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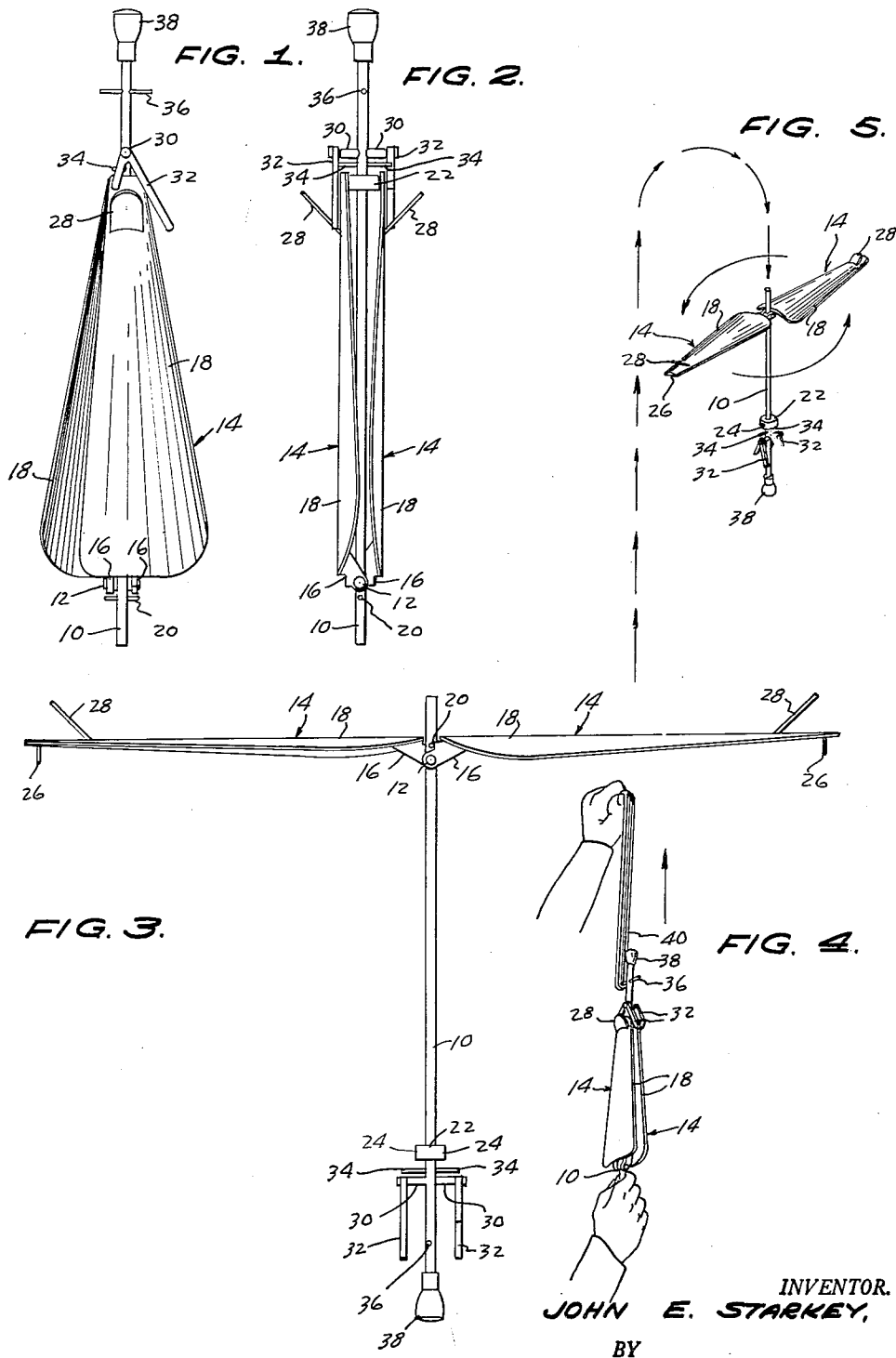
J. E. STARKEY

2,746,207

TOY HELICOPTER

Filed July 31, 1953

5 Sheets-Sheet 1



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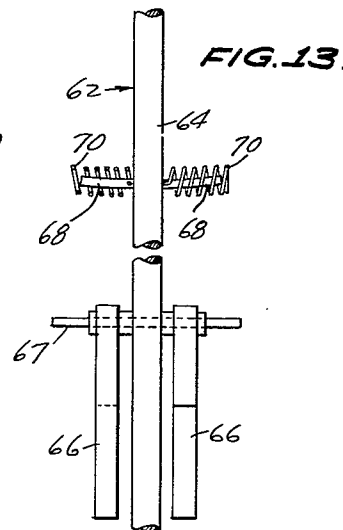
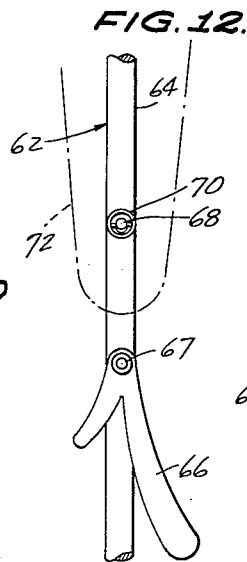
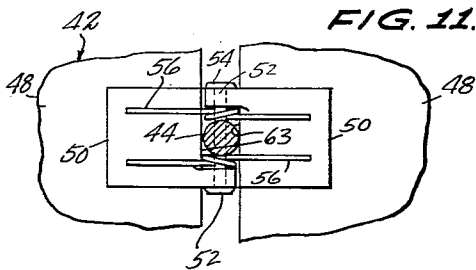
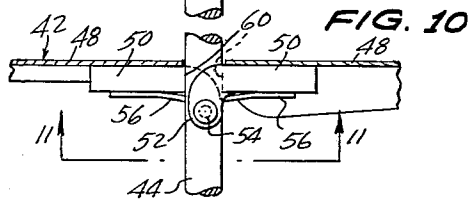
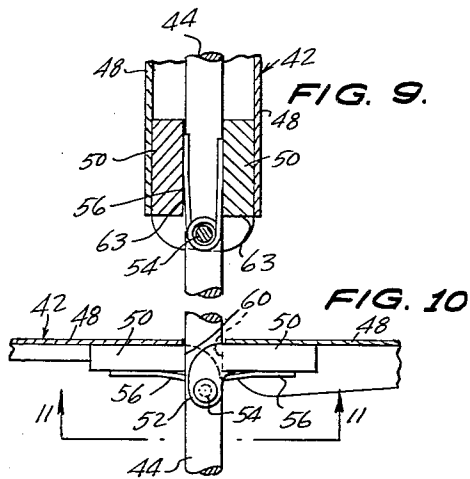
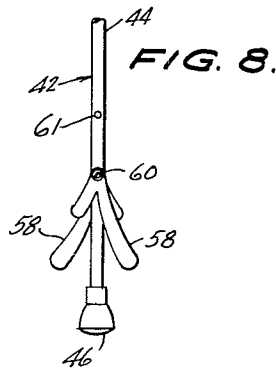
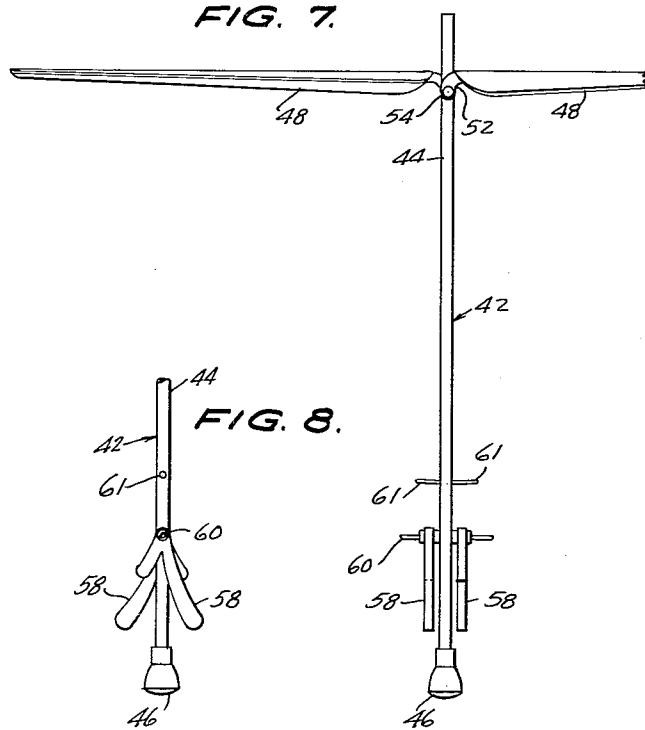
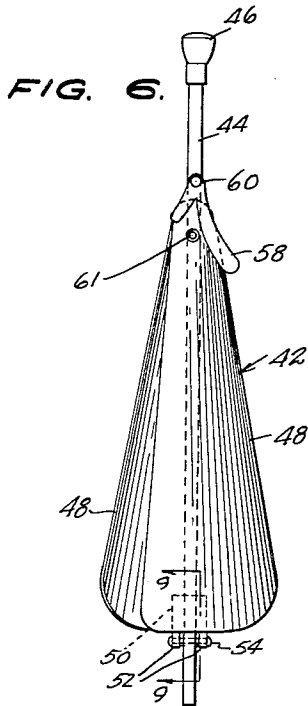
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5 Sheets-Sheet 2



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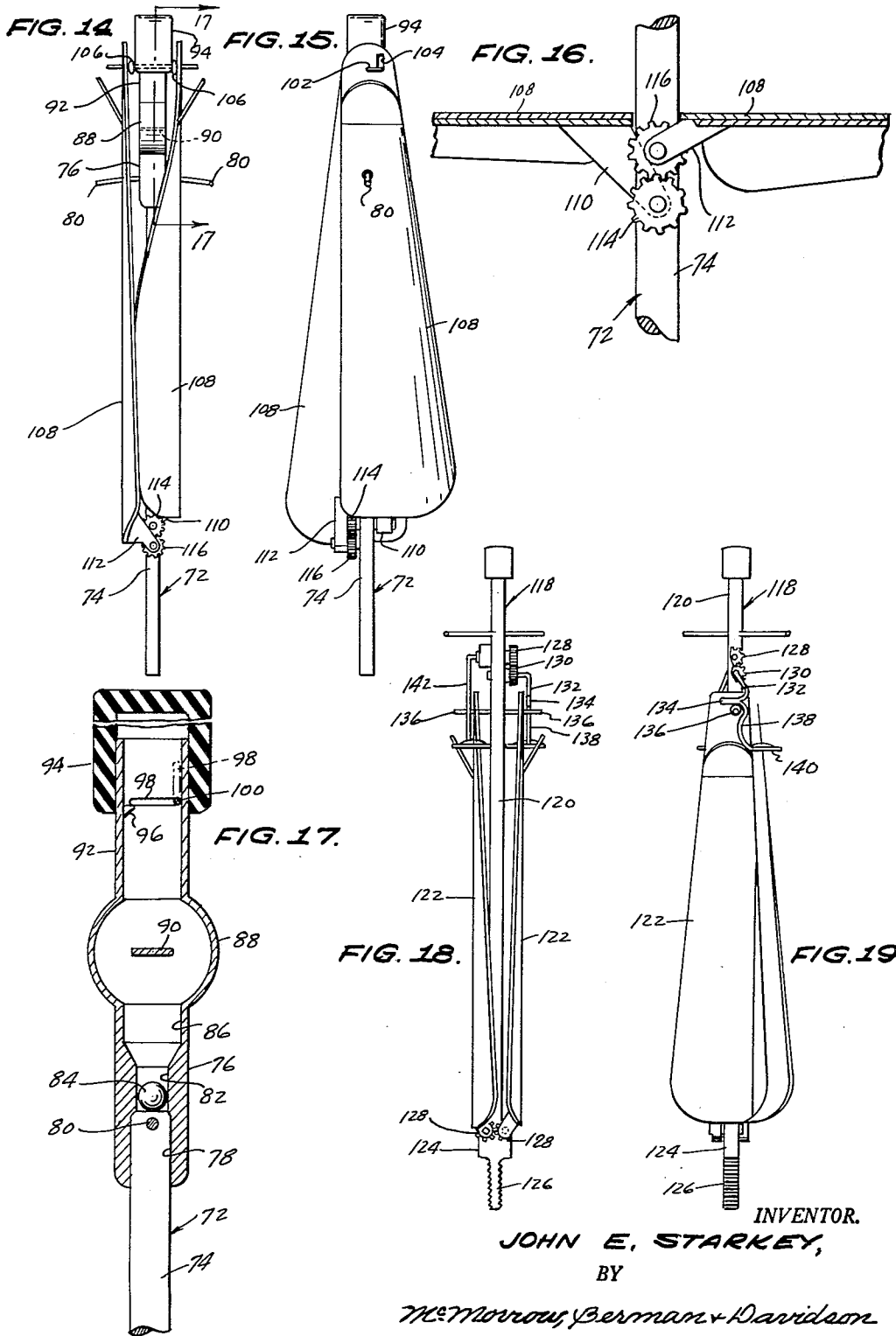
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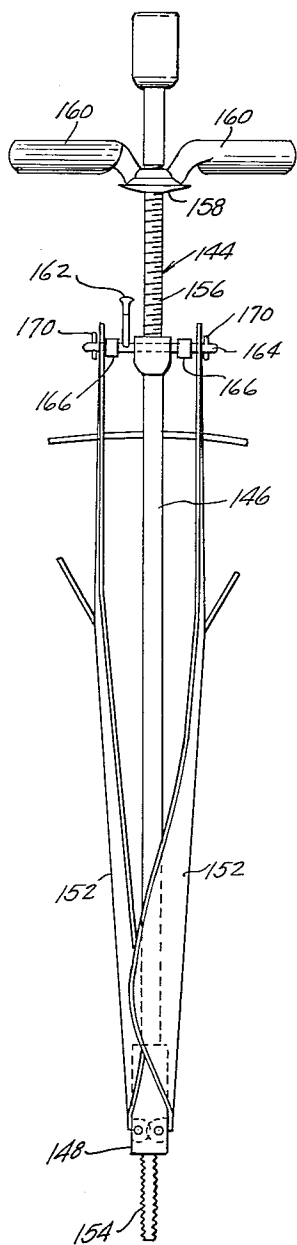


FIG. 20

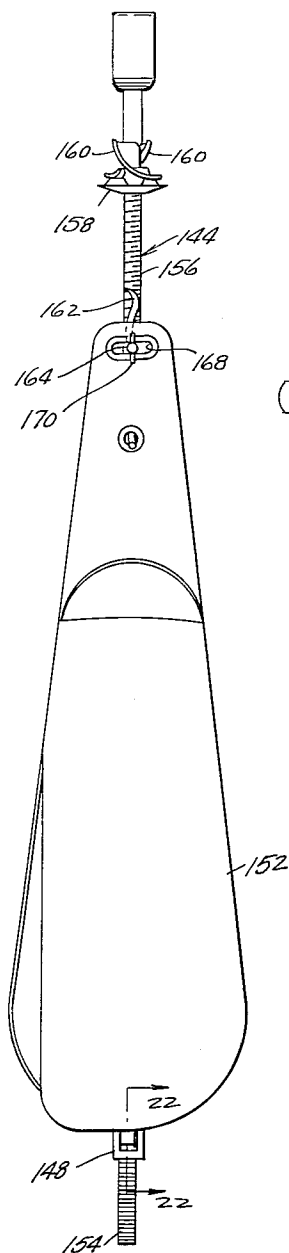


FIG. 21.

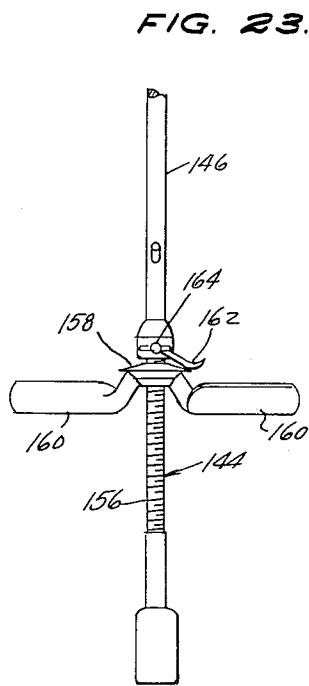


FIG. 23.

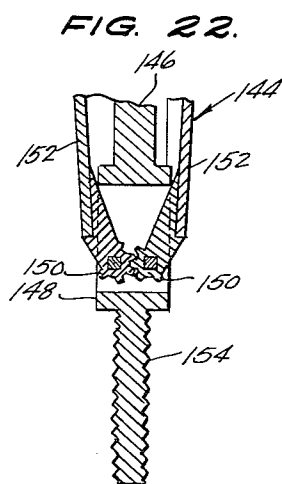


FIG. 22.

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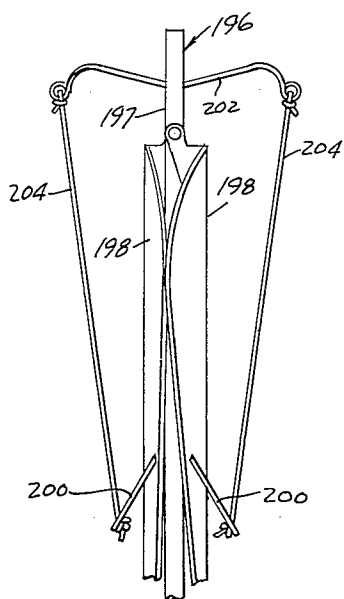
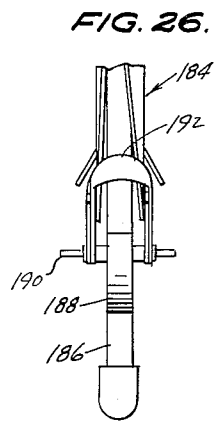
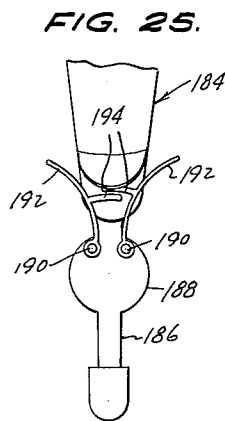
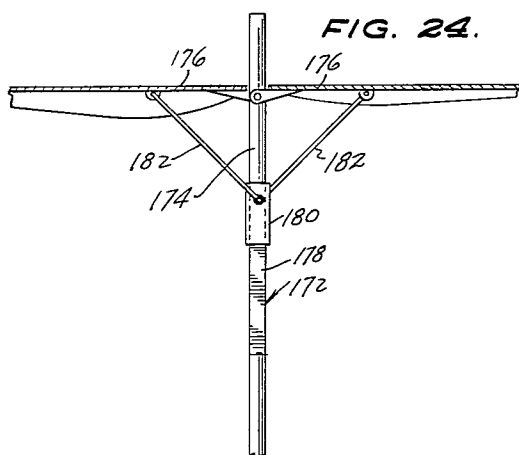
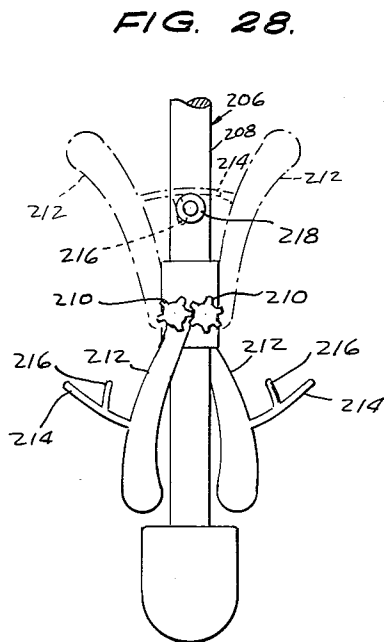


FIG. 27.



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TOY HELICOPTER

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Application July 31, 1953, Serial No. 371,556

4 Claims. (Cl. 46—75)

This invention relates to toys, and more particularly has reference to a toy helicopter adapted to be forcibly propelled into the air, and further adapted, at its point of highest ascent, to invert itself and rotate with its blades outspread during its return to the ground.

An important object is to provide a toy of the type stated which will be so designed as to insure that a pair of helicopter blades will be folded against an associated stem on which the blades are pivotally mounted, during ascent of the toy, this arrangement being effective to insure rapid, accurate movement of the stem to a relatively high altitude, when the stem is propelled forcibly into the air by a means such as a rubber band.

Another object of importance is to provide a toy helicopter as described in which the means for holding the helicopter blades folded during the ascent of the toy will be so weighted and mounted on the stem as to automatically gravitate to a position clear of the blades, responsive to inversion of the stem at the point of highest ascent thereof.

Additional objects are to provide a toy helicopter having means to open the blades thereof, and restraining arms associated with the blades, simultaneously, and having means, further, which will, in at least one form of the invention, effect opening of the blades at varying heights above the ground.

Yet another object is to provide a toy helicopter as stated which will be inexpensively constructed, will make use of relatively inexpensive materials, and will be sure in operation on each occasion of use.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a side elevational view of the toy helicopter as it appears when folded;

Figure 2 is an elevational view taken from the right of Figure 1;

Figure 3 is a view in elevation of the toy with the stem inverted and the blades swung outwardly to their operative position;

Figure 4 is a reduced perspective view showing the toy as it appears when in use, immediately prior to its being propelled into the air;

Fig. 5 is a reduced perspective view showing the toy in use, during the descent thereof;

Figure 6 is a view similar to Figure 1, showing a modified form;

Figure 7 is a view similar to Figure 3, in which the device as shown in Figure 6 has been inverted and the blades thereof opened, the device now appearing as it would during descent;

Figure 8 is a fragmentary elevational view showing the lower end portion of the stem as it appears after the blades have been opened and the device is descending;

Figure 9 is a fragmentary, longitudinal sectional view, on an enlarged scale, taken substantially on line 9—9 of Figure 6;

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Figure 10 is a fragmentary, longitudinal sectional view showing the connections of the blades to the stem, the device being illustrated as it would appear during descent;

Figure 11 is a sectional view on line 11—11 of Figure 10;

Figure 12 is a fragmentary elevational view showing the stem of another modification;

Figure 13 is a fragmentary elevational view of the stem of the form shown in Figure 12, taken at right angles to Figure 12;

Figure 14 is a view similar to Figure 2, showing a fourth embodiment;

Figure 15 is an elevational view taken from the right of Figure 14;

Figure 16 is an enlarged, fragmentary, sectional view showing the blades opened and showing means incorporated in the fourth embodiment whereby the blades are caused to open simultaneously;

Figure 17 is an enlarged, fragmentary, longitudinal sectional view on line 17—17 of Figure 14;

Figure 18 is an edge elevational view, the wings or blades being folded, showing a fifth embodiment;

Figure 19 is an elevational view taken from the right of Figure 18;

Figure 20 is an edge elevational view, the blades being folded, of a sixth embodiment;

Figure 21 is an elevational view of the form of the invention shown in Figure 20, looking toward the right hand side of the device as it is illustrated in Figure 20;

Figure 22 is an enlarged, detail sectional view on line 22—22 of Figure 21;

Figure 23 is a fragmentary elevational view, the stem being inverted as it would appear during descent of the device, showing a rotatable impeller as it appears when shifted to a blade-releasing position;

Figure 24 is a fragmentary view partly in elevation and partly in longitudinal section of a seventh embodiment;

Figure 25 is a fragmentary elevational view of an eighth embodiment;

Figure 26 is a fragmentary edge elevational view taken from the right of Figure 25;

Figure 27 is a fragmentary edge elevational view of a ninth embodiment; and

Figure 28 is a fragmentary elevational view of a tenth embodiment, the dotted lines indicating positions to which restraining arms may shift when positioned to hold the blades against movement from their normally folded positions.

The toy helicopter constituting the present invention includes an elongated stem 10 having, adjacent one end thereof, a cross pin 12 projecting outwardly from diametrically opposite locations of the stem to provide a pivot shaft for blade assemblies designated generally at 14. Each blade assembly includes an ear 16 arranged longitudinally of and projecting beyond the wider end of a tapered blade 18. Each ear 16 is fixedly secured to the inner surface of its associated blade, and has an opening receiving one end of pin 12. Adjacent the apertured end of each ear 16, a stop shoulder is formed on the ear engageable against the adjacent end of a stop pin 20. Stop pin 20 is extended diametrically of stem 10 adjacent and parallel to cross pin 12 (Figures 1 and 2), and thus, when the blade assemblies are swung to their use position shown in Figure 3, the stop pin will limit outward swinging movement of said assemblies.

As shown in Figure 1, the blades 18 are offset transversely of stem 10 relative to one another. The blades, from end to end thereof, are curved in cross section to provide an airfoil, the blades being oppositely pitched to cause rotation of the toy in the direction shown by the arrows in Figure 5, during descent thereof.

When the blades are folded, the smaller, free ends there-

of contact diametrically opposite portions of a collar 22 fixed to stem 10 and formed with diametrically opposite radial openings 24 receiving holding pins 26 extended inwardly from said free ends of the blades. Pins 26 and collar 22 cooperate to hold the free ends of the blades against lateral movement in the folded blade positions, to insure that the blades will be properly positioned relative to a restraining means to be described hereinafter, and to insure, further, that the blades will not trap an undesirable quantity of air tending to slow the ascent of the toy.

Fixedly secured to the outer surfaces of the respective blades, adjacent said smaller ends thereof, are ears 28, each ear extending outwardly from its associated blade and being disposed substantially in a plane oblique to the main plane of its blade. Ears 28 diverge in a direction away from the pivotal connection of the blade assemblies to stem 10, thus to cause said ears to trap air when the stem is inverted from the position shown in Figure 2, with the trapped air tending to swing the blades 18 outwardly.

Fixedly secured to stem 10 adjacent collar 22 are diametrically opposite projections 30, and pivotally mounted on the outer ends of said projections are restraining arms 32. Each arm 32 is formed substantially to a V shape, with one portion of the arm being substantially longer than the other portion (Figure 1). The arrangement causes each arm to be so weighted at one end as to tend to swing to a position shown in Figure 1, when the blades are folded and the toy is to be propelled upwardly into the air. In this position of each restraining arm, the shorter end portion thereof overlies the smaller end of the adjacent blade 18, thus to cause the restraining arms to hold the blades 18 against outward swinging movement when the stem is in the normal position thereof shown in Figures 1 and 2.

When the stem is in said position, swinging movement of restraining arms 32 in one direction will be limited by the ends of a diametrically arranged stop member 34 carried by stem 10 adjacent projections 30.

That end of the stem 10 adjacent restraining arms 32 is provided with a weight 38, which may be of resilient material so as to also serve as a bumper, when the toy reaches the ground. Of course, the arms 32, collar 22, and the associated parts adjacent thereto also constitute weight means, so as to weight the adjacent end of the stem to an extent sufficient to cause the stem to invert itself when propelled into the air with the weighted end 38 up.

A transversely disposed pin member 36 is provided upon stem 10, adjacent weight 38, and is engaged by one end of an endless elastic element 40 such as a rubber band. The other end of the elastic element is grasped in one hand as shown in Figure 4, while the stem 10 is grasped at that end thereof adjacent pin 12. The toy is then shot into the air as shown by the arrows extending between Figures 4 and 5.

At its point of highest ascent, the stem will invert itself, and responsive to inversion of the stem, restraining arms 32 will swing about their pivot axes, due to their weighted formation. This causes the restraining arms to be disposed clear of the path of swinging movement of blades 18. Therefore, air trapped by ears 28 will cause blades 18 to swing outwardly from collar 22 to a slight extent, it being understood that pins 26 would be loosely engaged in the apertures 24 of said collar 22. This slight outward movement of the free ends of blades 18 causes the blades to trap a substantially greater quantity of air, whereby to immediately adjust the blades to the positions thereof shown in Figure 3. In these positions, the blade assemblies 14 will slow the descent of the stem 10, and due to the pitch of said assemblies, the entire toy will rotate during said descent.

In Figure 6 there is shown a modified form, designated generally by the reference numeral 42. In this form of

the invention the stem has been designated by the reference numeral 44, and at one end, has a weight means 46. The stem has diametrically opposed blades 48 hingedly mounted thereon, the blades 48 being generally similar, in respect to the pitch and outer configuration thereof, to the blades 18 of the first form.

Referring to Figures 9-11, the blades 48 at their larger ends, have blocks 50 adhesively or otherwise fixedly secured to the inner surface thereof. Each block 50 has a curved ear 52 extended from the inner surface thereof, at one side of the block, the ears 52 of the respective blocks being spaced apart as best shown in Figure 11, to receive the opposite end portions of a pivot pin 54 that is mounted in and extends transversely through the stem 14.

Springs 56 are coiled about the pin 54, and have their opposite ends underlying the respective blocks 50, said springs being so tensioned as to normally urge the blocks and their associated blades 48 to the positions shown in Figures 10 and 11.

The illustrated construction and relative arrangement of the blocks 50 and springs 56 can, I believe, be varied in a commercial embodiment of the invention and I might desire, for example, to have each spring so formed as to have one end embedded or otherwise retained in a complementary recess of a block 50, the other end of the same spring being laterally extended and seated in a socket opening on the side surface of stem 44. The same result, of course, would be obtained, that is, the springs would be so tensioned as to normally urge the blades 48 to an open position.

The restraining arms 58, in the modified form, are pivotally mounted upon a cross pin 60, said pin 60 being of such length as to permit the same to receive the elastic element 40 when the device is to be propelled into the air. Thus, the means 36 shown in the first form of the invention could be eliminated.

The restraining arms 58 are similar to the arms 32 of the first form, in that they are of angular formation, with each arm having an elongated leg and a short leg. In the modified form, however, the arms may have their legs longitudinally curved as shown, thus to cause the restraining arms to be engaged by the opposite ends of a stop and aligning pin 61 extending transversely through the stem 44 adjacent the pin 60 (Figures 6-8). Thus, the opposite ends of the pin 61 define stops, that will limit swinging movement of the restraining arms in such a way as to insure that the restraining arms will be properly positioned over the smaller ends of the blades 48, when the device is to be propelled into the air.

The opposite ends of the pin 61 are disposed in openings formed in the smaller ends of the blades 48, said openings being substantially greater in diameter than the diameter of pin 61, and registering with the pin 61 in the folded position of the blades. The pins 61, thus, serve not only as stops for the restraining arms 58, but also as guide means for the blades 48, which guide means will hold the blades against lateral deviation when the blades are in their folded position.

It is also thought to be of importance that the inner ends of the blocks 50 serve as stops, that will limit outward swinging movement of the blades 48 by engaging against diametrically opposite portions of stem 44 (see Figure 10). This construction eliminates the pin 20 used in the first form of the invention.

The springs 56, of course, serve to eliminate the ears 28 used in the first form of the invention, since the springs will expand as soon as the restraining arms 58 swing to the positions thereof shown in Figures 7 and 8, responsive to inversion of the device at the point of highest ascent thereof.

In Figures 12 and 13, there is shown another form of the invention, designated generally by the reference numeral 62. In this form of the invention the stem has been designated 64, and has restraining arms 66 pivotally mounted upon an elongated, transversely extending pin

67. Pin 67 is elongated to permit the same to receive the elastic element 40, when the device is to be propelled into the air.

In the form of the invention shown in Figures 12 and 13, the springs 56 are not used, nor are the ears 28. Instead, the blades are initially given their impetus toward an open position through the medium of spring means mounted wholly upon the stem 64. Thus, oppositely projecting, slightly curved pin members 68 are fixedly secured to the stem 64, and coiled about said pin members are springs 70, said springs being anchored to the pin members at one end, adjacent the stem 64. The other ends of the springs 70 are free to exert pressure radially and outwardly of the stem 64 in opposite directions, against the adjacent surfaces of the folded blades 72, thus to cause the blades to be shifted outwardly from the stem 64, as soon as the device inverts itself and the restraining arms swing out of engagement with the blades.

In Figures 14-17, a modified form is shown which has been designated generally by the reference numeral 72. This includes a stem 74 on one end of which is fitted a tubular housing 76. The housing 76, at one end (Figure 17) is formed with a counterbore 78 receiving one end of the stem 74, a cross pin 80 fixing the stem within the counterbore. The cross pin 80 projects laterally of the stem in opposite directions, and is slightly curved in the direction of its length as best shown in Figure 14, the cross pin extending through openings formed in the blades of the device to guide the blades during their initial outward swinging movement.

The stem can, of course, be fixed within the housing in other suitable manner, as by adhesive, etc.

The counterbore 78 of the tubular housing 76 merges into an axial channel 82 reduced in diameter relative to the counterbore, and disposed loosely within said channel is a gravity actuated means or ball element 84. Ball element 84 is of a diameter only slightly less than the diameter of the channel 82, thus to cause the ball element to be given straight line movement during its initial travel out of the axial channel.

That end of the channel 82 remote from counterbore 78 merges into an enlarged bore portion 86, said bore portion 86 merging into an oblate spheroidal chamber 88.

Extending transversely across the center part of the oblate spheroidal chamber 88 is a flat stop bar 90, and as will be noted from Figure 17, the stop bar 90 is positioned directly in the path of movement of the ball element 84, when the ball moves out of the channel 82. The purpose of the channel 82, in this connection is to impart straight line movement to the ball element 84, when the ball element moves out of its channel, thus to cause the ball element to strike the stop bar 90 in a manner to be made presently apparent.

The part 88, defining the chamber hereinbefore referred to, merges into an outer end portion 92 of the tubular housing, and closing said outer end portion is a cup-shaped cap 94, which provides a bumper as well as a weight means that will effect inversion of the device at the highest point of ascent thereof.

Within the upper end portion of the tubular housing there is provided a ledge 96, and normally seated against said ledge is the free end of a swinging latch member 98. The latch member 98 being rigid with a latch bar 100. Latch bar 100 is rotatably journaled in the wall of the tubular housing, and has its opposite ends projecting in opposite directions from the housing. Secured to the opposite ends of the latch bar 100 are latch arms, the latch arms being swingable into registration with slots 102 formed in the free ends of the blades of the device. The latch arms have been designated by the reference numeral 104, and when the device is being propelled into the air the arms 104 will be out of registry with the slots 102, and will be disposed in the positions shown in Figure 15. When the arms 104 are in the Figure 15

positions, the latch member 98 will be in the position shown in Figure 17.

It is desirable that washers 106 be interposed between the cap or bumper 94 and the adjacent portions of the blades, said washers being merely formed as small, plastic rings or the like and comprising spacers to hold the free ends of the wings away from the diametrically opposite portions of the bumper.

The wings or blades have been designated by the reference numeral 108, and one of said blades is provided, at that end thereof remote from the bumper 94, with a hinge bracket 110. The other blade is provided with a hinge bracket 112, the hinge brackets being disposed at opposite sides of the stem 74, with one bracket being slightly longer than the other. The bracket 112 is rigid with a gear 116, meshing with a gear 114 rigid with a shaft that is journaled in the stem 74 and that has a fixed connection to bracket 110.

It will be understood that the bracket 112 and gear 116 are both secured for rotation with a pin carried by the stem 74, said pin being rotatable within the stem 74. Alternatively, a fixed pin can project outwardly from the stem 74, and the bracket 112 and gear 116 could be fixedly secured to one another for joint rotation upon said fixed pin.

In any event, it will be seen that when the blades 108 swing from their folded positions shown to their open positions, the gears 114, 116, being in mesh, will cause the blades to open simultaneously, with neither blade opening more rapidly than the other. This timed, correlated opening of the blades is effective, of course, to insure that the device will open properly during the descent thereof, thereby to make certain that there will be proper operation of the same during said descent.

The means for causing the blades 108 to begin their movement to their open positions can vary, of course, and by way of illustration I have shown in Figures 14-17 outwardly directed vanes or blades similar to those used in the form of the invention shown in Figure 1.

In Figures 18 and 19, there is illustrated a modified form designated generally by the reference numeral 118. This includes a stem 120 provided at one end with a weighted bumper or cap. The stem 120 has blades 122 pivotally mounted thereupon, the blades being pivotally mounted upon a flattened, widened part 124 of the stem. The widened part 124 is integrally formed with a relatively flat, thin tongue 126 serrated or toothed on opposite surfaces thereof, to facilitate grasping of the tongue by one who is about to propel the device into the air.

Adjacent the weighted end of the stem, there are rotatably mounted gear segments 128, 130. These are in mesh with one another, and secured to the segment 130 for rotation therewith is a radially extending crank arm 132. Crank arm 132 is curved adjacent its connection to the gear segment 130, the curved portion of the crank arm merging into a lateral projection or finger 134. Finger 134 in turn merges into a curved outer end portion 138 of the crank arm, the curved outer end portion having at its free end a laterally offset weight means 140.

The finger 134 and the adjacent portion 138 are adapted to engage against one end of a cross pin 136 extending transversely through the stem 120 and projecting in opposite directions from the stem (Figure 18). It will be understood that the other end of the cross pin 136 will be similarly engaged by a crank arm 142 formed like the crank arm 132. The crank arms 132, 142 constitute pivoted restraining arms, that normally overlie the free end portions of the folded blades, said pivoted crank arms being so weighted as to swing out of their blade-covering positions, to release the blades for swinging movement to their open positions. The gear segments 128, 130 correlate the movements of the crank arms 132, 142, so as to insure that both of these arms will move simultaneously, and to an equal extent. Releasing of the blades 122 for outward swinging movement is thus timed in such a man-

ner as to insure that both blades will be simultaneously released.

The blades 122, when released, will swing outwardly in a correlated movement, through the medium of side by side gears 128 meshing with one another and rotatably mounted upon the widened part 124 of the stem. The gears 128 are secured to brackets connected fixedly to the adjacent ends of the blades 122, in the manner heretofore described with reference to the form of the invention shown in Figures 14-17.

It will be understood that the use of gears on the blades and the use of gears on the restraining arms can be such as to provide gears on the restraining arms with no gears on the blades. Conversely, gears could be provided upon the blades with no gears on the restraining arms.

In the form of the invention shown in Figures 18-19, the blades will remain folded until the device has reached the point of highest ascent. Thereafter, the device will invert itself, and the weighted arms 132, 142 will permit the blades to swing open, by swinging of the weighted arms out of blade-covering positions. The opening movement of the blades will, as hereinbefore stated, be timed to effect simultaneous motion of the blades.

In the form of the invention shown in Figures 14-17, the opening of the blades is accomplished in a slightly different manner. When the toy is initially propelled into the air, the ball element 84 will tend to move out of the channel 82, but will be given straight line movement due to the diameter of the channel 82. The ball element 84 will thus be caused to strike the stop bar 90 and will return to its seat on the end of the stem 74.

At the point of highest ascent, the toy shown in Figures 14-17 will invert itself, and this will cause the ball element to move out of the channel 82 once again. The ball element will now strike the stop bar 90, but will fall off the stop bar and move through one of the curved channels at opposite sides of the stop bar defined by the chamber 88. The ball element will now roll against the latch member 98 and will swing the latch member to the dotted line position shown in Figure 17. This will cause the arms at the outer ends of the latch bar to swing into registration with the slots of the blades 108, thus to permit the blades 108 to swing to open position.

In Figures 20-23, another modification has been illustrated. This has been designated generally at 144, and includes a stem 146 having a widened part 148 adjacent one end. At its other end, the stem is weighted in the manner hereinbefore described.

Gear segments 150 (Figure 22) are rotatably mounted within the widened part 148, in side by side relation, the widened part having an open center to accommodate the gear segments. The gear segments are integral with brackets secured fixedly to the blades 152 of the device.

The widened part 148 is integral with a flat end portion 154 serrated or roughened on opposite sides to afford a good grip thereupon.

A threaded rod 156 is coaxially aligned with the stem 146, and constitutes an extension of the stem. The stem 146 is provided, accordingly, at that end thereof remote from the tongue 154, with a threaded socket in which the adjacent end of the rod 156 is engaged. Alternatively, the stem 146 and rod 156 can be integrally formed, as desired. In any event, threaded upon the rod 156 is a tapered disc 158, and fixedly secured to diametrically opposite portions of the disc are oppositely pitched blades 160.

The disc 158 and its blades 160 can be positioned at any desired location along the length of the threads of the rod 156. When the device is projected, the disc will rotate and will move downwardly along the rod 156 to engage trigger 162 extending radially from a cross pin 164 rotatably mounted in the stem 146. When the disc 158 engages the trigger 162, it will bias the trigger to the position shown in Figure 23, causing partial rotation of the cross pin 164. The time of actuation of the trigger

162 depends on the repositioning of the disc 158 on the rod 156.

On the opposite ends of the cross pin there are provided radial fingers, said fingers being normally misaligned with slots 168 formed in the adjacent ends of the blades 152. The fingers have been designated at 170, and are shown in their normal position in Figure 21.

Partial rotation of the cross pin 164 by swinging of the trigger 162 to the Figure 23 position will cause the pins 170 to align with the slots 168, thus freeing the blades 152 for outward swinging movement.

Spacer washers or sleeves 166 are provided upon the cross pin 164, at opposite sides of the stem, to hold the adjacent ends of the blades 152 in properly spaced relation relative to the stem.

In Figure 24 there is illustrated another modification designated generally by the reference numeral 172. In this form of the invention the stem has been designated at 174, and pivotally connected to said stem are outwardly swingable blades 176. The stem 174 is provided, for a substantial part of its length, with a non-circular portion 178, and slidable upon said non-circular portion is a sleeve 180. The sleeve 180 has a bore complementary to the cross sectional shape of the non-circular portion, thus to prevent rotation of the sleeve 180 during its sliding movement.

Pivotally connected at one end to the sleeve 180 are links 182, said links being pivotally connected at their other ends to the blades 176, in spaced relation to the pivot axes of the blades.

By reason of this arrangement, equalizer means is afforded, that equalizes the blades during the outward swinging movement thereof, thus to cause both blades to open evenly when the device is inverted.

In Figures 25 and 26 there is illustrated another modified form of the invention designated generally by the reference numeral 184. The stem 186 has a circular, widened part 188, and carried by said widened part are transversely spaced pins 190. The ends of the respective pins project beyond the opposite faces of the widened part, and pivoted upon the respective pins are yokes 192. The yokes 192 are of inverted U-shape, with the legs of the yokes being curved longitudinally as best shown in Figure 25.

When the yokes are swung to the position shown in Figure 25, fingers 194 carried by the legs thereof overlie the adjacent ends of the blades of the device, to prevent the blades from swinging outwardly. This is the position of the yokes while the toy is ascending. When the toy inverts itself, the yokes, having the major portions of their lengths disposed laterally of their pivot axes, will swing from the positions shown in Figure 25, away from the blades. This will uncover the blades, and permit the blades to swing outwardly to open or unfolded positions.

In Figure 27 there is illustrated a modified form designated generally at 196. This includes a stem 197 on which blades 198 are pivotally mounted. The blades 198 have vanes 200 that are adapted to trap air when the toy inverts itself, to swing the blades to open positions. Connected to the outer ends of the vanes 200 are rubber bands or equivalent spring elements, said spring elements being connected at their other ends to the opposite ends of a bowed cross bar 202 carried by the stem 197.

When the blades 198 are folded, the spring elements 204 are placed under tension. Subsequently, when the blades are released for outward swinging movement, the spring elements 204 tend to contract, and this causes a positive force to be exerted upon the blades, tending to swing the blades to their open positions.

In Figure 28 there is illustrated a modified form designated generally by the reference numeral 206, and including a stem 208 having a widened part adjacent the weighted end thereof. On the widened part of the stem side by side gears 210 are rotatably mounted, said gears being in mesh with one another and being integral or

otherwise made rigid with the inner ends of the restraining arms 212. The restraining arms 212 are thus connected to one another for equalized swinging movement, thus to cause both arms to disengage themselves from their associated blades simultaneously.

The arms 212 are progressively widened in a direction away from the gears 210, so as to weight the arms at their outer ends, and intermediate the ends of the arms there are provided laterally projected, relatively elongated fingers 214, each finger being integrally formed intermediate its ends with a short projection 216. The projection 216 and the associated outer end portion of its associated finger 214 define a notch in which is received a cross pin 218 provided upon the stem 208. This is shown to advantage in the dotted line illustration in Figure 28.

When the arms 212 are in their dotted line positions in Figure 28, they are disposed in overlying relation to the adjacent ends of the blades of the device. Subsequently, when the device inverts itself, the arms 212 tend to swing to the full line positions shown in Figure 28, out of engagement with the blades, thus freeing the blades for outward swinging movement.

It may be noted at this point that the various modifications shown can be used independently of one another, or in combination, as desired. Thus, any of various combinations can be employed, as desired, and it will be well appreciated that it would extend the present application unduly to show all the combinations which are capable of use. For example, the restraining means shown in Figures 20 and 21 might be employed with the means 202, 204 of Figure 27, used for swinging the blades outwardly. Or, the restraining means shown in Figures 25 and 26 might be employed with the blade mounting shown in Figure 22. These examples are offered purely by way of illustration, and it will be understood that any of various combinations can be similarly effected.

Further, although geared restraining arms have been shown only in Figures 18, 19, and 28, other gearing arrangements might be employed for the restraining arms, using the principles shown by the geared arrangements illustrated in the blade mountings. In other words, the restraining arms might be pivotally mounted, with a geared connection therebetween, in the same manner as the blades 103 are pivotally mounted in Figures 14 and 15.

Certain important characteristics are found in each of the several forms illustrated, and it is thought that these characteristics will be readily apparent after a study of the drawings in conjunction with the above description. It may be noted, in passing, that a form of the invention such as shown in Figures 20-23 permits the opening time of the blades to be regulated. In other words, before the device is propelled into the air the disc 158 can be moved to a selected location along the length of the threaded rod 156, thus to predetermine the time that it will take for the disc 158 to arrive at the trigger 162.

It is also considered that any of various small whistling devices can be mounted upon the wing tips and/or on the stem, so as to effect a whistling sound during ascent and descent of the device.

From the foregoing description it will be apparent that the toy helicopter comprises at least two horizontally disposed blades arranged in confronting end to end spaced relation with a vertically disposed stem extending between the confronting ends of the blades, one end of the stem being above and spaced from the blades, and the other end carrying a weight and being below and spaced from the blades, the confronting ends of the blades being connected to the stem adjacent said one end thereof for movement from the horizontal position to positions extending longitudinally of the stem. At least two spaced levers are positioned inwardly of the weight and are engageable exteriorly with the portions adjacent the non-confronting ends of the blades when the latter are in the

longitudinal position with respect to the stem and are connected intermediate their ends to the stem for swinging movement about an axis transverse of the stem. In the forms of Figures 1, 6, 12 and 14, there is a lever on each side of the stem which is engageable exteriorly with the portion of the nonconfronting end of the complementary blade when the blades are in the longitudinal position with respect to the stem, the levers being connected intermediate their ends to the stem for swinging movement about an axis transverse of the stem, each lever embodying a pair of arms extending in a diverging relation from its point of connection to said axis with one of the arms being shorter than the other of the arms. Specifically, in the form of Figures 1, 6, 12 and 14, the levers are connected to the stem for swinging movement about a common axis transverse of the stem, while in the forms of Figures 18, 25 and 28, each of the levers is connected to the stem for swinging movement about a separate axis.

It is believed apparent that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. A toy helicopter comprising at least two horizontally disposed blades arranged in confronting end to end spaced relation, a vertically disposed stem extending between the confronting ends of said blades and having one end above and spaced from said blades and having the other below and spaced from said blades, the confronting ends of said blades being connected to said stem adjacent said one end thereof for movement from the horizontal positions to positions extending longitudinally of said stem, a weight on the other end of said stem, and at least two spaced levers inwardly of said weight and engageable exteriorly with the portions adjacent the non-confronting ends of said blades when the latter are in the longitudinal position with respect to said stem and connected intermediate the ends to said stem for swinging movement about an axis transverse of said stem, one of said levers being on one side of said stem and the other of said levers being on the other side of said stem, each lever embodying a pair of arms extending in a diverging relation from its point of connection to said axis with one of said arms being shorter than the other of the arms.

2. A toy helicopter comprising at least two horizontally disposed blades arranged in confronting end to end spaced relation, a vertically disposed stem extending between the confronting ends of said blades and having one end above and spaced from said blades and having the other below and spaced from said blades, the confronting ends of said blades being connected to said stem adjacent said one end thereof for movement from the horizontal positions to positions extending longitudinally of said stem, a weight on the other end of said stem and a lever on each side of said stem inwardly of said weight and engageable exteriorly with the portion of the non-confronting end of the complementary blade when the blades are in the longitudinal position with respect to said stem, said levers being connected intermediate their ends to said stem for swinging movement about a common axis transverse of said stem, one of said levers being on one side of said stem and the other of said levers being on the other side of said stem, each lever embodying a pair of arms extending in a diverging relation from its point of connection to said axis with one of said arms being shorter than the other of the arms.

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3. A toy helicopter comprising at least two horizontally disposed blades arranged in confronting end to end spaced relation, a vertically disposed stem extending between the confronting ends of said blades and having one end above and spaced from said blades and having the other end below and spaced from said blades, the confronting ends of said blades being connected to said stem adjacent said one end thereof for movement from the horizontal positions to positions extending longitudinally of said stem, a weight on the other end of said stem, and a lever on each side of said stem inwardly of said weight and engageable exteriorly with the portion of the non-confronting end of the complementary blade when the blades are in the longitudinal position with respect to said stem, each of said levers being connected intermediate the ends to said stem for swinging movement about a separate axis, one of said levers being on one side of said stem and the other of said levers being on the other side of said stem, each lever embodying a pair of arms extending in a diverging relation from its point of connection to said axis with one of said arms being shorter than the other of the arms.

4. A toy helicopter comprising at least two horizontally disposed blades arranged in confronting end to end spaced relation, a vertically disposed stem extending between the confronting ends of said blades and having one end above and spaced from said blades and having the other end below and spaced from said blades, a pair of spaced axes on said stem adjacent one end thereof, a gear carried by each of the confronting ends of said

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blades and connected to the adjacent axis for rotation therearound, said gears meshing with each other and connecting said blades for simultaneous movement from the horizontal positions to positions extending longitudinally of said stem, a hollow housing on the other end of said stem, a weight carried by said housing, a latch member having an intermediate part normally disposed interiorly of and across the housing and pivotally connected to said housing for movement from its normal position to a position longitudinal of said housing, a pair of arms exteriorly of said housing and each connected to said latch member for movement therewith, each arm normally engaging a blade when the blade is in the longitudinal position with respect to said stem, and gravity actuated means loosely disposed within said housing for actuating said latch member.

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