renewal of the cast iron cases, which easily crack under the heat, and cannot be used more than once.—*The Engineer.*

Cheap Manufacture of Oxygen.

Few things would have more important results in chemical technology than the cheap manufacture of oxygen gas. We have always kept our readers informed of the various methods proposed for attaining this desirable object; and we mentioned several months ago the process of MM. Tessie du Motay and Marechal. Having seen the operation in progress, we are now able to speak of its actual results. Arrangements are being made at the Hotel de Ville, at Paris, for the supply of oxygen, as a substitute for atmospheric air, to the gas burners used for illumination throughout the building. The generators and gasometers are already placed in the cellars: and it has been ascertained that the employment of oxygen causes the brilliancy of the light to be eight or ten times greater. The oxygen, it will be remembered, is derived from the decomposition of manganate of soda; and the apparatus for effecting this is simple and not expensive. In the first place, there is a boiler in which steam is generated at a moderate pressure. The steam is then passed through an ordinary super-heater, a worm set in a furnace. From this it passes into a retort in which the manganate of soda is kept at a dull red heat. Here the decomposition is effected, and the steam and oxygen pass on to a refrigerator in which the steam is condensed, while the oxygen passes on to a gas-holder. When the evolution of oxygen ceases the steam is shut off, and a current of atmospheric air is passed through the retort by which the manganate of soda is regenerated. Thus the operator starts with a charge of manganate (1 cwt. in the experiments under description) which never wants renewal. The charge of manganate in actual use, after over 80 re-oxydations, yields about 100 gallons of oxygen per hour, the cost of which is mainly the cost of the fuel consumed. A little carbonic acid is disengaged with the oxygen, but it has not been found necessary to separate this. One useful application of oxygen is shown at the same spot in a modification of the Drummond light. A mixture of oxygen and coal-gas is burned, and a flame is made to impinge on a cylinder of magnesia agglomerated by chloride of magnesium by the process of M. Carlevaris. These cylinders are very compact and lasting, and are the very best we have seen produced for similar purposes. The light given, we need hardly say, is very intense, and the method promises to receive extensive applications in Paris.—*Mechanics' Magazine.*

Ammoniacal Gas as a Motive Power.

The idea of using ammoniacal gas as a motive power in place of steam has been entertained by many inventors, but has never before, we believe, been successfully carried out. A few years ago, MM. Tellier and Flandrin proposed to propel omnibuses through the streets of Paris, by its means. They started, or proposed to start, with a vessel of the liquified gas, and supposed that when this was opened, by turning a tap, the gas would be condensed, and a vacuum formed, and the piston driven back by atmospheric pressure. Our readers will thus see that the principle of an ammonia engine is pretty much the same as that of Newcomen's steam engine. The plan, if at all feasible, is obviously better suited for stationary than locomotive machinery, and the most reasonable application of ammonia has been made by M. Fremont, who proposes to work a pump by its agency. His engine differs somewhat from that of M. Tellier, inasmuch as he drives the piston in both directions with the gas.

A recent visit to the Paris Exposition has shown us an engine of his actually at work—or, rather, in action, for it was not usefully employed—and driven by a mixture of steam and ammoniacal gas. Strong liquid ammonia is used in the boiler, and the vapor generated is said to be a mixture of at least 80 parts of ammoniacal gas and 20 parts of steam, so it may be fairly called an ammoniacal engine. The principal recommendations of ammonia when applied as a motive power consist in the small amount of fuel required, and the short time it takes to get up the steam, so to speak. The economy in fuel is very great, being about one fourth of that required to generate steam alone. As regards the boiler, it may be of either of the ordinary forms, the only complete novelty being the apparatus for condensing the steam and ammonia. The gas disengaged (about six atmospheres at 110° cent., with an ordinary solution of ammonia) does its work in the cylinder and then escapes into the tubes of a condenser, where the steam is condensed and the gas is cooled. The gas then meets with water from an injector which dissolves it, and the solution is carried on into a vessel called the "dissolver," from which it is pumped back into the boiler to do its work over again. The water for the injector is taken from the boiler, and is cooled before meeting with the ammoniacal gas by passing through a worm surrounded with cold water. These arrangements are necessarily a little complicated, and could not be fully understood without drawings. It is, however, satisfactory to see that an ammonia engine is a possibility, and thus power is obtainable where fuel and water are both scarce.—*Mechanic's Magazine.*

Birkhols' Metal.

We see it stated in the papers that A. Birkhols, formerly of Colt's factory in Hartford, the inventor of a metalic composition resembling brass, for the manufacture of which a company has been formed in Providence, R. I., with a capital of $300,000, has sold his patent to them for $40,000 of the stock, three cents duty on every pound manufactured, and a salary of $4,000 for superintending the manufacture.

The following is a copy of the patent:—

Be it known that I, Alexander Birkhols, of the city and county of Hartford and state of Connecticut, have invented or discovered certain new and useful improvements in the composition of cast metal, by means of which greater strength is acquired, and I do hereby declare that the same is described in the following specifications.

So as to enable a person skilled to make the same, I will therefore proceed to describe its component parts, the essential ingredient of which is cast iron. To make one hundred pounds of this composition, I first take two pounds of cast iron,