Electromagnetic Brakes for Aeroplanes

IT is a well-known fact that when the aeroplane was first brought out by the Wright Brothers of Dayton, Ohio, one of the greatest troubles they experienced was in making a safe landing. At first wooden skidding arrangements were used, while afterwards heavy rubber pneumatic tires came into vogue to take up the shock when the aeroplane alighted.

When an aeroplane lands on a plain or a large grass plot and it comes to rest, the danger is, of course, over. As aerial science is progressing, however, and as aeroplanes are forced to alight sometimes on very narrow platforms, the landing becomes more and more dangerous due to the smaller and smaller landing area which economic conditions make necessary.

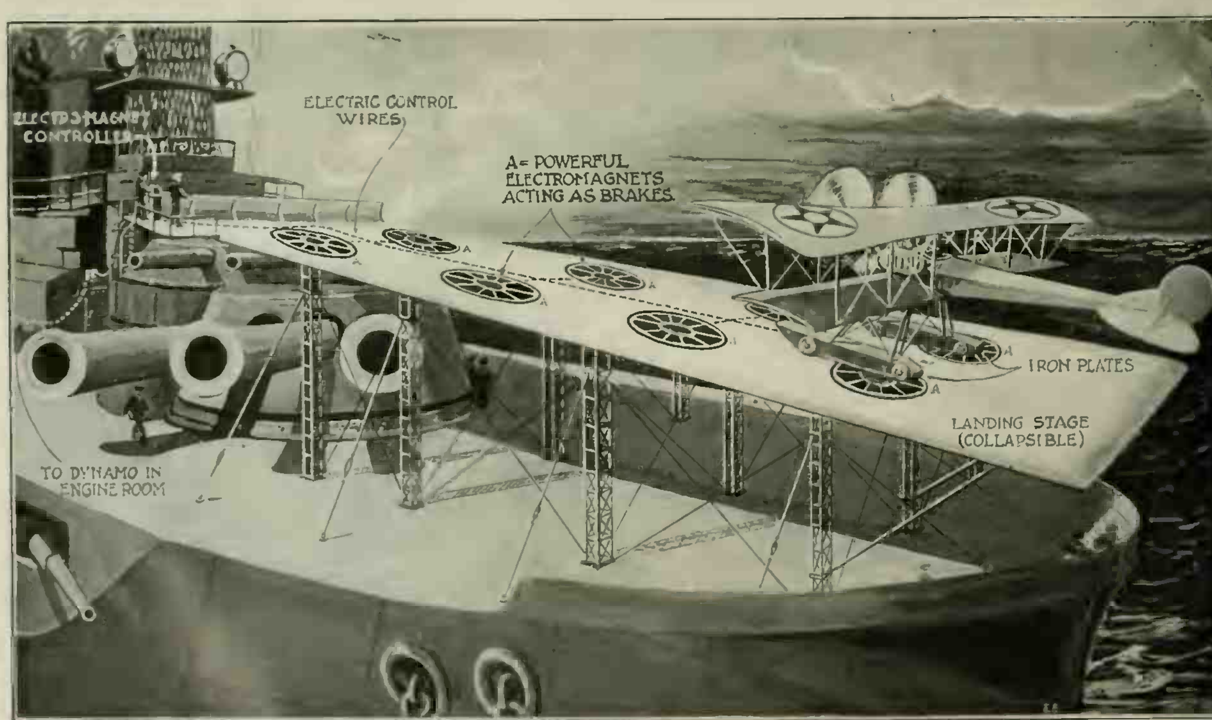
It is safe to predict that during the next twenty years our entire mode of life will have been revolutionized. Aeroplanes within ten years from now, particularly during the period of reconstruction after the present war, will become as plentiful as automobiles. The landing problem, therefore, becomes more and more important, and it goes without saying that when aeroplanes alight in a crowded city, they will not have large grass plots on which to land. Naturally the roofs of our tall buildings immediately suggest themselves. Nor is this a new idea. There exists today in Philadelphia a hotel, the "Bellevue Stratford," which has a landing platform on its roof. But this platform has never been utilized landing on a small plot for the reason that when an aeroplane comes out of the sky it cannot stop instantly. Its momentum usually carries it forward as much as 100 yards. Were the aeroplane to stop abruptly, it would naturally turn either a somersault or otherwise the machine would become wrecked. The same thing only on a smaller scale happens to an express train going at sixty miles an hour when the emergency brakes are set abruptly without the brakes gradually taking up the momentum of the train.

Recently it has been proposed to stop the momentum of aeroplanes by having them land on a wide strip of belting revolving in opposite direction to the oncoming flyer. While this idea is feasible it has never been used in practise, and it becomes obvious that it could not be used except from one direction. For instance, if the aeroplane came on at right angles to the moving belt, it would most likely be overturned. For that reason this device may be considered as impractical. Of course, when the weather is clear and the wind velocity is not great, an expert aviator will not have much trouble in alighting on a comparatively narrow run-way as has been proved right along by seaplanes making successful landings on battleships. At present our Navy has quite a few battleships equipt with narrow run-ways as explained above, but these are useless in a heavy sea, or when a gale is blowing. The reason is plane into the ocean. Quite a number of accidents have happened in the past due to these causes, and no doubt will happen in the future until some remedy is found.

Mr. H. Gernsback who has given this problem consideration seems to have found an astonishingly simple solution whereby it now becomes possible for an aeroplane to make a landing, on a very small area, no matter what its speed. The present invention on which patents are pending, is described herewith. Mr. Gernsback has also offered his invention to the Navy Department in connection with hydro-aeroplanes alighting on battleships at sea.

Our front cover illustration shows the idea clearly. This shows a future landing station "somewhere in the city of New York" on which a transatlantic aeroplane is just settling; the landing platform in this case is contructed of very heavy glass. Into this glass, which by the way is transparent, are sunk a number of large and powerful electromagnets such as are commonly used for lifting purposes. The idea of the transparent glass is that powerful searchlights can be placed underneath it and the entire glass expanse therefore will stand out sharply from its surroundings. Thus, an aeroplane from a considerable height will see the landing platform readily by night.

The electromagnets in this case would be quite large, say fifty or sixty inches across, each being capable of attracting about 200,000 pounds. These electromag-

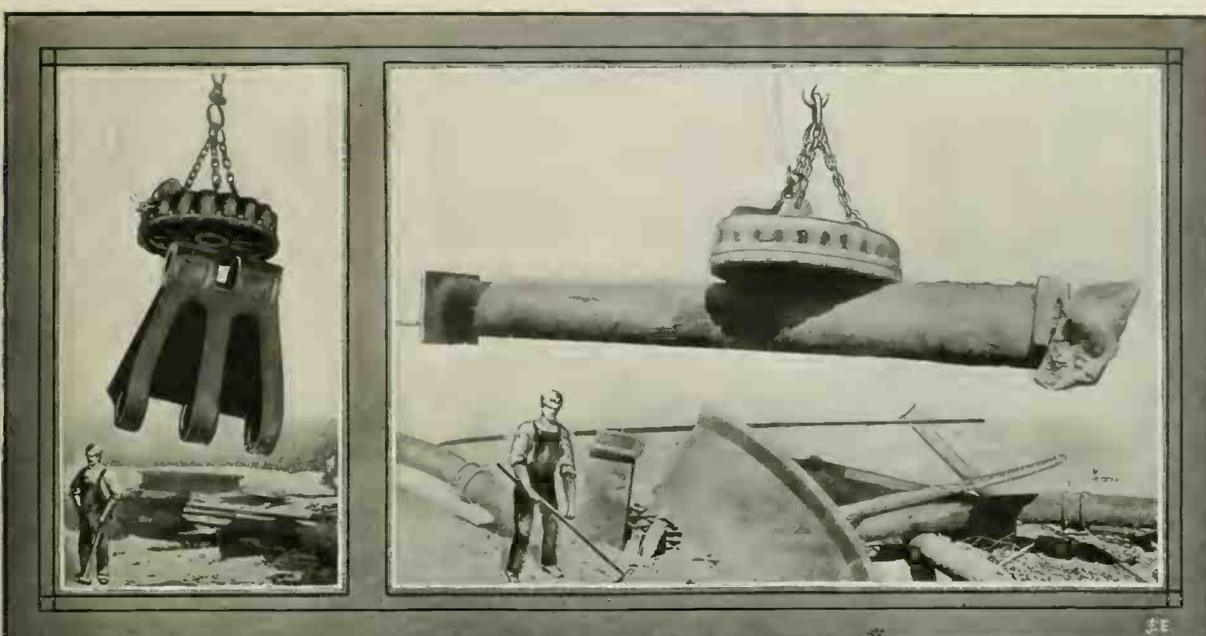


This Illustration Shows a Hydroaeroplane Landing on a Narrow Platform on Board of a Battleship. Huge Electro-Magnets A Are Sunk Into the Platform. Each of These Magnets Can Lift a Weight of 100.000 Lbs. When the Iron Pontoons of the Aeroplane Come Within a Few Feet of the Magnets a Powerful Braking Action Ensues, the Machine Quickly Coming to Rest. Once at Rest No Amount of Rolling of the Ship Nor Winds or Storm Will Be Able to Pitch the Aeroplane Into the Ocean.

as yet, for the good reason that it has been too dangerous, the landing area being too small.

Up to this time there has not existed a device whereby it was possible to make a that even if the aeroplane should make a successful landing, it would almost surely be tost into the sea by the combined pitching and rolling motion of the vessel, as well as by the wind trying to blow the aero- nets are by no means futuristic ideas as the accompanying photographs show. Large electromagnets are being built right now that can lift anywhere from eight to ten tons at contact.

In further explanation of Mr. Gernsback's idea, it will be noted that the aeroplane has two iron-armored, pontoon-like projections instead of the usual wheels, or instead of the usual boats as are used on hydro-aeroplanes. It now becomes apparent that as the aeroplane comes within a few feet of these energized electromagnets, there will ensue a powerful electromagnetic attraction betwen the electromagnets and the iron pontoons of the aeroplane. The tendency will be to pull the aeroplane down into contact with the electromagnets, but inasmuch as the flying machine still has considerable momentum, it will not stop at once, but will glide over a number of electromagnets until it finally comes within a few inches of the last row of electromagnets when the maximum tractive effect will be had. The aeroplane will then be pulled down entirely so that pontoons come into actual contact with the huge electromagnets, completely arresting the flight of the airship.



Huge Electro-Magnets of the Type Here Shown Are Proposed in This Article to Arrest the Motion of Aeroplanes. The Illustration at the Left Pictures a 52" Traction Magnet Capable of Lifting a Maximum Weight of 45,000 Lbs. The Casting Shown Weighs 4,800 Lbs. Illustration to the Right Shows a 62" Traction Magnet Lifting a Cast Iron Column Weighing 16,000 Lbs. This Magnet Can Lift a Maximum Dead Weight of 70,000 Lbs.

Now it must be understood, and it should be realized that these electromagnets have no effect whatsoever upon the iron pontoons *until the latter come within two or three feet of the electromagnets.* Elsewhere in this issue we show how close a metallic mass must come to an electromagnet before any appreciable attractive effect is had. From this it will be gathered that this invention does not purport to pull the aeroplane "out of the sky" as some people might think. It does not do anything of the sort. The idea simply is to arrest the motion of the aeroplane while in the act of landing and then hold the machine securely. If these electromagnets were not used, then it undoubtedly would often happen that the aeroplane could not stop quickly enough, and in this case it might slide over the edge of the landing platform down into the streets. Also while making a landing in a gale, such a huge machine which necessarily must have a large wing area becomes a toy of the elements; even if it had completely stopt, the wind might carry it away before the commander would have time to get the engines running at full speed. All this the electromagnetic brakes will prevent. Once the aeroplane has settled, the electromagnets will hold it as securely as if it had been riveted to the platform. Then after the landing has been made, the aeroplane can be readily secured to the platform by guys or ropes, so that the winds or storm will not carry it away; this being only a matter of a few minutes, the power can then be turned off from the electromagnets and no current is then used.

Another important point worth remembering is, that as the iron aeroplane pontoons fly a couple of feet above the electromagnets, the tractive effect while not abrupt is sufficient to retard the motion of the aeroplane gradually, and the electromagnets in this respect will act exactly as the reversing of a ship's propellers in the water. In other words, the momentum of the aeroplane will be absorbed gradually and not suddenly. Furthermore the pontoons may be equipt with small wheels, just extending a little distance from the lower surface if this is desired. Or, otherwise, the glass landing platform may be greased by means of some form of lubricant. If either of the two precautions were not taken, there would almost certainly ensue a terrific "grinding" action when the pontoons finally settled on the platform, and when the aeroplane was still in motion. However, these are small technical details, left to our engineers; there are at present a number of simple means to effect a smooth final landing without the grinding element contained in it due to excessive friction.

One of our illustrations shows the invention as adapted to hydro-aeroplanes making a landing on battleships and the like. As mentioned before, such landings at present are very dangerous, and often disastrous. The electromagnetic brakes will do away with all this, and once a landing has been effected, it will be almost impossible for the aeroplane to leave the narrow landing stage no matter how much the ship pitches, or what the wind velocity is. If the iron pontoons of the hydro-aeroplanes only engage two electromagnets, an enormous tractive effect anywhere from *two hundred to four hundred thousand pounds* can be readily obtained. Our illustration shows how the invention works out in practise. As soon as the operator who is in control of the electromagnets sees the oncoming aeroplane, he has it in his power to gradually switch on current into the electromagnets. Thus for instance, the two foremost electromagnets can be energized but half or one-quarter if required, so as not to jerk the aeroplane or stop it too soon. In other words *a gradual braking action can be had* at the will of the electrician in charge. If the rolling of the boat and the wind is very strong, he will use more power, or else he can "flash" the electromagnets. By this is meant to overload the electromagnets 50 to 100 per cent. Thus, an electromagnet usually capable of attracting a weight of 100,000 lbs. can be energized by using double the quantity of the current to give a tractive effect of over 200,000 pounds. Naturally this would be only for half a minute or so, as otherwise there would be danger of burning out the windings. However, inasmuch as the aeroplane makes a landing in less than ten seconds the "flashing" of the electromagnets is of no consequence. As soon as the aeroplane has come to rest, the blue-jackets will be ready to lash it fast, and then the current can be switched off.

THE GERMAN WATCH TRICK.

A pet trick that the German soldiers employ is to leave a watch hanging on the wall of their abandoned trenches. Said watch connects by electric wires with a high explosive bomb, which explodes when the watch is removed from the wall.

LADIES! GET A MAGNET!

A magnet will attract a hook and eye which is liable to rust, while it rejects the non-liable ones. So a magnet is a handy tool for the sewing basket.