The Flyer's Artificial Eye and Ear

By Dr. Alfred Gradenwitz

THE flyer's eye and ear are bound to fail him in a fog, in the clouds and by night—the eye, in so far as he no longer detects anything to guide him in the gray uniformity surrounding his machine, and the ear, inasmuch as his sense of direction and verticality, depending on the canals of the middle ear, no longer tells him at what angle his machine is banked.

In the last stage of the World War, all the huge fighters of the German army were fitted with a wonderfully efficient apparatus which could be fitly termed a substitute for the human eye and ear, viz., the Drexler Gyroscopic Steering Gage, which, of course, was developed on lines quite independent of the Sperry instrument. In designing this apparatus, the inventor availed himself of a less well-known gyroscope law. In fact, so far from starting from a "triple-liberty" gyroscope, that is, a top freely rotating in a Cardan suspension, he based his work on a "double-liberty" gyroscope, viz., a top free to rotate round its own axis, and, in addition, in another plane, though the latter rotation is limited by elastic strips or springs. In other words, a top in a Cardan suspension, of which the outer ring is fixed while the deflection of the ring carrying the gyroscope is limited in the manner just outlined.

If such a gyroscope be inclined sideways it will not show any deflection, but, on account of the tension of the elastic bands or springs, and the stationary arrangement of the ring carrying the top at right angles thereto, it will readily follow any inclination of the gyroscope.

If, however, the apparatus be turned round in the direction of the arrow, the *law of precession* will come into play; that is to say, the top will respond to any thrust in the direction of the arrow by a rotation at right angles thereto. So far from following the rotation corresponding to its previous position, the top will therefore deflect, overcoming the tension of the elastic bands as indicated pictorially.

A "double-liberty" gyroscope such as this, provided with an index, is so installed on the flying machine that the top, as long as no outside forces are exerted upon it, will rotate in a plane determined by the vertical line and the direction of flight. This top, apart from its rotation round its axis, can only perform a motion limited by springs at right angles to the longitudinal axis of the flying machine. Where the top occupies the position just outlined, the index connected with it will be in its central position, thus showing that the machine is flying straight ahead. If, however, the machine voluntarily or involuntarily describes a curve, the outside frame carrying the top, which is rigidly fitted into the flying machine, will be turned, thus causing the top and the index connected with it to deflect at right angles thereto, to the right or left, according as the curve described is a right-hand or a left-hand curve. As soon as the machine is again flying in a straight line, the springs above referred to will reduce the curve index to its central position.

The gyroscope is combined with a transversal pendulum oscillating in a damping glycerine casing, for indicating any transversal deflection from the horizontal position of the carrying planes, while a specially designed liquid level gage allows even the slightest longitudinal inclination of the plane to be noted. The reading marks of the pendulum should always agree with the upper carrying surfaces of the flying machine phantom, if the machine, in flying either in a straight line or in a curve, is to be in equilibrium. A special readjusting attachment enables the apparatus to be adapted to the peculiarities of the machine or any personal preference of the pilot by allowing the angle of inclination in curves to be increased or reduced at the free will of the aviator.

The use of this steering gage not only means increased safety to the pilot and passengers, but relieves the enormous strain upon the nerves of the pilot, who

no longer has to spy about and anxiously to look for his bearings at the ground below him through the fog, clouds and darkness.

Finding a Cool Hat

HOWEVER lightly one may be clad there is little comfort in the hot weather if the hat is not having a cooling effect. In this connection some interesting tests have been made to determine the heating

The German double-liberty gyroscope, showing the manner in which deflection of the plane carrying it from the true horizontal affects the instrument

or cooling action of various kinds of hats commonly worn. On a very bright day when the shade temperature was 96.8°F. seven individuals were given hats, each one being of a different type. These were worn outdoors for two hours and at the end of this time the temperature inside the hats was taken.

In the case of a typical soldier's hat, made of cloth and with a hard peak, the reading was very high, being no less than 98.6°F. In an ordinary cloth cap it was 94.1°. Inside the hard round bowler the record was

How the new system facilitates the installation of wall fixtures; and the outlet plate, ceiling plug and wall plug

92.3°. Contrary to expectation the silk hat came fourth on the list with a temperature of 89.6°. The hard straw hat was not very much cooler with a temperature of 86.0°. Very much more comfortable was the soft felt hat with a reading of only 79.7°. It was discovered that, where the felt was black, or very dark in color, the air inside was much hotter than in the case of a light shade. The figures given are for a hat of a somewhat pale gray hue. Coolest of all hats is the soft straw Panama, which gave a temperature of 77.9°.

When a Lighting Fixture is Not a Fixture

By George Gaulois

ELECTRIC lighting fixtures need be "fixtures" no longer. Why? Because a device recently invented and now developed on a practical scale makes it possible to move electric chandeliers and wall brackets from place to place as easily as electric toasters, vacuum cleaners and other appliances are plugged in the usual lighting circuit.

The basis of the new invention, which promises to mean much in the electrical industry, is a plug with curved blades. This plug may be attached to any wall light. With its lighting fixture attached, this plug is inserted with a rotary motion into a new type of electric outlet, the blades pointing upward. Electrical and mechanical connections are made at the same time; and the plug, supported by the curved blades, is strong enough to hold the heaviest wall fixture. The outlet looks very much like the familiar base-board plate, having two parallel slots in a rounded triangular center.

An inconspicuous circular plate marks the new ceiling outlet, which forms a unit of this novel system of fixtures. A plug with curved prongs also is provided for this outlet. It differs from the wall plug, however, in that one-half of the plug is inserted at a time, the prongs extending in opposite directions. A hook at the other end of the plug supports the chandeliers, and makes the necessary electrical connections by means of flexible wires. Now these mechanical hooks, as distinguished from the curved prongs which make the electrical connections and also secure the lower hooks to the ceiling, may be arranged either in a coinciding or in an opposite manner, so as to form in construction either a hook or a ring. In either event the ring of the chain supporting the fixture serves to hold the two halves together, thus locking the entire arrangement in place.

The devices for this new system are to be manufactured by a number of companies and will be on the market by the beginning of the new year. The flexibility of lighting which will be afforded by this system will be especially appreciated in the home. The ability to rearrange and replace lighting equipment without the services of the electrician will make possible a rapid development in the science of home lighting. Builders of new homes will be freed from the necessity of selecting all their lighting fixtures before the house is finished. A sufficient number of outlets provided for in the architects' plans will make it possible to buy lighting fixtures as needed after the house is finished.

What Is Dry Rot?

THE term "dry rot," the Forest Products Laboratory finds, is applied by many persons to any decay which is found in wood in a comparatively dry situation. Thus loosely used the term actually includes all decay in wood, since wood kept sufficiently wet cannot decay.

In the more limited sense in which pathologists use the term, "dry rot" applies only to the work of a certain house fungus called *Merulius lacrymans*. This fungus gains its distinction from the fact that it is frequently found growing in timbers without any apparent moisture supply; in reality it does not grow without moisture and is as powerless as any other fungus to infect thoroughly dry wood. Given moist wood in which to germinate, it is able to make its way a surprisingly long distance in dry timbers, drawing the water it needs from the moist wood through a conduit system of slender, minutely-porous strands. Wood in the typical advanced stage of dry rot is shrunken, yellow to brown in color, and filled with radial and longitudinal shrinkage cracks, roughly forming cubes. In many instances these cracks are filled with a white felty mass, the interwoven strands of the fungus.

The dry rot fungus is active in nearly every region of this country, in Canada, and in Europe. It is destructive to timbers and logs in storage. Soft woods are more commonly infected by it than hard woods.