swirling thermals turn (in the northern hemisphere) in a counter clockwise direction, at about 60 to 90 R.P.M.

As pictured in LIFE of June 21, 1943, it would seem that looking down from above, the rotor on the helicopter turns in a clockwise direction.

Now, therefore,
To raise the craft to 200 feet
Work done (6000) (200) = 1,200,000 ft. lbs.
Power available 180 H.P. or 99,000 ft. lbs./sec.
Time required

$$\frac{1{,}200{,}000}{99{,}000} = 12 \text{ seconds}$$

Average rate of climb $\frac{200}{12} = 17$ feet per second

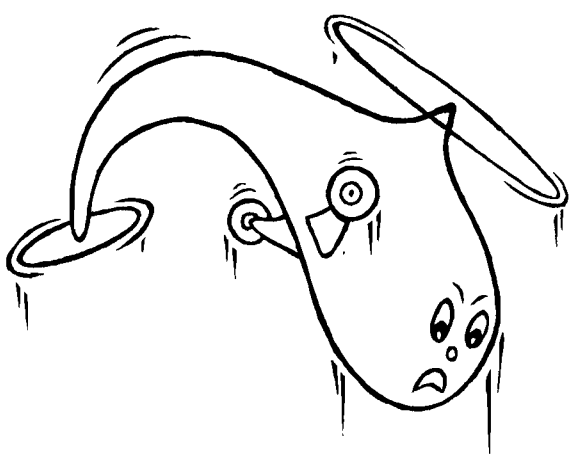
Now, however, if the average velocity from the earth to 200 feet is 17 feet per second and at 200 feet a lift (ridge lift) of 5 feet per second is encountered a lift of 22 feet per second will be had or a 29% increase.

If a thermal is encountered instead of ridge lift, a vertical velocity of perhaps 7 feet will be encountered.

$\frac{17 + 7}{17} = 1.41$, OR AN increase of 41% in vertical velocity.

Moreover:
An increase of lift up to 10 feet per second at about 1000 feet would increase the lift.

$\frac{17 + 10}{17} = 1.59$ or an increase of 59% in vertical velocity.



THERMAL TROUBLE

Dale Clark

More unpredictable on a rotating wing is the effect of swirling spirals or thermals whose rotation is counter to that of the wing. It is likely that the average thermal rotates at about 70 R.P.M. (some much more quickly, dictated at least in part by vertical velocity).

Lift and drag on any wing varies as the square of the velocity.
(210 R.P.M.) (19 foot rotor) (from LIFE)
Tangential velocity (πd^2) (RPM)

$$\frac{\left(\frac{\pi}{4}\right)(210\text{-}60)^2}{(210)^2} = \frac{22500}{44100}$$

= .51, a 51% instantaneous increase in lift.

It becomes evident that the steering rotor at the after end of the fuselage must be speeded up to overcome the roration of the thermal.

All lift encountered in the atmosphere except perhaps early evening (after sundown) thermals is likely to be turbulent. This poses the problem of damping out resonant frequencies in rotor blades.

Except as resonant frequencies are damped out, there is ever the possibility that lift though available might not be made use of because of the possible rough operation of the rotor blades.

It would seem from the foregoing which is entirely unrelated to any helicopter experience, that measurable fuel savings might be effected in flying a positive vertical lift aircraft, if favorable vertical currents are made use of.

If this be so then we may expect that the flight lanes of helicopters will follow the paths already laid out by migratory soaring birds. Particularly along the windward side of the Appalachian Mountains.

Moreover, it would seem that flying low in the lee of mountains or buildings and hangars ought to be in the category of stunts.

It happens that one of the routes of commerce opened by man's ingenuity was the old Delaware and Hudson Canal which ran from Kingston, New York, to the coal fields of Pennsylvania. This canal winds along the valleys on the west side of the Shuwangunk Mountains.

It is along this ridge of mountains that we have long soared at Wurtsboro and along which Barringer once made a long flight.

It seems likely, therefore, that helicopters might be expected to carry men and perhaps even freight along the windward side of this ridge of mountains that face the prevailing north-westerly winds.