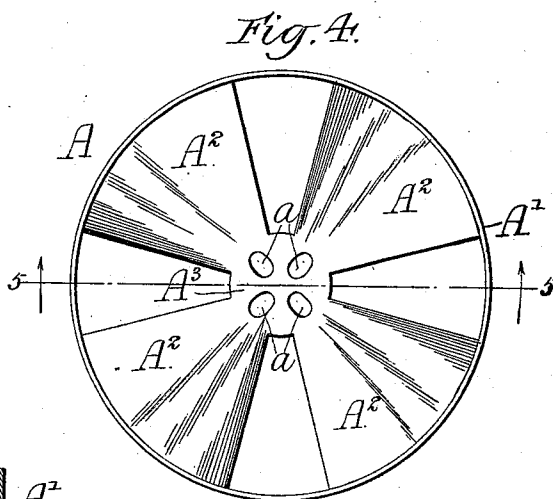
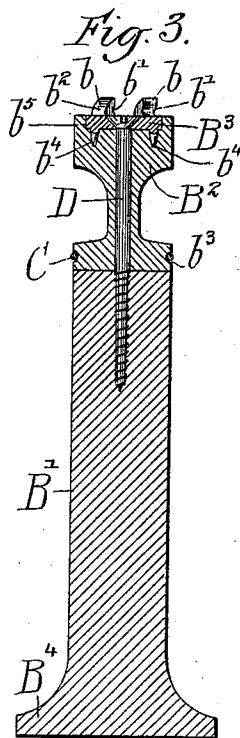
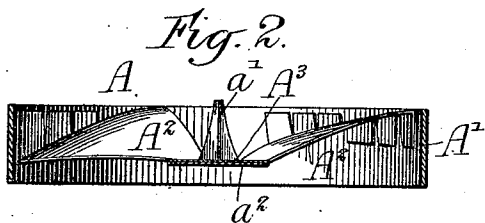
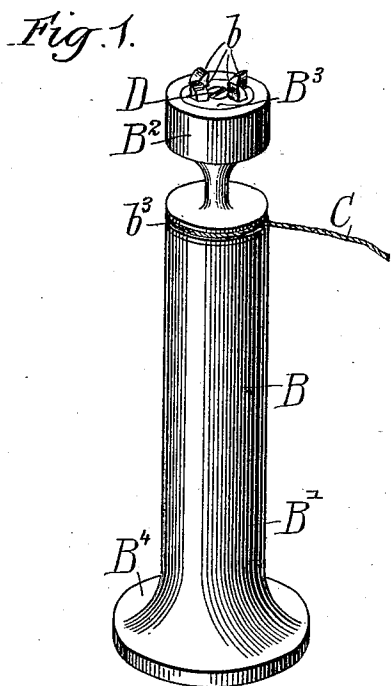
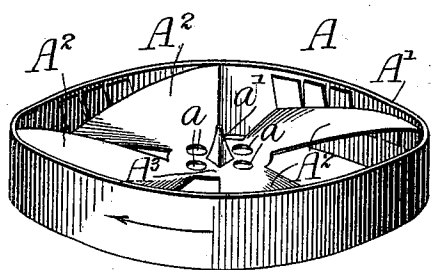


(No Model.)

C. M. HOLLINGSWORTH.
FLYING TOY.

No. 510,137.

Patented Dec. 5, 1893.



Witnesses.
Wm. J. Fleming
Louis M. F. Whitehead.

Inventor:
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by Dayton, Pook & Brown
his Attorneys.

UNITED STATES PATENT OFFICE.

CHARLES M. HOLLINGSWORTH, OF EVANSTON, ILLINOIS.

FLYING TOY.

SPECIFICATION forming part of Letters Patent No. 510,137, dated December 5, 1893.

Application filed July 1, 1892. Serial No. 438,679. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. HOLLINGSWORTH, of Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Flying Toys; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel article in the nature of a flying toy and it consists in the matters hereinafter described and pointed out in the appended claims.

An article embodying my invention embraces two parts, to-wit, a disk having spiral blades like those of a screw propeller, and adapted to use in the air and spin in contact with the ceiling of a room or a like horizontal surface, and an actuating device for temporary engagement with the disk and constructed to give rapid rotary motion to the same; as will be hereinafter set forth.

In the accompanying drawings illustrating my invention: Figure 1 is a perspective view of the flying wheel or disk and the actuating device therefor. Fig. 2 is a view in central vertical section of the disk. Fig. 3 is a view in central vertical section of the actuating device. Fig. 4 is a plan or face view of a form of the wheel differing somewhat from that shown in Figs. 1 and 2. Fig. 5 is a sectional view of the wheel shown in Fig. 4, taken on line 5—5 of said Fig. 4.

As shown in the said drawings, A, indicates as a whole the movable or flying disk or wheel, the same consisting of a plurality of radial obliquely arranged blades A^1 , A^2 , connected with each other at the center of the disk or wheel and secured at their outer margins to a cylindric band or ring A' surrounding said blades A^1 , A^2 , and of considerable width in a direction perpendicular to the plane of the disk or wheel. At its center the disk or wheel is provided with means for engagement with an actuating device for giving rotary motion to the disk, herein shown as consisting of apertures, a , a , formed in a central disk, A^3 , to which the several fans A^1 , A^2 , A^2 are connected at their inner ends. The wheel or disk is also provided with a central bearing point, a' , extending upwardly from the cen-

ter of the disk to a point slightly above the top margin of the band or rim A' , in the manner clearly shown in Fig. 2. The wheel or disk made as described may be constructed in any suitable manner of any suitable material, such as sheet metal, wood or paper; that shown in the drawings being made of paper and the several blades cut from a single piece or sheet of paper and secured at their outer margins to the rim which is formed of paper, straw-board or the like in one or more layers. The central portion A^3 in which the holes a are formed is shown as being strengthened by a reinforcing piece or layer, a^2 .

B indicates as a whole the actuating or sending device. This consists of a handle or pedestal, B' , and a drum or spool B^2 , pivotally connected with the same and provided with a plurality of teeth or prongs, b , b , b , adapted for engagement with the holes a a a of the wheel or disk A. Attached to the drum B^2 is a cord, C, which is adapted to be wound upon the drum B^2 and to give rapid rotary motion on being forcibly unwound therefrom in a familiar manner. The points or prongs b b are secured in the end of the drum B^2 on the flat end thereof remote from the handle of the standard B' and concentrically with the axis of rotation of the drum.

In the use of the sending device the same is held with the drum uppermost and the wheel or disk allowed to rest upon the flat end of the drum with the holes a a engaged with the points or prongs b b . The drum is then rapidly rotated by the use of the cord C and a rapid rotary motion thereby given to the wheel or disk which by reason of the inclination of its blades becomes disengaged from the pins or points and rises and floats in the air. To insure engagement of the points or prongs b b with the disk or wheel said points or prongs may be made hollow or concave on their sides b' b' , which are advanced as the drum is rotated the hooked ends of the points or prongs formed by so making the advance faces concave serving to prevent the disk or wheel from prematurely rising or slipping from the prongs. To facilitate the disengagement of the wheel from the said prongs at the proper time, the rear surfaces, b^2 , of said prongs are inclined or beveled, as shown, so that when the wheel or disk has acquired

a sufficiently rapid rotary motion and the drum ceases to revolve the tendency of the disk to rise clear of the prongs will be aided by the said inclined surfaces thereof. To further insure the prompt release of the disk, from the prongs of the sending device the cord C instead of being disconnected from the drum is secured thereto in such manner that when the full length of the string has been drawn off the drum the string itself will suddenly arrest the movement of the drum and prevent its further rotation; it being obvious that when the drum is thus suddenly stopped the rear margins of the holes *a* acting on the inclined rear surfaces of the prongs will lift the disk and thus not only insure its complete disengagement from the prongs but give it an initial upward movement.

As a convenient means of attaching the cord to the drum the latter in the construction shown is provided in one of its larger parts with a groove, *b*³, within which the cord is placed and tied at one side of the drum. Said drum B² is shown as formed with upper and lower enlarged parts connected by a central smaller spindle on which the cord C is wound for giving rotary motion to the drum and the pivotal connection between the drum and handle or standard B' is conveniently formed by means of a screw, D, inserted endwise through the drum and into the upper end of the handle or standard, the head of the screw serving to prevent the drum from being disengaged therefrom and to hold the drum in engagement with the smooth part of the screw on which it rotates.

As a simple and desirable construction the prongs *b b* are made integral with a circular metal plate or disk, B³, secured to the outer end of the drum by means of points or prongs, *b*⁴, *b*⁴, which are driven into the end of the drum, said plate being arranged concentrically with reference to the screw D and being provided with a central aperture through which said screw passes and which engages the head of the screw. Said plate B³ thereby not only forms a convenient means of attaching the prongs *b b* to the drum, but also constitutes a bearing surface or bushing for engagement with the screw D. The plate B³ may be easily cast with the prongs *b* and the points *b*⁴ thereon so that these parts may be made at small expense. To facilitate the construction of the parts the said plate B³ is seated in a circular recess, *b*⁵, formed in the end of the drum when the same is made. This recess not only insures a stronger connection between the plate B³ and the drum and affords a large flat bearing surface at the end of the drum on which the disk may rest, but it facilitates assembling of the parts by insuring the central location of the said plate at the time it is applied to the end of the drum.

The handle or standard B' is shown as made of considerable length and of cylindric form so that it may be easily held in one hand when the cord C is grasped and operated by

the other hand and as provided by its lower end with an enlarged part or base, B⁴, adapted to rest upon a table or other horizontal surface so as to sustain the sender in an upright or vertical position. The construction of the sender with a broad base in this manner is especially desirable from the fact that it is often desired to maintain the axis of the drum in an exactly vertical position at the time of spinning or sending the wheel or disk and the presence of the base enables the standard to be held by the hand firmly against a horizontal surface such as the top of a table at the time of drawing the cord from the drum for the purpose of rotating the same and sending the wheel or disk.

The action of the wheel or disk made as described is as follows: Upon being given rapid rotary motion through the medium of the sending device, the wheel will rise rapidly in the air, until the point of the central spindle or projection *a'*, already described strikes the ceiling of the room or apartment, in which the device is used, and will then continue to rotate and spin against the ceiling. If no ceiling is present, the wheel will descend in proximity to the floor where it will continue to revolve without however coming in contact with the same, until it has lost its speed. This capacity of the wheel for sustaining itself in the air but a short distance above the floor or any other horizontal surface over which it is rotated, is due to the absence of any projection extending below the rim A' and to the presence of the said rim A' which by preventing the outward escape of air maintains a cushion of compressed air beneath the wheel and thus prevents its contact with the floor during the time it is in rapid rotation. In practice a wheel or disk made generally as shown in the drawings will if made of proper weight and having its blades arranged at a suitable inclination float or maintain itself a short distance above the floor or other horizontal surface while moving sidewise or laterally in an irregular manner for a considerable period of time. It has been observed that the presence of the rim A' has an opposite but similar effect on the action of the wheel when the same is spinning in contact with the ceiling the action of the blades in such case being to maintain a partial vacuum above the wheel by propelling the air downward, and the presence of such partial vacuum being secured by the presence of the band or rim A', and the shortness of the bearing point *a'*, which prevents the inflow of air except at the narrow space between the upper edge of the rim and the ceiling above the same. In other words, the inclined blades acting to exhaust the air from the space above the wheel more rapidly than the air can enter said space through the narrow passage at the upper edge of the rim, a partial vacuum is formed which tends to maintain the wheel in its elevated position or in contact with the ceiling. It follows, therefore, that a disk or wheel thus con-

structed with a wide or vertically deep rim will maintain itself against the ceiling a very long time when spinning.

The blades of the wheel during the rotation of the same tend in all cases to produce a vacuum above the wheel and condensation of air below the same so that when the wheel is spinning near the floor the air forced downward being confined within the space between the blades and the floor and being held from free escape from such space by the presence of the rim, will be maintained under pressure sufficient to sustain the weight of the wheel. The wheel constructed as described is not only amusing as a toy but interesting as a scientific curiosity.

It is essential to the operation of the wheel or disk as a toy to be spun in contact with the ceiling that the bearing point *a'* should project above the upper edge of the rim only so far as to prevent contact of the rim with the ceiling in spinning, so that little space will be afforded between the edge of the rim and the ceiling for access of air, it being obvious that the smaller the passage for air at this point the greater will be the vacuum produced and the sustaining force arising therefrom. In practice, however, a somewhat liberal space is provided, as shown in the drawings, to prevent contact of the rim with the ceiling in case the disk is thrown in a slightly inclined position, or when the ceiling is not perfectly smooth.

I claim as my invention—

1. The improved flying top consisting of a plurality of oblique radial blades and a cylindrical rim surrounding said blades and attached to the outer ends thereof, the planes of the edges of said cylindrical rim being perpendicular to the axis of the top and the radial blades lying wholly between said planes,

and a spinning point extending above the rim a distance sufficient only to prevent contact of the rim with a ceiling or similar horizontal surface against which the point may rest, whereby air is prevented from freely flowing into the space above the blades and a partial vacuum is there produced, substantially as described.

2. An improved flying top consisting of a plurality of oblique radial blades, a cylindrical rim surrounding said blades and attached to the outer ends thereof, the planes of the edges of said cylindrical rim being perpendicular to the axis of the top and the radial blades lying wholly between said planes, said top being without any part extending below the lower edge of said rim, whereby air is compressed beneath the top, substantially as described.

3. An improved flying top consisting of a plurality of oblique radial blades, a cylindrical rim surrounding said blades and attached to the outer ends thereof, the planes of the edges of said cylindrical rim being perpendicular to the axis of the top and the radial blades lying wholly between said planes, a spinning point extending axially from the centers of said blades and projecting a distance sufficient only to prevent contact of the rim with a ceiling or similar horizontal surface against which the point may rest, said top being without any part extending below the lower edge of said rim, whereby air is compressed beneath the top, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

CHARLES M. HOLLINGSWORTH.

Witnesses:

C. CLARENCE POOLE,
G. W. HIGGINS, Jr.