Dec. 12, 1939. J. S. KANE 2,183,195

MULTIPLE AIR PROPELLER

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FIG. 1.

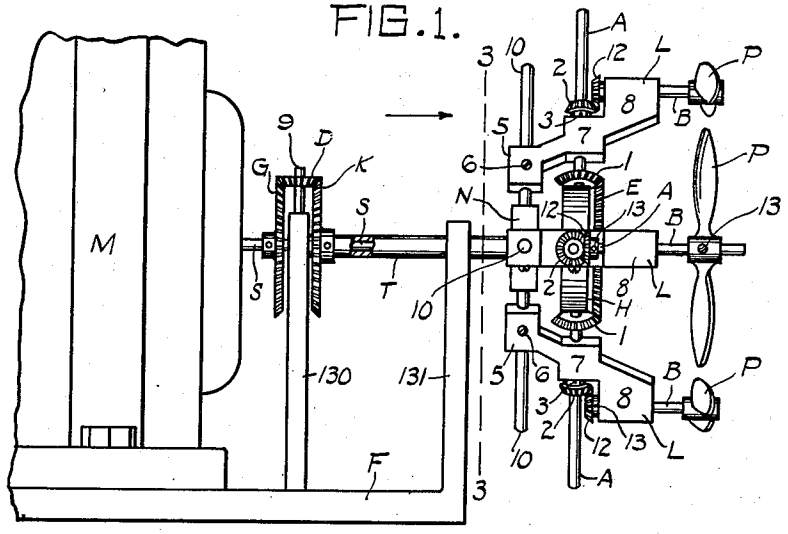


FIG. 2.

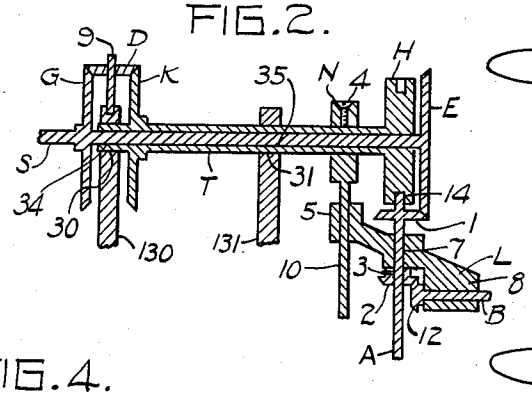


FIG. 3.

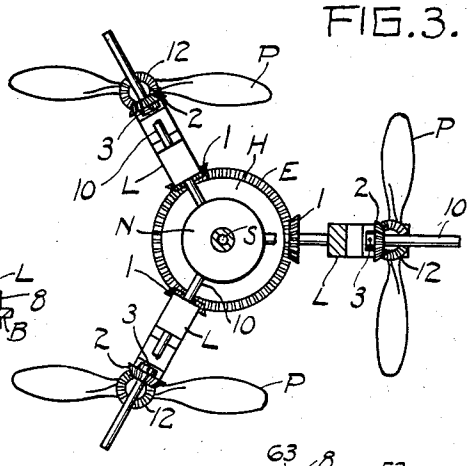


FIG. 4.

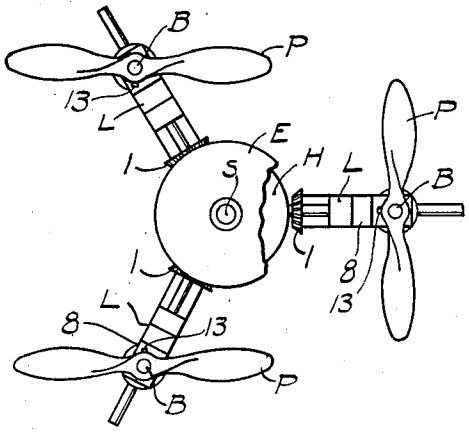
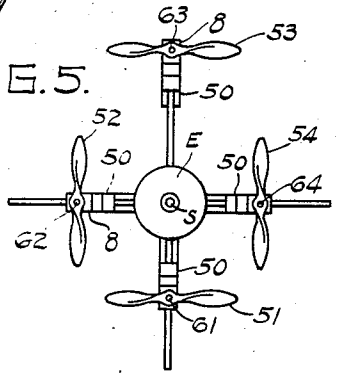


FIG. 5.



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FIG. 6.

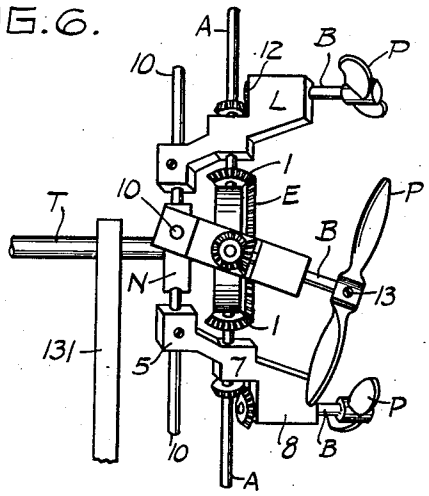


FIG. 7.

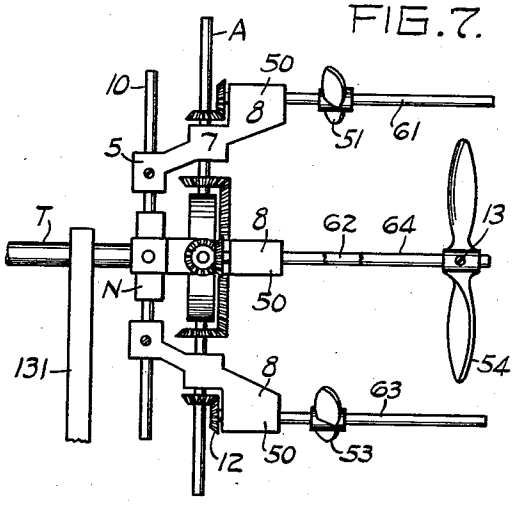


FIG. 8.

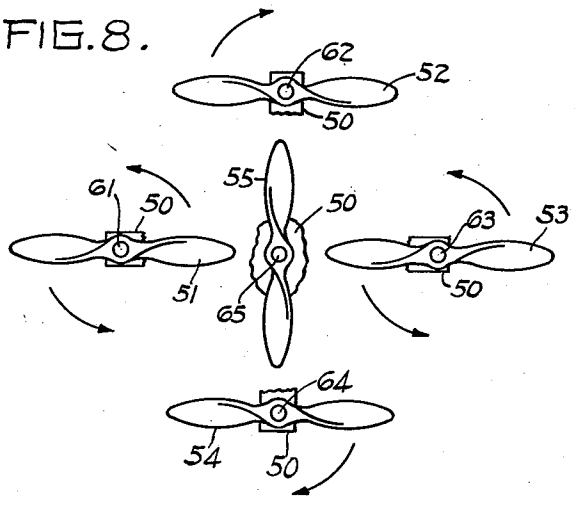
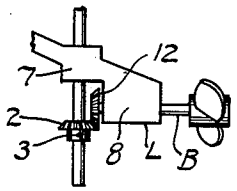


FIG. 9.



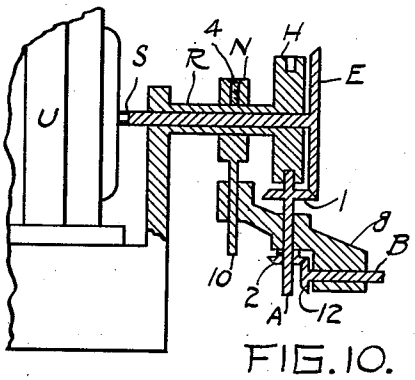


FIG. 10.

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Patented Dec. 12, 1939 2,183,195

UNITED STATES PATENT OFFICE

2,183,195

MULTIPLE AIR PROPELLER

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Application February 6, 1939, Serial No. 254,850

4 Claims. (Cl. 230—254)

This invention relates to multiple air propellers. Its principal purpose is to provide a plurality of fans or propellers all driven, preferably, by a single motor in a simple and compact arrangement, but whereby a plurality of air currents can be adjusted so as to work together for various purposes.

Another advantage is that instead of a single large fan or propeller, I use a plurality of small ones, thus reducing the leverage necessary to drive the outer edges of a fan.

By my preferred arrangement of a plurality of fans, each revolves individually and the axis of each fan also revolves in a circle, thereby creating a plurality of small currents which have a tendency to spiral or produce a cyclonic effect by which the total air current tends to keep together.

The axes of revolution or driving shafts of all the propellers can turn around a common center or can be stationary and some of the individual fans or propellers can revolve in one direction and some in another. Some propellers can be in advance of others and in fact, many different arrangements of propellers can be made.

In the drawings,

Fig. 1 is a side elevation of my device.

Fig. 2 is a vertical transverse section through the axis of the driving shafts to show some of the inside details of construction.

Fig. 3 is an elevation, partly in section, viewed from the left as shown by the arrow on line 3—3 of Fig. 1.

Fig. 4 is an elevation from the right of Fig. 1.

Fig. 5 is a diagrammatic elevation, similar to Fig. 4, showing four propellers instead of three.

Fig. 6 is a side elevation showing another adjustment of three propellers.

Fig. 7 is a side elevation showing another adjustment of four propellers.

Fig. 8 is a diagrammatic elevation, similar to Figs. 4 and 5, showing five propellers.

Fig. 9 is a detail showing how the direction of the rotation of a propeller can be reversed.

Fig. 10 shows a modification in which the tubular shaft is fixed or replaced by a tube and in which the main driving gears and idle gear are omitted.

In the drawings, F represents a frame of any suitable kind provided with supports 130, and 131 which carry shaft bearings 30 and 31 for a tubular driving shaft T. In some of the constructions, this shaft can be fixed in place or may be merely a tube, in which case the bearings 30 and 31 become merely part of the supports, there being other bearings 34 and 35 carried by tubular shaft T for an inside or main driving shaft S.

This shaft S is driven by a motor M, preferably of the electric type, and carries at one end a driving gear G of the bevel type and at the other end a driven gear E, also of the bevel type.

The tubular shaft T carries a second driving gear K near one end and between this and gear G is an idle gear D which is carried on a shaft 9, whereby when gear G revolves in one direction, gear K revolves in the opposite direction.

Shaft T at the other end carries a radial shaft bearing hub H which revolves with shaft T and carries with it a plurality of radial shafts A, A, all revolubly carried by hub H and each revoluble in bearings, such as 14, in hub H. Each of these shafts A is also revoluble in a medial bearing 7 to be described.

Each radial shaft A carries an inner radial shaft gear 1 which engages the teeth on the driven gear E, whereby it and its shaft A are revolved. 2 represents an outer radial shaft miter gear which is slidably carried by each radial shaft A. Each gear 2 is adjustable on its shaft A and is preferably reversible thereon, being held in the desired position with the gear teeth outward or inward as by means of a set screw 3.

N represents a spider which, as shown, is preferably circumferentially adjustable on the tubular shaft T by means of a set screw 4, whether the tubular driving shaft is revoluble or merely a carrier for the inside shaft, such as S. Carried by spider N are a plurality of fixed radial arms 10, 10 corresponding in number with the radial shafts A and ordinarily in a position directly in line with or behind them.

However, as shown in Figs. 6 and 10, they may be moved circumferentially to produce the result shown.

L, L represent a plurality of bearing carriers, each including at one end a collar 5 which is slidable on a fixed radial arm, such as 10, being adjustable thereon as by a set screw 6. Each bearing carrier L also carries a medial bearing, such as 7, for a radial shaft A and at substantially right angles thereto carries a propeller shaft bearing 8 at its outer end, or the end opposite collar 5.

B, B represent propeller shafts, each of which is revoluble in and is carried by a propeller shaft bearing, such as 8. Each shaft B carries a propeller shaft gear 12. Each propeller P is preferably adjustable on its shaft B as by means of a set screw 13 so that it can be moved in and out and can be positioned in the same orbit plane with the other propellers, or in a different orbit plane, as shown in Fig. 7.

When the inside main driving shaft S revolves, it revolves the hub H twice as fast in the opposite direction and through the bevel gear E and gear 1 and the radial shafts A, A, the propellers are also revolved.

If it is desired to change the direction of the air stream produced by each propeller, the

spider N can be moved circumferentially, as shown in Fig. 6.

As shown in Fig. 5, by loosening the set screw, such as 6, for a bearing carrier and 3 for an outer gear 2, one or more propeller carriers L can be moved away from the axis of the driving shafts and can then be fixed in position so that some or all of the propellers will revolve in orbits with the same or with different radii.

As shown in Figs. 5, 7 and 8, instead of using three propellers, I can use four, marked 51, 52, 53 and 54. These are carried by propeller shafts 61, 62, 63 and 64, similar to propeller shafts B, and revolubly supported on bearing carriers 50, which are similar to L.

Some of the propellers can be positioned with their respective propeller shafts a greater distance away from the drive shaft than the others and, as shown in Figs. 8 and 9, by reversing one or more of the shaft miter gears, such as 2, each propeller driven thereby will move in a reverse direction from the others.

There may also be another propeller shaft 65 which extends outward from the main driving shaft to carry a fifth or central propeller 55. This fifth propeller may be in a different orbit plane from the other propellers, as shown.

In Fig. 10, I show a construction in which a tubular shaft, such as R, forms merely part of the frame, the driving gear G, idle gear D and driving gear K being omitted, a motor, such as U, directly driving a main inside driving shaft S. With this construction, the position of the propellers can be shifted at will but there is no reverse motion as between a shaft bearing hub, such as H, and a driven miter gear, such as E.

The propellers revolve at the speed produced by motor U, gear E and gears 1, 1. Spider N can be turned on stationary shaft R and fixed in position by set screw 4 to produce the result shown in Fig. 6.

I claim:

1. In a multiple propeller air control device, the combination with a frame including shaft bearings; of an inside driving shaft carrying a driving gear at one end and a driven gear at the other end; means to drive said shaft; an outside tubular driving shaft through which the first shaft passes, such tubular shaft carrying a second driving gear at one end and a radial shaft bearing hub at the other end proximate the driven gear, said tubular shaft being revoluble in said frame shaft bearings and carrying bearings for the inside driving shaft; an idle gear between the first and second driving gears; a plurality of radial shafts revolubly carried by and revoluble in the radial shaft bearing hub; an inner radial shaft gear carried by each radial shaft at its inner end and meshing with the driven gear; an outer radial shaft miter gear slidably and adjustably carried by each radial shaft near its outer end; a spider circumferentially adjustable on and carried by the tubular driving shaft and including radial arms; a plurality of bearing carriers, each including a collar at one end slidable and adjustable on each fixed radial arm, a medial bearing for a radial shaft and a propeller shaft bearing carried at its other end; a propeller shaft which is revoluble in and is carried by each propeller shaft bearing; a propeller shaft gear carried by each propeller shaft in engagement with a radial shaft miter gear; and a propeller adjustably carried by each propeller shaft.

2. In a multiple propeller air control device, the combination with a frame including shaft bearings; of an inside driving shaft carrying a driving gear at one end and a driven gear at the other end; means to drive said shaft; an outside tubular driving shaft through which the first shaft passes, such tubular shaft carrying a second driving gear at one end and a radial shaft bearing hub at the other end proximate the driven gear, said tubular shaft being revoluble in said frame shaft bearings and carrying bearings for the inside driving shaft; an idle gear between the first and second driving gears; a plurality of radial shafts revolubly carried by and revoluble in the radial shaft bearing hub; an inner radial shaft gear carried by each radial shaft at its inner end and meshing with the driven gear; an outer radial shaft miter gear slidably and adjustably carried by each radial shaft near its outer end; a spider carried by the tubular shaft and including radial arms; a plurality of bearing carriers, each carried by the tubular shaft and each including a medial bearing for a radial shaft and a propeller shaft bearing; a propeller shaft which is revoluble in and is carried by each propeller shaft bearing; a propeller shaft gear carried by each propeller shaft in engagement with a radial shaft miter gear; and a propeller carried by each propeller shaft.

3. In a multiple propeller air control device, combination with a frame including shaft bearings; of a driving shaft revoluble therein and carrying a driven gear; means to drive the shaft; a radial shaft bearing hub surrounding the shaft; a plurality of radial shafts carried by and revoluble in said hub; an inside radial shaft gear carried by each radial shaft at its inner end and meshing with the driven gear; an outside radial shaft miter gear slidably and adjustably carried by each radial shaft near its outer end; a spider adjustably supported in the frame and including radial arms; a plurality of bearing carriers, each including a collar at one end slidable and adjustable on each radial arm, a medial bearing for a radial shaft and a propeller shaft bearing carried at its other end; a propeller shaft which is revoluble in and carried by each propeller shaft bearing; a propeller shaft gear carried by each propeller shaft in engagement with a radial shaft miter gear; and a propeller carried by each propeller shaft.

4. In a multiple propeller air control device, the combination with a frame including shaft bearings; of a driving shaft revoluble therein and carrying a driven gear; means to drive the shaft; a radial shaft bearing hub surrounding the shaft; a plurality of radial shafts carried by and revoluble in said hub; an inside radial shaft gear carried by each radial shaft at its inner end and meshing with the driven gear; an outside radial shaft miter gear slidably and reversibly carried by each radial shaft near its outer end; a spider supported in the frame and including radial arms; a plurality of bearing carriers, each including a collar at one end slidable and adjustable on each radial arm, a medial bearing for a radial shaft and a propeller shaft bearing carried at its other end; a propeller shaft which is revoluble in and carried by each propeller shaft bearing; a propeller shaft gear carried by each propeller shaft in engagement with a radial shaft miter gear; and a propeller carried by each propeller shaft.

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