NEW YORK-CHICAGO FLIGHT.

THE TWO MOST FEASIBLE ROUTES FOR THE AIRSHIP RACE.

HOW AN AEROPLANE WORKS, AS SHOWN BY GLENN CURTISS

A Simple Explanation of Flight in Untechnical Terms For the Average Man.

The aeroplane of Glenn H. Curtiss, in which he made his Albany-New York flight, is the one from which the accompanying diagrams are drawn. The Curtiss machine is held to have proved itself, by the recent flight, the most advanced type of aeroplane yet devised in America, possibly in the world.

The Curtiss aeroplane is shown in ground plan in Figure 1. The aeroplane flies in the direction indicated by the arrows. A is the altitude rudder, perched out at the end of a bamboo framework, in front of the driver. B B, are the two stabilizing rudders, out at the ends of the planes. C is the rudder for lateral steering, perched out behind, as A is before. P P is the upper sustaining plane, four feet under which lies the lower sustaining plane, parallel and of the same shape and size. In front of the planes is the steering wheel, W. Just back of W is the aeroplanist's seat, S, and between the planes is placed the big engine. Back of the engine and behind the big planes is the propeller, X.

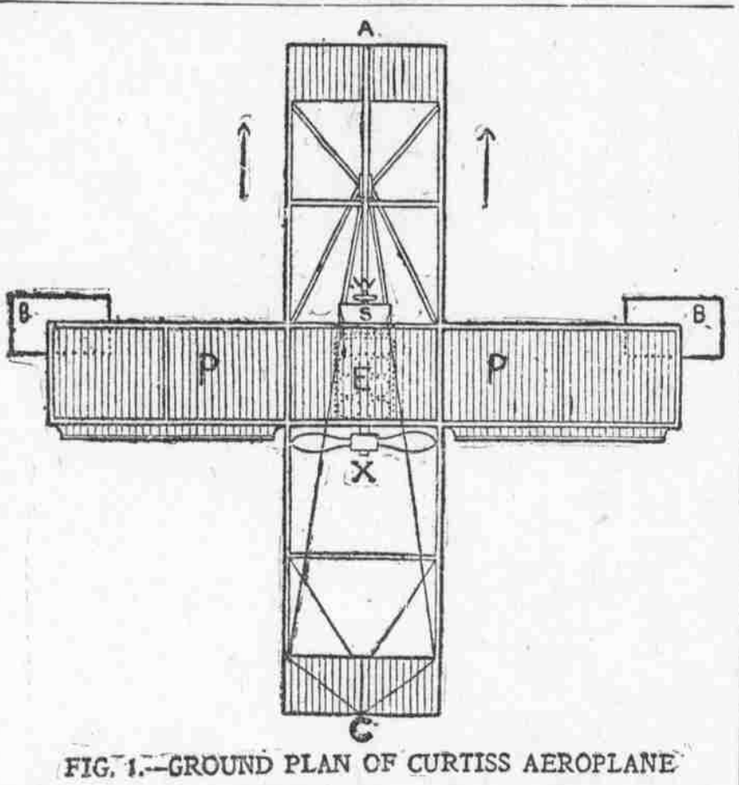


FIG. 1.—GROUND PLAN OF CURTISS AEROPLANE

In the type of aeroplane now most developed, the propeller, X, placed behind the engine, E, and the driver, at S, forces the machine forward in a horizontal direction. The planes, P, P, catch the air on their under surfaces, slightly inclined and concaved for that purpose. The pressure lifts the machine in the air or sustains it there at a desired level.

The engine that supplies the power is a gasolene explosion motor closely similar to that used in automobiles. Only slight differences are necessitated by the adapting of the engine to the aeroplane. The controls for the magneto and gasolene supply are placed forward of the engine, at the driver's seat, S, for he is under the disadvantage of sitting in front of the motor.

It is now to be seen how the propeller, X, driven by the engine, E, sends forward the machine, which is sustained by the gliding on the air of the plane, P P, and the similar plane under it. There remains to be seen the more delicate and difficult part of flying, namely the work of keeping the flyer straight and level. Each of the rudders, A, B B and C, does its own particular share of this work. It is a threefold work, and far more complicated than the control of automobile, ship or bicycle. All these travel on a horizontal surface and are guided only to right and left.

The function of the forward rudder, A, is to turn the course of the aeroplane up or down. Right here the tremendous difference between the aeroplane and almost all methods of locomotion known to us becomes apparent. To realize the difference, it is only necessary to try to conceive an automobile that one could, by a turn of the wrist, start to soaring upward from the ground. Nothing else so free and complete in the whole realm of motion, as known to human experience, exists as in the aeroplane of to-day, rude and imperfect, compared to its prospects, as it still presumably is. And the freedom and complete command of space that distinguish the aeroplane all lie in rudder A, the altitude rudder.

Figure 2 is a drawing of the essential details of this wonderful rudder. The rudder is shown from a point of observation forward of it and to its left.

The rudder consists of two horizontal planes, p p. They are connected with a framework similar in shape to the skeleton of an oblong box. This framework has the planes p p for its top and bottom sides. The framework hinges at the two ends on the axis represented by the dotted line, a. It is by turning on this hinge that the planes are made to act as rudders.

This action is produced in the following manner: When the framework is tilted so that the fronts of the planes point upward, the air through which the aeroplane is advancing catches on their under side. The pressure of the air on the under sides of the planes lifts them up, and so lifts the nose of the whole aeroplane up, making it take an upward direction.

When, on the other hand, the planes p p are tilted downward, the air as it is cleft presses on their top surfaces and forces them to point earthward. And so they give the downward direction to the course of the aeroplane, when the flyer desires to fly lower.

It will readily be seen that without the altitude rudder, A, the aeroplane would be helpless.

How is the altitude rudder controlled by the aeronlanist? The view in Fig. 2 shows this in the apparatus, c c c. This is a peculiar but perfectly simple device. The rudder is pushed forward or pulled back by a long rod. The rod runs from a

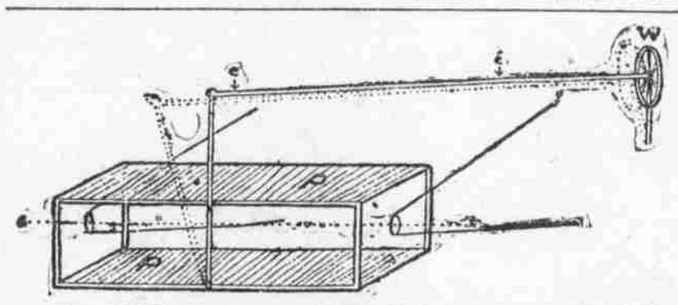


FIG. 2.—ELEVATION OF ALTITUDE RUDDER, A.

crosspiece of the framework of the rudder back to the steering wheel. It is fastened at the hub of the wheel. The wheel works backward and forward as well as turning.

More vital still than the altitude rudder, and certainly more of a departure from all other known methods of equilibrium, are the stabilizing rudders or fins, B B. The working of these is shown in Fig. 3.

An aeroplane is poised as delicately on its airy even keel as a tightrope walker on his wire. The stabilizing fins serve the same purpose as do the fan of the Japanese tightrope performer. They save the flyer from tipping over to one side or the other.

Fig. 3 will show how this is done. The purpose of the arrangement here shown is to to tilt the one plane upward and the oppisite one downward at the same time.

The control of the planes, B B, lies in the wires c c c c. The axis of each plane lies in the dotted line, A. The wires, cc, fastened behind the axes of the planes, tilt them by an upward or downward pull. The wires c c run down from each plane to a pulley at the corner of the lower sustaining plane, P. From the pulley they run straight to the top of the back of the driver's seat, S. There they are fastened. When it sways to the right, it pulls the wire that draws down the rear of the stabilizing plane out at the left wing tip. When the seat sways to the left, it draws down the stabilizing plane at the right wing tip.

The wring, c c, runs also up from the tops of the stabilizing planes through pulleys overhead, and so connects the stabilizing planes from above. When, therefore, one stabilizing plane has its after edge pulled down by the tilting of the seat back, the same pull, communicated by the wire overhead to the other stabilizing plane, pulls its rear up. Whichever way the one stabilizing plane is turned, the other one is turned oppositely.

The manner in which this action rights the aeroplane will be readily understood. The process is as follows: As soon as, in the course of flight, the aeroplane sags to the left, the driver leans over to the right in his seat. It is the motion that he would naturally make to find his own equilibrium. In leaning to the right he pushes the seat back over with him. This pulls the wire that draws down the left stabilizing fin's after part. Thus the fin turns on its axis, or in such a way as to present a slanting under surface to the wind. The wind delivers an upward pressure on this surface, and this upward pressure tends to right the sagging left end of the aeroplane. At the same time the pull that started from the seat back is sent on from the left fin over the overhead wire and down to the upper surface of the right fin, which is drawn up. The right fin is thus made to present its upper surface to the wind, and the wind then depresses the right end of the aeroplane at the same time that the left is being raised. In a moment the aeroplane is righted. The driver thereupon straightens up in his seat, bringing the seat back again to the upright position and so drawing the stabilizing fins back again to their original place.

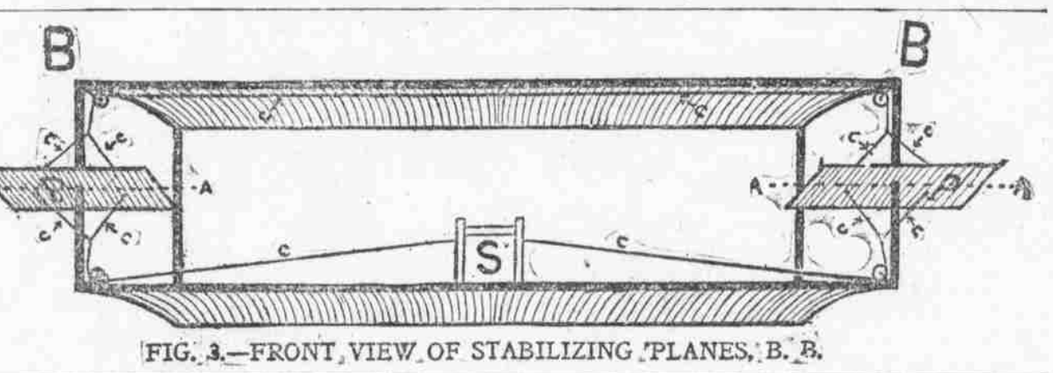


FIG. 3.—FRONT VIEW OF STABILIZING PLANES, B. B.

The third of the important controls of the aeroplane in the air is shown in Fig. 4. It is the side to side steering gear, the most complicated, because it is the least important. It needs a second motion of the hands, which are already busy with the altitude control.

Fig. 4 shows a view of the side-to-side rudder, C. It is cleft, and through this cleft passes a horizontal plane. This is just a fixed plane, placed to sustain the weight of the after end of the aeroplane. The rudder C, save for this cleavage into an upper and a lower part, is very similar to a ship's rudder. It is noteworthy that this is the only vertical plane on the whole Curtiss machine. The rudder C swings on a vertical axis, a. The positions into which it may swing are shown by the dotted lines.

It is with this wheel, of course, that the driver turns to right and left, doubles on his course and makes the most complicated evolutions.

There are other things that the aviator has to attend to besides his direction and stability control, of course. But they do not require his ever taking more than one hand from the steering wheel. There is the throttle which feeds the fuel to his engine. It is a short, slender lever, at his right hand. A brief motion cuts off his fuel and shuts down his engine, or lessens his speed or increases it. The electric control is in a little twist-button fastened on the front of his seat between his knees.

In starting, Curtiss, after testing his engine, first takes his place in the driver's seat, turns on the throttle and grasps the steering wheel. Then, while two or three men hold the machine from darting forward on its wheels, a mechanic starts the engine with a quick turn of the propeller. With the propeller going briskly, Curtiss gives a signal, and the aeroplane is released by the men holding it. It starts forward rapidly on its wheels. When the right speed is reached, Curtiss pulls the steering gear back a little toward him. The aeroplane rises from the ground. The ground friction overcome, it gains speed rapidly and rises faster, till it reaches the desired level.

In descending, Curtiss picks out with his eye the favorable spot. When within some 200 yards of it and at some twenty yards' elevation, he shuts off his engine with a movement of the right hand. Depressing the head of his flyer, he glides down mentum.—Condensed From the New York Evening Sun.

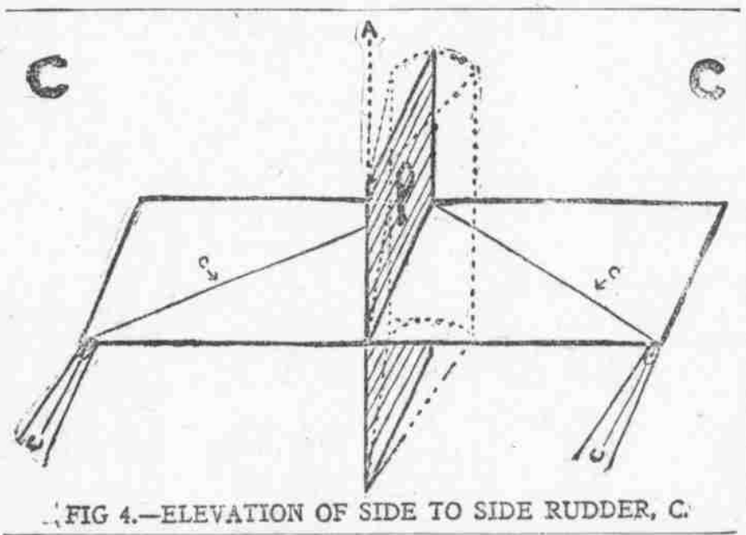


FIG 4.—ELEVATION OF SIDE TO SIDE RUDDER, C.

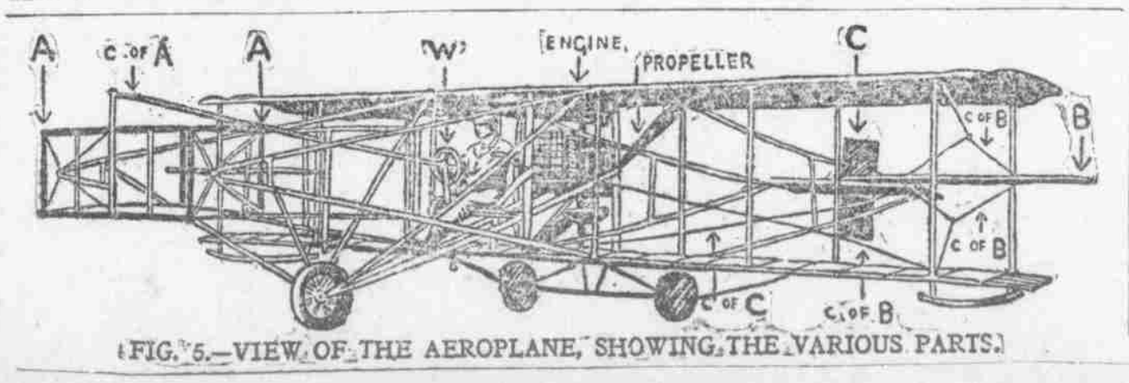
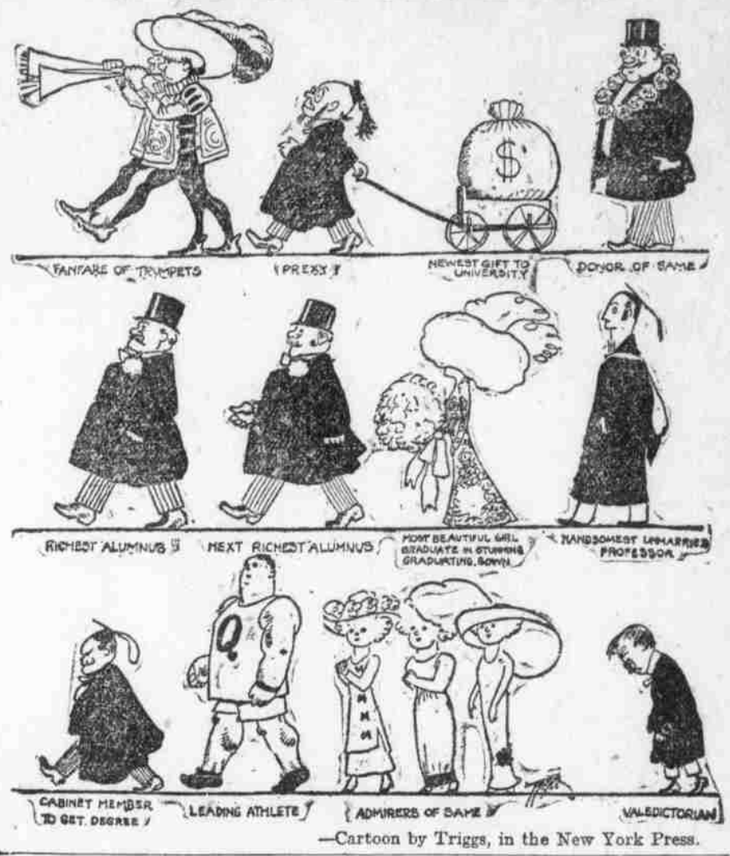


FIG. 5.—VIEW OF THE AEROPLANE, SHOWING THE VARIOUS PARTS.

COMMENCEMENT AS IT OUGHT TO BE.



—Cartoon by Triggs, in the New York Press.

WARNS GRADUATES OF NATION'S PERILS.

Dr. McAfee Tells New York University Class Conscience is Safeguard of Americans.

New York City.—Three clergymen, all of the class of 1860, took part in the baccalaureate service in the auditorium of New York University. These were the Rev. William H. Phraner, of Hempstead, L. I.; the Rev. Dr. William H. Neilson, of Plainfield, N. J., and the Rev. Dr. John McVey, pastor emeritus of the North Presbyterian Church, Binghamton, N. Y. Chancellor Henry M. MacCracken pronounced the benediction and the Rev. Dr. Cleland B. McAfee, pastor of the Lafayette Avenue Presbyterian Church, Brooklyn, preached the sermon. Thirty-four of the graduating class were present to hear the farewell sermon. Dr. McAfee said in part:

"No system of society will prevent what we see every day—young men with every opportunity, with full powers, with all inducements to manliness, who will not be manly. The Bowery crowd, the bread lines, the assemblages of the down and outs, are not made up of men who had no chance. You find college men among them. Last winter a visitor who had passed through the same experiences himself found that two per cent. of the men who made up one bread line were college men. He found thirty college men of his own acquaintance in one small section.

"The slums produce many failures, but the avenues produce enough to teach us clearly that society has to take account of the individual and what means more, that the individual must take account of himself. The only basis for a self-respect which cannot be lost is a definite, implicit recognition of the right of a man's conscience in his life.

"Men who are entering citizenship to-day can take part in movements to answer questions like these: Can a new racial type be formed by sudden blending in large proportions of the people of all the earth? Will democracy work in a large way? Can the nation herd together until the blending take place? What is the limit of safety in individual wealth in a democracy? How shall a nation be saved from imperialism in its period of acquiring wealth? No nation has yet been so saved. What can we make peculiar in our own nation to save it? The answers to these questions lie in the assertion in individual life, and so in public life of the old fashioned and imperious claims of conscience.

"And it is a hopeful place in which to work. There is in this country a hereditary strain of moral seriousness. The biggest thing about the American people is not pocket nor head, but conscience, and any man who has a clear cut moral appeal will command a hearing and a following. That is our safeguard. That insures the continuance of our national idealism."

CHANCELLOR DAY DECRIES AUTOMOBILES.

Much of Country's Productive Capital Absorbed, He Says---Self-denial Emphasized--Chancellor Declares Lack of This Accountable For Lower Marriage Rate.

Syracuse, N. Y.—There are so many young men coursing about the country in automobiles, and their pleasure absorbs such a large share of the productive capital of the country, that Chancellor James R. Day believes it is becoming a question if the automobile is not a curse to the country.

The chancellor was speaking to the graduating class of Syracuse University on self-sacrifice and self-denial, and he chose the automobile as a "broad and apparent illustration" of a luxury that too often is not sacrificed.

"Young mechanics and clerks and business men," he said, "who need all of their capital, are mortgaging their homes by the thousand and losing their positions often by their infatuation with this form of pleasure.

"It is said that about $500,000,000 is invested in the automobile trade, and this enormous capital is non-productive, that is, it adds comparatively nothing to the wealth of the people, but, on the contrary, absorbs it. It means ninety per cent. of wasted money and wasted time. A certain per cent. returns in business uses and wholesome rest and recreation.

"I know the criticism that will be sure to come because of what will be called an attack on a great industry, but I address myself to the abuse of self-indulgence in a good thing. I emphasize self-denial."

Lack of self-denial is accountable, the chancellor believes, for a lower marriage rate. "If you want to know," he said, "why men marry less than of old, perhaps the secret is in the false whim of supporting a wife. He cannot afford to support a wife, the bachelor says. No woman ought to consent to be such a wife. She ought to say: 'I am not seeking or consenting to be supported. There will be two of us. If I cannot earn as much as you, I can save more. We will plan together.'

"The greatest woman is the woman who brings to a man a home. She is greater than the suffragette or the female temperance lecturer."

Dr. Day also declared that more money was spent on dogs than for preachers.

The Chancellor reviewed his published letters on the Carnegie Foundation Fund, and continued:

"Since these letters were published Wesleyan University, more denominational than we ever have been, has been placed upon the Foundation! We have been told that we could not be accepted because we were generally known to be a Methodist university. Is Wesleyan not so? Hobart an Episcopalian college, Oberlin distinctly Congregationalist, Rochester Baptist, are all on this Foundation.

"Syracuse, with nothing in its charter requiring any one connected with it to be a Methodist, with half its faculty of other churches, with a majority of students from other denominations, with absolutely no sectarianism about its spirit or work, is arbitrarily excluded! And this is done in the name of liberalism as opposed to narrowness and bigotry!

"There has been nothing more comical or that is greater farcical burlesque since the Puritans burned and hanged their fellow mortals for differing with them in religious opinion.

"There is positive evidence that this erratic and inconsistent administration of the Carnegie Pension Foundation does not represent the intention or spirit of Mr. Carnegie, who gave us, with no religious or embarrassing restrictions, the largest sum he had given to any university for a general library."

Denounces Insurgents.

Chancellor Day severely arraigned the insurgent Republicans in Congress. He said in part:

"We believe that but for the insane assault upon the commerce of the country, upon railways and manufactures, from which there are small signs of immediate relief, as the politicians do not seem to have discovered any other issue of equal demagogic effect, we would be able to report a couple of millions more of increase in our endowment."

Employers and Workers May Contribute to Berlin "No Job" Fund.

Berlin.—The municipal authorities are preparing for the introduction in the City Council this winter of a measure embodying a plan of insurance against unemployment.

The plan constitutes one of the most comprehensive moves toward social legislation ever proposed. The intention of the authors is to combat the widespread distress that always develops among the working classes of the capital during the winter months.

Central Will Spend $5,000,000 For Equipment, W. C. Brown Says.

Washington, D. C.—W. C. Brown, president of the New York Central, was so pleased at the way in which President Taft had treated the railroads in the present controversy over rates that he said that he would order the resumption of all work on the Central which he ordered suspended.

This work will require the expenditure of about $5,000,000. It has to do with improving stations, building new ones, laying of tracks and making yard and roadbed improvements.