SOME EXPERIENCES OF AN AVIATOR.

HOW ONE MAN LEARNED TO FLY WITH A BLÉRIOT.

BY CLAUDE GRAHAME-WHITE.

In the beginning of 1908 my enthusiasm was aroused in aeroplanes, and I immediately set to work to construct a model helicopter, which at that time presented to me the best means of flying, being a type of aeroplane that would rise from the ground immediately without any speed impetus in a forward direction. I constructed a couple of models on this principle, but soon discarded this form of aeroplane, for I found that a tremendous power was required to lift the dead weight off the ground without attaining a forward velocity, and although in theory the helicopter presented many advantages, I found that in practice they were thoroughly outbalanced by the over-numerous disadvantages.

Toward the middle of the same year I on several occasions visited the works of Voisin Frères at Billancourt, in the environs of Paris, and derived considerable valuable information in connection with biplanes from M. Gabriel Voisin. I, however, always have had a penchant toward monoplanes, which type of flying machine, to my mind, more closely approximates the natural flight of a bird.

I then set to work to ascertain which was the best type of monoplane at that time being manufactured, and although I accumulated a good deal of knowledge, it was not until M. Blériot successfully crossed the Channel on his monoplane in July last that I seriously took up aeroplanes commercially. Since that date I

ing all packed joints, and the consequent leaking and loss of water, which may prove most disastrous when the machine is in actual flight.

There is one central cam-shaft, which is fitted with seventeen cams, sixteen of which operate the valves, while the remaining one operates, by means of a bell crank lever, a plunger oil pump, which forces the oil through the hollow crankshaft to the big-end bearings, and thence by suitable piping to the cam-shaft, pistons, and gudgeon pins. The lubricating oil is fed to the crank chamber by gravity, and is kept at a constant level in the crank chamber by an ordinary float, a downward movement of which opens a by-pass to the oil tank, which is automatically closed again by the float when the oil reaches its normal level.

The magneto and pump are both placed on top of the engine, and are driven by a short shaft, and are very get-at-able, and easily dismantled. The crankshaft is fitted with ball bearings throughout, and this system appears to be highly satisfactory. The carburetor is placed in the center of the engine, between the cylinders, and, by means of an ingenious arrangement of copper piping, the vapor is collected in a center dome, which insures equal distribution of the gases to the various cylinders, and great economy in the weight of piping. The cylinders are 100 millimeters bore by 130 millimeters stroke, and 60 horse-power, the normal power of the engine, is developed at 1,000

up at the first quarter turn. After many warnings from M. Blériot's foreman, who was in charge, that I was not on any account to accelerate my engine too much, I mounted the machine along with my friend as passenger, and immediately gave word to let go, and we were soon speeding along over the ground at a good sixty kilometers an hour, but with a sense of perfect control and safety, and the faster we went the less inconvenience we found from the draft caused by the propeller. Being very anxious to see whether the machine would lift off the ground, I gave a slight jerk to the elevating plane, and soon felt the machine lift off the ground; but, remembering the warnings of the foreman, and being anxious not to risk breaking the machine, I closed the throttle, and contented myself by running around the ground in order to familiarize myself with the handling of the machine.

As no flying is allowed after eight o'clock on Sunday morning at Issy, we only had half an hour's practice, and, highly satisfied with my first experience, we started off to Mourmelon by car, and, after a 200-kilometer run, we arrived there in time to see Mr. Farman conduct some very interesting flights with a passenger, which, just at nightfall, resulted most disastrously. Owing to the breaking of one of the wires which operated his elevator, he was unable to move it, and the machine kept ascending against his will. In order to avoid a more serious accident, he had to shut

MR. C. GRAHAME-WHITE AND FRIEND ON HIS BLÉRIOT No. 12 TYPE MONOPLANE.

A SUCCESSFUL FLIGHT WITH THE NEW TYPE OF BLÉRIOT MACHINE.

have devoted the whole of my time and attention to the subject, and have visited all the various aeroplane meetings which have been held on the Continent, and as a result of the experience I have thus gained, my choice finally fell on a Blériot type monoplane, several of which I placed orders for in August last. I secured absolutely the first delivery of the big "Type XII." Blériot monoplane, which differs very essentially from the "Type XI." in which M. Blériot crossed the Channel.

The last five weeks I have spent daily at M. Blériot's works in Paris, in order to thoroughly acquaint myself with the construction and various essential points in connection with the erecting of a successful machine. My monoplane was due for delivery at the end of September, but, owing to M. Blériot's special request, I sanctioned its being exhibited at the first aeroplane exhibition at the Grand Palais in Paris, where it was on view from September 25th to October 17th, which naturally very considerably retarded the date of delivery to me.

At the closing of the exhibition the machine was removed to the E. N. V. motor works, which firm fitted the 60-80 horse-power eight-cylinder "V" type water-cooled engine, which has been the means of all the various very successful flights accomplished by Rougier in his Voisin biplane. I did not decide on this engine until I had visited the works of practically all the other aerial motor manufacturers, but after exhaustive research and trials I became convinced that my choice of an E. N. V. engine was of the best.

There are innumerable construction features in this engine which immediately recommend themselves to the novice, inasmuch as while weight has been reduced to a minimum, the essential and vital working parts have been kept well over the margin of strength to eliminate failure as far as possible from breakdowns. These engines are water-cooled, and the copper water jackets are electrolytically deposited on the cast-iron cylinders in the most ingenious manner, thus obviat-

ing all packed joints, and the consequent leaking and loss of water, which may prove most disastrous when the machine is in actual flight.

As will be noticed from the accompanying illustration, the design of the machine differs very essentially from the small Blériot type, Calais-Dover, inasmuch as the engine is placed very much lower in the fuselage, and the driver's and passenger's seats are placed behind the engine in the same plane, thereby bringing the center of gravity very much lower, insuring greater stability in flight.

The propeller shaft is fixed high up in the extreme front of the machine, and the propeller, which has a diameter of 2.4 meters, is chain-driven, and is geared down to revolve at half the speed of the engine, for, as precisely in the same manner for marine use, the lower the revolutions of the propeller the greater its efficiency, there being a greater grip of the air and less slip.

After the *mise au point* of the motor and a six hours' continuous run, to test radiator efficiency and the satisfactory working of the pressure feed and all other details, the machine was removed to Blériot's works to have the final adjustments of the wings, the vertical plane, and the fixed stabilizer, rudder, and elevator; and, after several disappointments, I eventually obtained delivery of my machine in working order at the Parade Grounds at Issy-les-Moulineaux, at 7:30 on Sunday morning, November 7th; and, as I had gathered a good deal of useful knowledge and information from watching the antics, and profiting by the errors, made by other beginners on Blériot monoplanes, I had a good idea of what not to do when the engine was started up and we were ready for our first trial. As M. Blériot was away in Vienna himself, and none of his employees had ever actually flown a machine we had a more or less hazy idea as to how it should be controlled.

It was a very cold morning, but the engine started

off his motor, and hundreds of spectators present were horrified to see the machine fall like a stone from a height of 60 feet.

I happened to be on my car at the time the accident took place, which was about a mile from Mr. Farman's hangar, from where I was watching his flights. I immediately set out on the car with some of his mechanics, and arrived first on the spot, to find Mr. Farman and his passenger absolutely unhurt, but the machine smashed to pieces.

I took a late train back from Mourmelon on Sunday night, and arrived in Paris at 1 A. M. on Monday morning. Then after three hours' rest my friend and I turned out again, and got down to Issy-les-Moulineaux, about five o'clock in the morning, arriving some two hours before Blériot's mechanics turned up. We, however, got the machine out and tied it to some railings, and I then had my first experience of starting the engine, which to a novice at first sight appears a most hazardous undertaking, as unless the machine is either held firmly by several men, or strongly tied up, it immediately has a tendency to leap forward. We, however, successfully managed to start the engine, and then rigged up a leash, and when we had mounted the machine we let go, and before eight o'clock in the morning we had accomplished several very successful flights, both with and against the wind. These experiences we continued throughout the day, and by nightfall I felt quite capable of an extended flight if only the ground had been large enough.

The following day we were out again early, and had absolutely no difficulty in flying the machine with my friend as passenger and sixty liters of gasoline and twenty liters of lubricating oil. We, however, had a somewhat unfortunate accident toward mid-day. Another small Blériot had become damaged, and was stopped some two hours in the center of the field, which much handicapped my maneuvers, and at one time, when we were at a height of 25 feet, my whole attention appeared to be absorbed by this stationary

machine in the middle of the practice ground. In my over-anxiety to avoid going in its direction I accelerated my motor instead of decelerating as was my intention. The machine then rose very much higher in the air than I had any intention to do, and seeing that I should have to fly right over the stationary machine if I continued in my course, I decided to make a hasty descent. This I successfully accomplished in ample time before reaching the other machine, and on grounding it was my intention to stop my motor. I pulled the throttle toward me for this purpose, being accustomed to decelerate motor cars in this manner, but instead of closing the throttle by this action I opened it, and, of course, accelerated the speed of my engine so quickly that it caused the tail of the machine

to turn right round, in the same manner as a car would skid if the brakes were jammed on quickly on a greasy road. The severe side strain of this movement caused one of the front forks of the front wheels of the machine, which carry all the dead weight of the engine and passengers, to twist and break, and this put the machine *hors de combat* for the rest of the day.

In order to give some idea of the weight of the machine, I may mention that it took eight strong men to lift one side of it in order to wheel it back into the hanger. The machine in working order, with gasoline and lubricating oil for a three hours' continuous flight, weighs between 900 and 1,000 kilogrammes, or about a ton.

The following day M. Blériot had returned from

Vienna, and he sent for me and strongly urged me not to use the aeroplane any more at Issy, as he said the ground was far too small for such a powerful and fast machine, and he further told me that he himself would not attempt to fly it there, and strongly advised me to send it off immediately down to Pau, where there is a very fine aerodrome with hangars and every other convenience for aeroplanists.

I therefore immediately had the machine packed up, and it is now on its way down to Pau, and I propose joining the machine there with M. Blériot early next week, he having undertaken to personally instruct me and to make me thoroughly proficient in the management of the machine before bringing it over to this country.—The Car.

EXPLOSIVES FOR USE IN COAL MINES.*

HOW DYNAMITE IS THAWED SAFELY.

BY C. E. MUNROE AND CLARENCE HALL.

A LARGE number of different explosives can be formed by mixing various combustible substances with various oxidizing agents, or by using such mixtures as "dopes" for dynamite, or by using them together with the different nitro-substitution compounds. In fact, the number is so great that a book published in 1895 gave the names of more than one thousand different explosives, and many have been added to the list since that date. As the number of those in actual use is much smaller, it is clear that most of the explosives known are, for various reasons, unsuitable for use; indeed, not one of those more generally known is suitable for use under all circumstances. For instance, some of them on explosion give off a considerable volume of flame; some of them on explosion give off considerable volumes of poisonous or noxious gases; some of them explode so quickly as to shatter the rock or other material in which they are fired and break it down into fine pieces; some of them are too bulky, and so on.

It is evident that if we are seeking to break down the rock in an open quarry for the purpose of making use of that rock as ballast for roads, we can employ an explosive that produces a long flame, or gives off poisonous gases, or shatters the material, because the

FIG. 2.—BOXES OF DYNAMITE, SHOWING METHOD OF PACKING IT.

Considerations such as these have led to an investigation by the United States Geological Survey of the explosives offered in the market, for the purpose of determining, in the interest of the coal miner, which

in diameter, and so made that it can be filled with fire damp, or with coal dust and air mixed, or with gas, dust, and air mixed in any desired proportion, so as to reproduce the dangerous conditions that may occur in coal mines. Attached to one end of the gallery is a very strong "gun" with a chamber representing the bore hole in a mine. From this "gun" various exactly determined quantities of the explosive to be tested may be fired, either untamped or tamped, into the mixture in the gallery, and thereby it can be learned whether or not the definitely known quantity of explosive used as described will cause the ignition and explosion of the mixture in the gallery. Besides this gas and dust gallery there is at the testing station a collection of other apparatus and appliances by which to test the various properties of explosives, and so to find their relative value and their relative safety for use in coal mines. This investigation has been going on since September, 1908, and there have already been published two lists of explosives that have passed all test requirements in a satisfactory manner and are considered to be suitable for use in coal mines, provided they are used under the prescribed conditions.

These approved explosives are, therefore, called by the United States Geological Survey "permissible explosives."

With reference to the characteristic component of

FIG. 1.—FLAMES FROM EXPLOSION OF EQUAL WEIGHTS OF BLACK BLASTING POWDER AND OF A PERMISSIBLE EXPLOSIVE.

work is done in the open air, and because the rock has to be broken up into small pieces anyway, so that it is well for the explosive to do it. If, however, we sought to get out from that quarry blocks of stone such as marble or granite, which were to be used in building or for monuments, we should avoid using the shattering explosive and choose one that slowly, and without a shock, separates the rock mass from the deposit. Yet for this purpose also, as the work is in the open air, it might matter little if the explosive gave rise to a large flame or gave off poisonous gases, provided the quantity of explosive used was small. But the conditions in a coal mine are very different from those in a quarry. The mine is inclosed and not out in the open air, and, moreover, it is liable at any time to contain inflammable gases or coal dust, or both, which may form explosive mixtures with the air. If under these circumstances an explosive were used which gave off a long flame on firing, this flame, darting out from the bore hole, might set fire to the explosive mixture in the mine and produce a mine explosion.

Moreover, as the mine is an inclosed space and as the wholesomeness of the air within it depends upon artificial ventilation, it is also objectionable in such a mine to make use of an explosive giving off any considerable quantity of noxious gases, which must be removed from the mine after the explosion before the miner can safely return to his work.

of such explosives are suitable for use in coal mines and will do the work with the greatest degree of safety for the miner using them. Of course, it is impossible to insure complete safety, for no explosive can be perfectly safe and every explosive should be treated with the greatest care and consideration.

FIG. 3.—THAWER FOR FROZEN EXPLOSIVES.

With this object in view the United States Geological Survey has established a testing station at Pittsburg, Pa., where there has been erected a large gallery made of steel, 100 feet long by 6 feet 4 inches

each of these permissible explosives, they may be placed in three classes—ammonium nitrate powders, hydrated powders, and nitroglycerin powders. Most of these powders contain nitroglycerin, and therefore

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