der. It has four feed-pipes leading into it, and communicating with two oil cisterns suspended from the diaphragm ring, two to each cistern. The cisterns are filled from cans of oil, by means of small force pumps and a supply pipe—a waste pipe being also attached to each, leading away into an empty can. The furnace is immediately beneath the chimney, which is constructed of thin sheet copper, having a bulb at the bottom 6ft. in diameter. The chimney is divided into several portions, as may be seen in the drawing, which take to pieces, and are capable of packing into a small piece for easy transit. At the top is a head of open wirework, crowned with an asbestos mat or damper to prevent the heat striking directly upwards and burning the roof of the balloon. The substance of the balloon is French cambric, an excessively fine fabric, with a double crossed wo f, so as to be impervious to the air. It is slightly heavier than the silk usually employed for balloons, but requires no preparation or dressing of any kind to render it air-tight. The furnace or burner—see Figure 2—is of annular character, constructed of copper, hollow, with a bulge round at the bottom to contain the oil. At the junction of the bulge and the walls of the furnace, on both sides, is a ring of wick—see A A. At the summit of the burner or furnace are numbers of perforations piercing into its interior. A wall or ring of metal is erected on the top to direct the flame upwards. The action of the apparatus is as follows Upon filling the bulge with oil and lighting the wicks, the walls of the furnace are quickly heated, the surface of the oil inside being rapidly converted into inflammable gas as its body becomes hot. The gas escapes at the perforations before alluded to, and very shortly ingnites outside the burner with a loud roar, continuing to burn fiercely until the cisterns are exhausted. These are, of course, replenished from the tin cans carried in the car, as previously explained. The average heat generated throughout the balloon is about 100 deg above the surrounding atmosphere, a higher temperature than that being considered dangerous for the fabric of the balloon. It has been found, however, experimentally, that a temperature of 22 deg. above the surrounding atmosphere will actually lift the balloon off the ground.

The actual lifting power of M. Menier's hot air balloon can very easily be calculated. Air when heated from 50 deg to the boiling point, viz, 212 deg., expands to the extent of 33 per cent. beyond its original bulk. Assuming then the average temperature of the surrounding atmosphere up to a short distance from the earth's surface, say 300 yards, to be 50 deg., we should expel from the balloon by heating it to 150 deg., of heat, about 20 per cent. of its original contents. Now a globe of air 1ft. in diameter weighs is nearly as possible $\frac{1}{25}$th of a pound and as Menier's balloon is very nearly spherical, its contents would weigh in pounds, $70 \times 70 \times 70 \times \frac{1}{25}$, or 13,720 lb., because the contents of spheres as directly proportional to the cubes of their diameters. Hence, by the above process we should reduce this weight by 13,720 ÷ 5 or 2744 lb. This then would be the total lifting power of the balloon, or exactly 23½ cwt., and deducting 13 cwt. for the weight of the entire apparatus, we find that 10½ cwt. is the excess of lifting power arrived at. Occupants, freight, and ballast to that extent could therefore be carried in M. Menier's balloon.

The notion of employing ballons for purposes of military reconnoitring is by no means of late origin. It has been tried with varying success on more than one occasion. The victory with Jourdan obtained over the Austrians, at Fleurus in 1794 was ascribed to the knowledge obtained of the enemy's movements by means of a balloon. Moreover, in the late American war, attempts were made to utilise balloons for purposes of military observation, but owing, doubtless to the indifference in the nature of scientific appliances possessed by the army of the North, no good results were obtained. In the year 1863 a series of experimental trials was instituted at Aldershott with a view of intercepting the movements of a brigade sent out on purpose, by placing an officer of the Quartermaster-General's Department to watch its movements from a high altitude in a balloon, but he failed in following the various manœuvres of the opposing troops. This was, however, very possibly due to the very elementary knowledge possessed by the military authorities of the heights, &c , at which bodies of troops could be distinguished. The late Franco-Prussian war has thrown an immense amount of light upon the subject of military aeronautics. Under any circumstances, M. Menier's balloon possesses the qualifications of portability and simplicity of action in a very marked degree, which qualifications we should say are a *sine qua non* in articles of war *matériel* required for rapid movements or upon the line of march. The rope employed for restraining it is of the strongest possible description, being of steel wire, and tested up to four or five times the utmost strain that will ever be put upon it.—*The Engineer.*

ON THE CARE OF CHINA AND GLASS WARE.

Very few are the causes more prolific of domestic discord than the continuous breakage of cherished crockery. To sufferers from such mishaps we commend the following practical suggestions from the Boston *Journal of Chemistry.*

One of the most important things is to season glass and china to sudden change of temperature, so that they will remain sound after exposure to sudden heat and cold. This is best done by placing the articles in cold water, which must gradually be brought to the boiling point, and then allowed to cool very slowly, taking several hours to do it. The commoner the materials, the more care in this respect is required. The very best glass and china is always well seasoned, or annealed, as the manufacturers say, before it is sold. If the wares are properly seasoned in this way, they may be washed in boiling water without fear of fracture, except in frosty weather when, even with the best annealed wares, care must be taken not to place them suddenly in too hot water. All china that has any gilding upon it may on no account be rubbed with a cloth of any kind, but merely rinsed first in hot and afterwards in cold water, and then left to drain till dry If the gilding is very dull and requires polishing, it may now and then be rubbed with a soft wash leather and a little dry whiting; but this operation must not be repeated more than once a year, otherwise the gold will most certainly be rubbed off and the china spoilt. When the plates, etc., are put away in the china closet, pieces of paper should be placed between them to prevent scratches on the glaze or painting, as the bottom of all ware has little particles of sand adhering to it, picked up from the oven wherein it was glazed. The china closet should be in a dry situation, as a damp closet will soon tarnish the gilding of the best crockery.

In a common dinner service, it is a great evil to make the plates too hot, as it invariably cracks the glaze on the surface, if not the plate itself. We all know the result—it comes apart; "nobody broke it," "it was cracked before," or "cracked a long time ago." The fact is, when the glaze is injured, every time "the things" are washed the water gets to the interior, swells the porous clay, and makes the whole fabric rotten. In this condition they will also absorb grease; and when exposed to further heat the grease makes the dishes brown and discolored. If an old, ill used dish be made very hot indeed, a teaspoonful of fat will be seen to exude from the minute fissures upon its surface. These latter remarks apply more particularly to common wares.

As a rule, warm water and a soft cloth are all that is required to keep glass in good condition; but water bottles and wine decanters, in order to keep them bright, must be rinsed out with a little muriatic acid, which is the best substance for removing the "fur" which collects in them. This acid is far better than ashes, sand, or shot; for the ashes and sand scratch the glass, and if any shot is left in by accident the lead is poisonous.

Richly cut glass must be cleaned and polished with a soft brush, upon which a very little fine chalk or whiting is put; by this means the lustre and brilliancy are preserved.

VICTORIA RAILWAY —The engineering party in charge of Mr. Hogg, engaged in the extension of the Victoria Railway to Haliburton, have arrived here, after completing their preliminary line. They report very heavy rock cuttings for the first six miles, and lighter through the remainder till near Haliburton, where they met a large gravel bed The land is very good on both sides of the line. Mr. Ross, the Chief Engineer, has been experimenting here with dualin and dynamite. It is the intention of the company to put on steam drills in their granite cuttings. The Icelanders have been paid promptly for their work, and seem satisfied with their treatment.