RULES GOVERNING THE COMPETITION FOR THE \$15,000 FLYING MACHINE PRIZE OFFERED BY MR. EDWIN GOULD.

1. A prize of \$15,000 has been offered by Mr. Edwin Gould for the most perfect and practicable heavier-than-air flying machine, designed and demonstrated in this country, and equipped with two or more complete power plants (separate motors and propellers), so connected that any power plant may be operated independently, or that they may be used together.

CONDITIONS OF ENTRY.

2. Competitors for the prize must file with the Contest Committee complete drawings and specifications of their machines, in which the arrangement of the engines and propellers is clearly shown, with the mechanism for throwing into or out of gear one or all of the engines and propellers. Such entry should be addressed to the Contest Committee of the GOULD-SCIENTIFIC AMERICAN Prize, 361 Broadway, New York city. Each contestant, in formally entering his machine, must specify its type (monoplane, biplane, helicopter, etc.), give its principal dimensions, the number and sizes of its motors and propellers, its horsepower, fuel-carrying capacity, and the nature of its steering and controlling devices.

3. Entries must be received at the office of the SCIENTIFIC AMERICAN on or before June 1st, 1911. Contests will take place July 4th, 1911, and following days. At least two machines must be entered in the contest or the prize will not be awarded.

CONTEST COMMITTEE.

4. The committee will consist of a representative of the SCIENTIFIC AMERICAN, a representative of the Aero Club of America, and the representative of some technical institute. This committee shall pass upon the practicability and efficiency of all the machines entered in competition, and they shall also act as judges in determining which machine has made the best flights and complied with the tests upon which the winning of the prize is conditional. The decision of this committee shall be final.

CONDITIONS OF THE TEST.

5. Before making a flight each contestant or his agent must prove to the satisfaction of the Contest Committee that he is able to drive each engine and propeller independently of the other or others, and that he is able to couple up all engines and propellers and drive them in unison. No machine will be allowed to compete unless it can fulfill these requirements to the satisfaction of the Contest Committee. The prize shall not be awarded unless the competitor can demonstrate that he is able to drive his machine in a continuous flight, over a designated course; and for a period of at least one hour he must run with one of his power plants disconnected; also he must drive his engines during said flight alternately and together. Recording tachometers attached to the motors can probably be used to prove such performance.

In the judging of the performances of the various machines, the questions of stability, ease of control, and safety will also be taken into consideration by the judges. The machine best fulfilling these conditions shall be awarded the prize.

6. All heavier-than-air machines of any type whatever—aeroplanes, helicopters, ornithopters, etc.—shall be entitled to compete for the prize, but all machines carrying a balloon or gas-containing envelope for purposes of support are excluded from the competition.

7. The flights will be made under reasonable conditions of weather. The judges will, at their discretion, order the flights to begin at any time they may see fit, provided they consider the weather conditions sufficiently favorable.

8. No entry fee will be charged, but the contestant must pay for the transportation of his machine to and from the field of trial.

9. The place of holding the trial shall be determined by the Contest Committee, and the location of such place of trial shall be announced on or about June 1st, 1911.

The provision of a quick stoppage is an advantage hitherto restricted to direct-current motors, which can act as generators; with alternating induction motors the braking must be produced by external means. A suggestion of Mr. A. Hérens is given in *L'Industrie Electrique* for removing this drawback, by providing a suitable excitation for the stator of an induction motor during the act of stopping, which enables the rotor to generate alternating currents and thus to absorb energy. The desired end may be attained by coupling a small series direct-current machine to the motor, connected so that when the main circuit is opened, the direct-current machine is coupled to one of the stator phases and excites the field, while the rotor is either short-circuited or connected to a resistance. Alternately a rectified current derived from one of the rotor

phases—in the case of a wound rotor with slip rings—may be used to excite the stator field, the current being rectified either by an electrolytic valve, a commutator, or other means.

SOME INCIDENTS IN THE EARLY LIFE OF FERRANTI. BY A. J. JARMAN.

Sebastiani Ziani de Ferranti, the newly-elected president of the British Institute of Electrical Engineers, is the son of Cäsar Ferranti, an eminent photographer of Bold Street, Liverpool, England. It was at St. Augustine's College, Ramsgate, Kent, that Mr. Ferranti, who was being educated there, met with an accident that nearly caused the loss of his eyesight, while fitting up an electric bell between the college and the monastery. One of his battery carbons was broken, and he endeavored to join the two ends together and fasten them with a lead bond. The carbon pieces were suitably drilled and molten lead was poured into the hole; but the young experimenter had neglected to dry the carbon thoroughly, and as a consequence, there was an explosion due to the instant conversion of the moisture into steam. Molten lead was thrown into his face, blinding him for a time, and burning him badly. This was in 1879.

The first dynamo Ferranti ever saw was at 41 Queen Street, Ramsgate. It was driven by hand power, and was fitted with shuttle-wound H-pattern Siemens armature. In 1881 Mr. Ferranti became located in London. It was at No. 10 Glenarm Road, Lower Clapton, that Mr. Ferranti commenced the design of a new alternating current dynamo. His idea was to convert Faraday's disk into a practical armature. Here Mr. Ferranti and the writer often conversed upon the subject, and during his stay at this address the photograph herewith published was made. It was taken at night by the light of an arc lamp, with an exposure of four seconds. The current was furnished by a 44-cell bichromate battery, and the arc

FERRANTI IN 1881. PHOTOGRAPHED BY THE LIGHT OF AN ARC LAMP OF HIS OWN CONSTRUCTION.

was fitted with a 6-millimeter positive carbon and a piece of quarter-inch copper wire for the negative pole. This was probably the earliest use of a copper pole in an arc lamp.

In 1882, Ferranti had completed the design of a new alternating current machine, and had protected his invention with a patent. The machine was made at the writer's electrical workshop, then at 25 Richmond Street, St. Luke's, London. The machine was tested here, the magnets being excited by a current of 16 amperes at 65 volts from a shunt-wound dynamo. It lighted 42 16-candle-power incandescent lamps on a parallel circuit, the available power being insufficient to produce the best effect. It was here that Sir William Thomson (late Lord Kelvin) saw this machine at work lighting the lamps. The design of the machine was similar to that of his own "mouse mill" machine. The dynamo weighed half a ton. The armature copper strip was insulated with black cotton tape made and fitted by the writer. It was eventually presented to the Museum of Patents at South Kensington. The making of the cotton strip armatures and magnet coils was carried on in the writer's workshops for several months, and eventually these alternating current generators were manufactured at the Appold works by Ferranti, Thomson, and Ince.

Ferranti's 10,000-horse-power alternating generator was fitted at Deptford. Much to his surprise, it was found that the electro-motive force was much higher at the end of the line than at the generator. This was due to the fact that the concentric conductor acted like a Leyden jar. This came to be known as the Ferranti effect. The difficulty was eventually overcome. It entailed a loss of 16 amperes at 10,000 volts in a 6-mile conductor, due to static charge.

In Mr. Ferranti the Institute of Electrical Engineers has chosen a man of high electrical skill and mechanical qualifications, having gone through the mill of practical experience. His alternating current

meter, as well as the current generator, will stand as monuments to his skill and ability.

[Note.—Mr. Ferranti's presidential address before the Institute of Electrical Engineers was unusually interesting. It is republished in full in the current SCIENTIFIC AMERICAN SUPPLEMENT.—Ed.]

OIL LOSSES BY FIRE.

BY CHARLES A. SIDMAN.

It has been estimated by the Geological Survey of the Department of the Interior that there is lost annually more than a million and a half barrels of oil by the burning of oil wells, and from other causes.

The greatest loss is during the months of May to October, and is occasioned by any number of causes. The principal one seems to be the careless use of matches. Other reasons which cause fires in oil wells are from lightning, from the spark of an automobile, and from the gases which emanate from the wells.

It sometimes happens also that a well is flowing at such a great rate that the bearing of the pump may develop a serious leak, and spray a great many barrels of oil on the ground before it can be stopped. If a thunder storm should arise at that time, there is danger of the well's catching fire from lightning, and causing a great deal of damage as well as loss of life.

A case of this kind happened this past spring in the State of Louisiana, with a very large well which had a flow of oil variously estimated at from 8,000 to 25,000 barrels a day. A leak developed which could not be stopped at once, and while waiting for suitable machinery to arrive, a severe thunder storm broke out. The well had been spraying oil from the leak for several days, drenching the men working near it, which made it especially dangerous for them, for it happened that the oil was of such a gravity that it contained about twenty per cent of gasoline and was very inflammable.

The men who were working on the well are termed "greasy men," and when this storm came up were ordered to a nearby stream of water, so that if lightning did strike the well they could plunge in and thereby save themselves.

The well was struck, and there immediately began a fight to extinguish the fire. The gases in the well threw the oil to a great height, causing danger to life and property as well.

The simplest method to extinguish the fire seemed to be to drown it out by means of steam. Twenty-five steam boilers were secured from a nearby city, brought to the well, and attachments made with a nearby natural gas well, and the fire was extinguished within forty-eight hours. For several hours afterward the ground was sprayed with hot steam to be sure that no fire remained.

There are several ways of effectively stopping a fire in an oil well. It can be stopped by water to a certain extent, but the danger of the oil's spreading, and of the vapor thrown off by the evaporation of the water does not make it safe to try this method with a large fire. In cases of small fires it might answer, but not always. Steam driven by force pumps is an effectual means of killing a fire, and is resorted to in most cases. In many of the oil fields one will see many buckets of sand lying around the wells. Aside from being a cheap method of fighting fire, it is also one which can be performed with ease, for a man can pick up a bucket and stop an incipient fire almost as soon as it has started.

Many of the large and modern oil companies have had installed in their fields and near their refineries a system of high-pressure water pipes for use in such cases of sudden fires. High-pressure steam pipes are also run into the fields for the same purpose. It is interesting to note in the case of a field of tanks, the means taken to prevent fires. The majority of the tanks have a sort of sprinkler system installed. A large iron pipe is placed around the top of the tank. This is punched full of holes, and at the outbreak of a fire the high pressure is turned on, which causes a flow of water to run down the outside of the tank. At the same time hot steam is introduced inside of the tanks by the same means as the water is, which prevents the gases or vapor inside of the tank from catching fire. If the tank does begin to burn from the top, then the oil is pumped from the bottom of the tank into another one, thereby saving a great deal of the oil.

One of the principal and most important positions with any oil company is that of fire marshal. It is his duty to know the position of all the fire plugs, just what connections are to be made, and to take complete charge in cases of fire. Upon this "emergency man" depends the saving and salvation of the oil men.

There are discovered from time to time what are known as freak wells. One in particular is located in Mexico. It was drilled with every indication of producing a big supply of oil. After the nitro had been set off there gushed forth a volume of hot water, mud, stones, and very little oil. The gases in the oil and the force of the explosion caused the opening, which