one of these days the air ship will be as common in use and its name as much employed in our vocabulary as steamship or war ship or vessel. Henry Lecomte, Director of the School of Aerostation at Paris, will soon make a rash attempt to cross Africa by balloon, starting from Mozambique. The peculiar feature of his balloon is a special apparatus for the production of hydrogen gas, so as to maintain the floating power. This gas is to be generated during the night time. The balloon will carry provisions for 100 days and will have a capacity of 10,000 cubic metres. Experienced aeronauts believe that this is a very hazardous undertaking. Lecomte proposes to cross Africa in its wider part, making a longer journey than any yet recorded.

Mr. Maxim, of whose experiments in this line we made mention recently, is now completing his invention of an aerial machine which he asserts will be superior to all other agencies of destruction in warfare. He has already spent \$50,000 on his invention, and if necessary \$50,000 more will be expended to insure success. The machine is building at Crayford, near London, and is nearly ready for a practical trial. Maxim has made an exhaustive series of experiments to test the practicability of his idea, and it remains to be seen whether he can carry out his scheme with a full-sized machine.

He says his invention has been recently tested while captive, the engine propelling it being at work, and he thinks he proved it to be capable of carrying at least 10,000 pounds. The weight of the full size machine, including men, engines, fuel, water, and all accessories, is 5,400 pounds. The fuel is gasoline, giving 5,000 gas jets. The machine is propelled by 'two screws and there is an engine to each screw.— World's Progress.

## TO REMOVE IRON RUST.

The engineer who is so unfortunate as to have a portion of his engine become rusted, or the more fortunate man who takes charge of an engine which has been neglected and is covered with rust, finds before him a tedious job in cleaning and getting the metal to again present a polished surface. Rust, chemically considered, is an oxide of iron when it appears on iron or steel, but the combination of oxygen and any other metal will form a rust, although in such cases it is usually given another name. The combination of oxygen with iron can only take place to an appreciable extent in the presence of moisture or hydrogen, and if extensive leaves little depressions in the metal when the rust is removed. This occurs from the fact that when the oxygen combines with the iron, that portion of the iron forming the combination is loosened or separated from the mass. There are two ways in which rust may be removed from iron or steel. The first and most common practice is by the use of some abrasive material, and the process is usually termed scouring. Another method is by chemical action, by the application of some chemical applied in solution, which has a high affinity for oxygen and which withdraws the oxygen, leaving the iron particles free.

One of the best compounds for such purposes is given by the *Chronique Industrielle* as follows: Potassium cyanide 15 grammes, soft soap 15 grammes, whiting 30 grammes, and sufficient water to form the ingredients into a paste. This is to be applied as a scouring material and well rubbed over the rusted surface, after which it is to be thoroughly wiped off and a coating of oil applied to stop further action. The active material in this composition is the potassium cyanide, which has the strongest deoxidizing property of any substance with which we are acquainted; and further, it is one of the most poisonous substances known, the base being potassium, which is combined with cyanic acid, and cyanic acid is so poisonous that it is extremely dangerous to use in any manner unless partially neutralized by combination with some other substance, as in the present C886

Cyanic acid is of itself a gas, and in this condition it is extremely destructive to life, the inhalation of even a small quantity being sufficient to cause instantaneous death. When in solution in water the liquid is called hydrocyanic acid, a single drop of it, if taken internally or entering the system in any manner, being sufficient to cause death within the short space of two seconds of time.

No particular danger is to be apprehended from the use of the composition *i* iven for removing rust, as the addition of soft soap, which is of equal weight with the cyanide of potassium, goes far to counteract the acridity of the cyanide. Then the further addition of whiting in double the amount of cyanide reduces the strength of the compound so much that it is relieved of the greater part of its dangerous properties.

If any one attempts to make use of this compound for scouring purposes, we would suggest that he do so only when the hands are free from abrasions of any kind, as if it should come in contact with any portion of the flesh where the skin is removed a very bad sore would probably be the result.—Stationary Engineer.

## A NEW WATER SOFTENER.

We illustrate herewith a new water-softening apparatus devised by M. H. Desrumaux, which is now being introduced by La Société Anonyme Française, "L'Epuration des Eaux Industrielles," Lille, and which is reported to give excellent results. Like most of the modern forms of water-softening plant, it consists of two parts -(1) a tank in which the precipitation of the lime salts is effected, and (2) a special form of apparatus for removing the precipitate from the softened water. The preparation of the lime water, which is the reagent used to bring about the precipitation, is also effected in a special form of mixing plant which produces lime water of the maximum strength. The water to be softened enters the apparatus at A, and passes into the small regulating tank B, which ensures a constant level, and which distributes such a proportion of the water to the lime in the accessory cylinder J as to form sufficient reagent to effect the complete softening of the water, whilst the remainder and greater portion of the water passes at once into the interior of the precipitation cylinder at L. A determination of the hardness of the water indicates the relative distribution of water to the two parts of the apparatus, and, when once regulated,