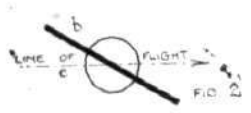
TWO INTERESTING PATENTS.

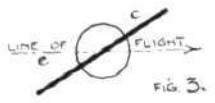
CONCERNING the problem of lateral balance, which has in the past formed the theme of much discussion and even litigation, the accompanying extracts from patents taken out in 1868 and 1870, brought to our notice by that eminent pioneer in research, J. W. Dunne, are interesting in that they indicate how this problem was regarded in those days.

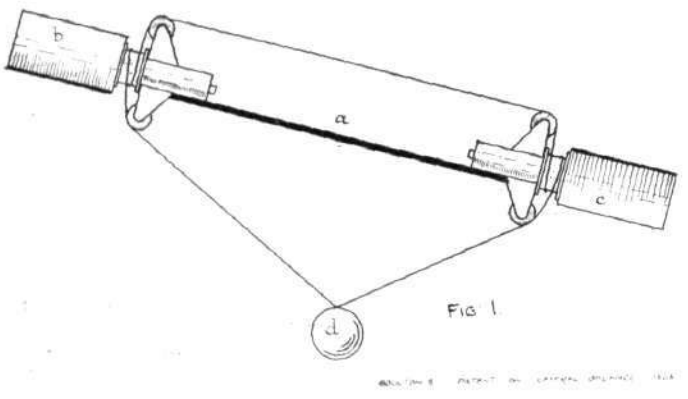
The first of these extracts is taken from a patent granted to Matthew Piers Watt Boulton in 1868. It has reference to the maintenance of side balance by the employment of planes rotatable about horizontal axes situated at the ends of the main supporting surfaces, a method closely analogous to that adopted on Curtiss biplanes of the present day.

Fig. 1, sketched from the original drawing accompanying the specification, illustrates his invention and the manner in which it is operated. The following is an extract from the subject matter of his patent :—

" Fig. 1 represents a transverse section of a plane fitted with rudders constructed according to my invention to prevent its turning over on an axis in its line of motion through the air. *a* is a section of the plane which is supposed to have taken a position inclined to the horizon ; *b* and *c* are two vanes mounted on axes one at each side of the plane, so that it can be turned round like a throttle valve ; *d* is a heavy body suspended by an endless cord, which passing over guide pullies is wound for several times on barrels on







BOULTON'S PENDULUM-OPERATED BALANCERS, 1868.—*a* = main supporting surface ; *b c* = rotatable balancers ; *d* = pendulum-operating balancers by means of cords passing over drums on their axes.

the axes of *b* and *c*. When the plane takes an inclined position, as represented in the figure, the weight *d* tending to hang vertically under the centre of gravity tightens the cord on one side and slackens it on the other, and thus causes the vanes *b* and *c* to turn into inclined positions upon their respective axes. The cord is so wound upon the barrels *b* and *c* that while the one is caused by the action of *d* to rotate in the one direction the other rotates in the opposite direction.

" Fig. 2 represents an end view of *b*, and Fig. 3 an end view of *c* when these vanes are turned to suit the oblique position of *a* in Fig. 1. The plane being moved through the air in the direction of the arrow *e*, the air presses upon the under surface of the vane *c* and on the upper surface of *b*, and thus tends to restore the plane to its horizontal attitude."

It will be seen that theoretically, in the operation of Boulton's balancers, no relative change would occur in the resistances presented to forward advance on the right and left-hand sides respectively of the machine, and although not definitely stated in the specification, it is quite likely that Boulton supposed this to be one of the advantages of such a system.

In this connection it will be remembered that the chief claim of the Wright Brothers is that any method of restoring lateral balance by the variable inclination of surfaces disposed at equal distances on each side of the centre point of the machine is accompanied by the introduction of unequal resistances on each side of the machine. As a result, a swerving effect is set up which necessitates the simultaneous use of the rudder.

It was on this point that the legal battle between the Wright Brothers and Glen Curtiss was fought in the American Courts.

Another interesting point in Boulton's invention is the manner in which the balancers are operated by cables passing over wooden drums keyed to their axes, which recalls somewhat the Wright Brothers' method of controlling their early gliders in which the pilot assumed a recumbent position.

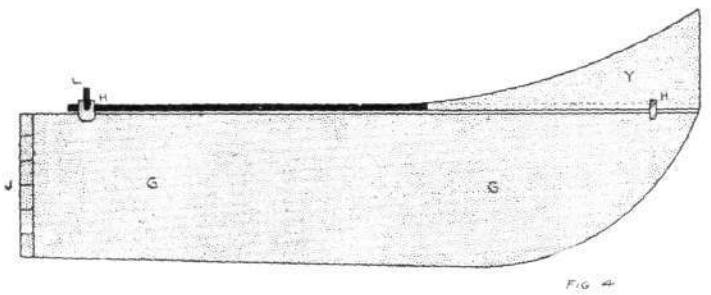
The other patent was taken out by Richard Harte in 1870. In his specification he proposed an aeroplane propelled by a screw, in which the supporting surfaces did not move relatively to the other parts of the machine. It is interesting to note that, while he intended to use the forward motion through air as a means of preserving lateral balance, his longitudinal balance was to have been maintained by the use of a " beak" or heavy metal bob with which he could adjust the centre of gravity to suit the centre of pressure.

His balancers, except in the method by which they are operated, were very similar to the *ailerons* or hinged flaps that are employed to-day.

Fig. 4 is a sketch taken from the drawings accompanying his original specification.

The section referring to this is worded as follows :—

" At the end and back or hinder part of each wing is a flap which moves up and down upon a hinge in the back edge of wing. This hinge is prolonged in the shape of a rod, and this rod is in connection with a lever, by means of which the flap is made to rise above or fall below the rest of the surface of the wing, this lever being in connection



HARTE'S BALANCERS, 1870.—*G* = wing ; *H* = hinge of wing flap ; *J* = junction of wing to main body ; *L* = lever operating wing flap ; *H* = wing flap.

with a second lever which is within reach of the person who steers the machine.

" The motion of the fans of the screw propeller being rotatory tends to give a rotation to the whole machine in the opposite direction. This I counteract by means of the flaps of the wings, each of which acts upon the principle of the ship rudder, and their combined action is such that when one flap is turned up and the other down they simply counteract this tendency of the machine to rotate and keep it steady."

Referring to the operation of these flaps, Harte makes the following observation :—

" When both flaps are depressed the machine will descend. When both are equally raised it will ascend, and when both are raised, but unequally, the machine will make a curve towards the side on which the flap is most raised."

A British Superior Certificate.

IN the official notices of the Royal Aero Club on page 960 will be found an important announcement regarding the institution by the Royal Aero Club of a superior aviator's certificate. Briefly, the candidates for this certificate must hold the ordinary *brevet* and make three tests, including a 100 mile cross-country out-and-home flight, a height flight of 1,000 feet, and a gliding flight from 500 feet above the ground, and landing within a hundred yards of the starting point.