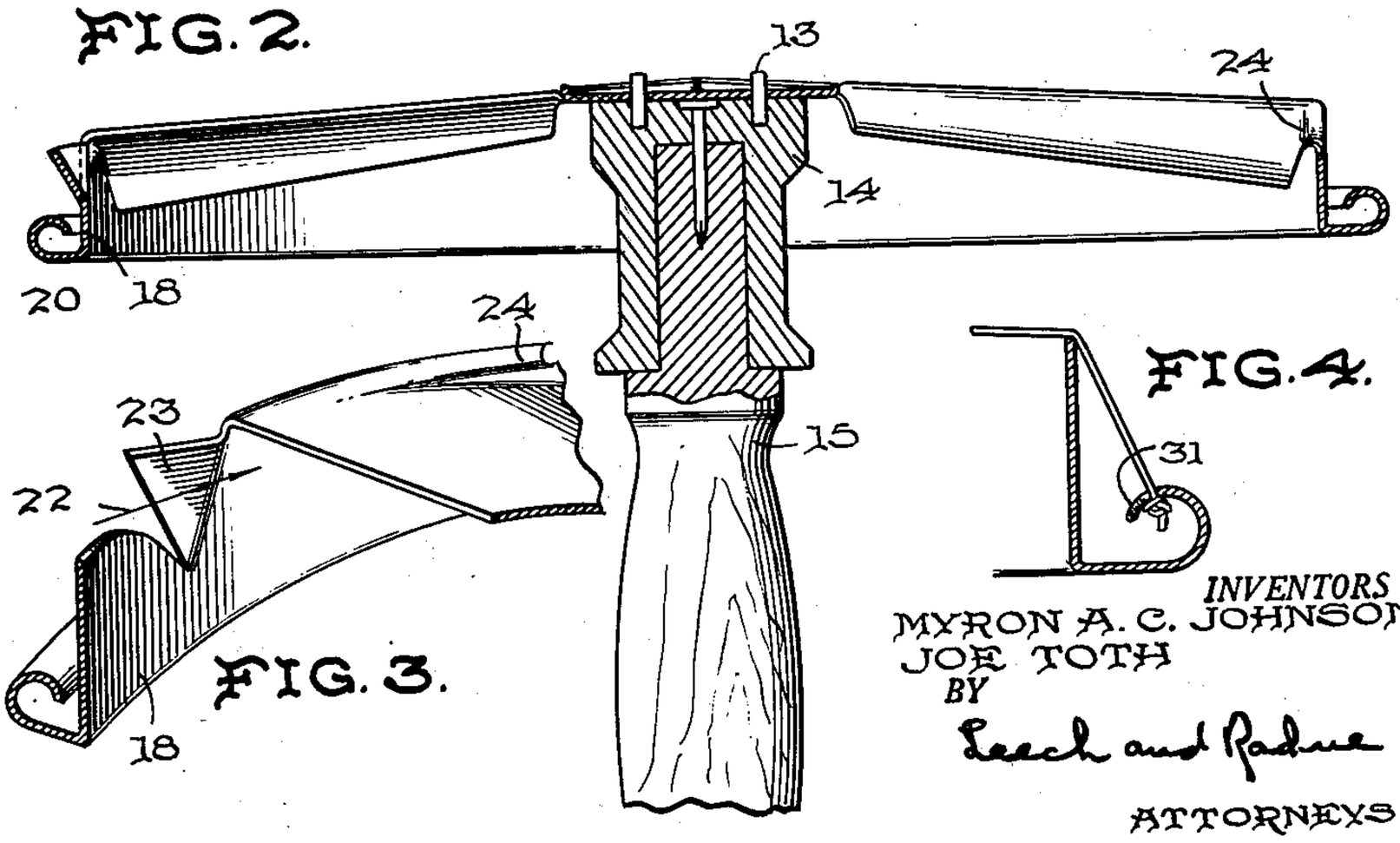


FIG. 3.




FIG. 4.

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## FLYING TOY WITH VIBRATING STRANDS

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7 Claims. (Cl. 46—83)

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This invention relates to flying toys of the type including a novel rotatable propeller disc or saucer-like shape adapted to be spun and launched from a hand held and actuated device, and more particularly to such flying discs of improved flying qualities equipped with means for producing sounds and musical notes.

It is a general object of the present invention to provide a novel and improved flying saucer toy of the sounding type.

More particularly it is an object of the invention to provide in a flying saucer toy a plurality of sounding means secured thereto in spaced positions within the periphery of the disc.

One of the important features of the invention resides in the arrangement of a central hub, spaced, radiating, lifting blades and a peripheral shroud, the whole arranged for providing unusual air movement for maximum lift and being arranged for mounting stretched resilient strands intermediate the lifting blades, whereby the strands are subject to vibration resulting from the passage thereover of the air moving downwardly or laterally between the blades.

Another important feature of the invention consists in the arrangement of the shroud and blade tips whereby slots or scoops are formed to increase the air flow about the blade tips and improve the efficiency of flight, especially during vertical and lateral travel.

Still another important feature of the invention resides in the construction and arrangement of the lifting blades whereby good lift and "travel" are achieved with relatively low rotational speeds and a small amount of power, so that the time of operation is increased.

Other features and objects of the invention will be more apparent to those skilled in the art from a careful study of the accompanying drawing and attached description wherein is disclosed a single exemplary embodiment of the invention, with the understanding that the limitations applying thereto are only those in the attached claims and that certain modifications and rearrangements of parts may be made therein without departing from the spirit of the invention.

In said drawings:

Fig. 1 is a top plan view of the aerial portion of a flying saucer toy constructed according to the several objects and features of the invention;

Fig. 2 is a vertical section therethrough taken on radial lines 2—2 of Fig. 1;

Fig. 3 is a fragmentary perspective view showing the junction of a blade and the shroud with the air scoop illustrated in detail and the shroud in radial section; and

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Fig. 4 is a fragmentary radial section through the shroud section, taken on line 4—4 of Fig. 1 and illustrating the fastening of a flexible strand.

Numerous types of flying toys have heretofore been proposed which constitute modifications of lifting propellers arranged to be set in rotation by some form of hand launching apparatus and to then take off and climb or fly under their own momentum. Children are no longer amused for any substantial period by the mere flight of these devices and in accordance with the present invention it is proposed to not only improve the flight characteristics of flying saucers but to arrange thereon sounding means whereby in the operation of the toy a series of sounds are given off at or above certain predetermined speeds of rotation. By this means the child's interest is aroused and the usefulness of the toy is considerably enhanced.

In the drawings only the rotor and a fragment of the launcher have been illustrated since the latter may assume any of a number of conventional forms. There is shown the rotor disc 10 having a flat hub area 11 perforated by slots 12 to loosely receive the pins 13 projecting from the top of the launcher spool 14 journalled on the handle stick 15 as shown in Fig. 2. A cord wrapped about the spool and withdrawn rapidly serves to rotate the whole assembly on the upper end of the stick and when the disc achieves adequate speed it will take off from the spool in the customary manner and fly until its momentum is lost.

The rotor 10 may be formed of any suitable material, such as plastic, sheet metal, stiffened paper or cardboard or the like, dependent on the desired cost and durability of the device.

Preferably the rotor is a unitary construction comprising three essential parts, the first being the central hub member 11 which is substantially flat, the radiating lifting blades 17 of approriate number, and the peripheral shroud 18 tying the tips of the blades together, protecting the user from the blade tips, giving rigidity to the assembly and providing weight to achieve a fly-wheel effect to maintain the disc in rotation for a longer period of time.

The flat central hub portion 11 cooperates with the launcher and joins the inner ends of the blades together. Since these ends of the blades do not impart much lift, this disc can be of considerable diameter. The integral lifting blades 17 have at least as much space between them as their own width. As shown there are eight blades each of about 18° angular extent and for convenience in manufacture their longitudinal edges 19 may be substantially straight and nearly

radial. Each of the blades is given a considerable pitch increasing from root to tip to provide lift for operation of the device, and in cross-section the blade is of high lift coefficient of generally the airfoil form of a slow speed airplane wing.

As seen in the drawing the shroud 18, which may be described as generally cylindrical in form, is of considerable depth. It may be considered a section of a true cylinder except as hereinafter described and its sides are vertical, but for purposes of rigidity and to improve the lateral flight characteristics the bottom of the shroud is preferably fitted with a radial flange 20 on the outside, as seen in Fig. 2. The outer edge of this is curled upwardly into a rigid bead presenting a smooth edge to prevent injury to the user and to protect certain conformations given to the upper portion of the shroud.

The areas of the junctions of the blade tips with the shroud are given special treatment to increase the air flow beneath the blades and thereby increase the efficiency of flight, especially as the rotor nears its zenith and moves laterally with the wind. In order to provide the supplemental air for the blade tips the shroud is cut and deformed ahead of the leading edge of each tip. Thus the upper edge is notched at 22 for each blade and the triangular tab 23 to the rear thereof is bent outwardly to form a scoop which takes in air from outside the shroud and directs it rearwardly and upwardly against the under face of the blade as shown by the arrow in Fig. 3. This gives higher lift, better efficiency and prolongs flight at a reduced rotational speed.

The trailing edge of the blade adjacent the tip drops well below the upper edge of the shroud and to achieve this the metal is bent as shown at 24 in Figs. 1, 2 and 3, forming a narrow slot when considered with the vertical portion of the shroud. To facilitate this forming, a small notch 28 may be cut at the junction of the trailing edge of the blade and the shroud. This arrangement of scoop and slot directs additional air to act on the broad tip of the blade where the lift is most effective. This improves the efficiency particularly during vertical and lateral travel by scooping and directing a greater volume of air into contact with the blade tips.

The space between the blades is at least as great as the blade width, as previously mentioned, and preferably each of these spaces is traversed by a resilient, flexible strand, such as 30. These strands may well be sections of ordinary rubber bands tightly stretched between 180° spaced positions on the shroud and crossing the center, as seen in Fig. 1. These strands may spring from the lower edge of the shroud and thus pitch upwardly at a fairly steep angle or may extend over the upper edge of the shroud. For maintaining the outer ends of the strands properly positioned the upper edge of the shroud may be notched intermediate the blade junctions and the strand is wrapped and secured with a suitable knot, or by an adhesive. Preferably, however, the upturned bead of the shroud is V-notched as at 31 to receive and hold the knotted end of a strand. Even though the strands are diametrically arranged, it is preferred to substantially immobilize the inner ends by having them pass through narrow notches 32 formed by pinching in the space between the blades, as seen in Fig. 1. If desired the corners 33 may be bent upwardly a slight amount to insure against lateral displacement of the bands.



It will be appreciated that the bands will be vibrated by the air passing over them as it passes between the blades under the rotational action of the disc and that the pitch of the sound given off by this vibration will be dependent among other things on the length and weight of the strand and the tension thereof.

In the ordinary course of events the several strands will not all achieve exactly the same tension so that a series of harmonious vibrations will be given off during operation of the device. Since a certain minimum speed of rotation is necessary to cause sufficient air velocity to vibrate the strands the sounds given off thereby will not take place except at velocities above the threshold value. The length of the strands will be substantially the same as that of the blades and if they are given a fairly tight tension an extremely high pitched whine will be produced in imitation of the wind whistling about certain types of aircraft. Other sizes and tensions of strands seem to produce a sound like the baying of a hound.

As mentioned before, the various strands attached to the rotor may each have an initial threshold velocity necessary for it to start into operation, and these velocities may well be arranged to be different, so that the operator may have some idea of the speed at which the disc is rotating, dependent upon which or how many of the sounding devices are in operation at the time.

Various other forms of sounding devices might be incorporated in the disc, but that disclosed is very effective and simple, not subject to damage and easily replaced.

Such a toy will appeal to children of a wide variety of ages.

We claim:

1. A flying toy rotor comprising, in combination, a hub, a plurality of circumferentially spaced blades radiating therefrom, a substantially cylindrical shroud supported from the tips of said blades and elastic filaments stretched from said hub to the shroud and extending between the blades to be vibrated by the air passing between the blades when the rotor is spun.

2. A rotor unit for a flying saucer type of toy including a hub, a plurality of circumferentially spaced and pitched blades radiating therefrom, an annular shroud ring connecting the blade tips together and being generally cylindrical, radial flange extending outwardly from the lower edge of said shroud and having a beaded periphery and a plurality of elastic strands extending diametrically across said unit and being anchored to the said shroud intermediate the blade attachments thereto, said shroud bead having positioning means for said strands therein.

3. A rotor unit for a flying saucer type of toy comprising a unitary hub, radiating pitched blades and a shroud ring, said blades occupying not more than 50% of the disc area, the main portion of said shroud being substantially cylindrical and the blade tips springing from the upper edge thereof, the leading edge of each tip projecting at least up to the plane of the upper edge of the shroud and the trailing edge being well below this plane, the metal of the shroud being formed to provide an air scoop ahead of the junction of each blade tip with the shroud arranged to direct additional air upwardly beneath and rearwardly under the adjacent blade tip to increase its lift.

4. The rotor unit defined in claim 3 in which the upper portion of the shroud just forward of the leading edge of each blade is deflected outwardly to scoop air beneath the tip.

5. The rotor unit defined in claim 4 in which the upper portion of the shroud is notched forward of the outwardly directed portion.

6. The rotor unit defined in claim 3 in which the blades have substantially radial edges and increase in pitch from root to tip.

7. The rotor unit as defined in claim 3 in which the shroud is fitted at its lower edges with a radial flange having a beaded edge, said flange projecting outwardly sufficiently far to protect the air scoops.

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