Prepared for the Scientific American.

On the Manufacture of Gas.

(*Continued from our last.*)

The duration of the process of distillation depends on the quantity of coals in the retorts. Gas managers entertain various opinions on this head, although it is agreed that thin strata and quick distillation produces the greatest quantity of rich gas. When the charge is fully carbonized, the doors are taken off, and the red hot coke drawn out by rakes. As soon as possible after drawing, the retorts are charged again, to prevent any loss of heat by their being left unnecessarily open.

The next portion ot the apparatus for consideration, is that of condensation. In all well arranged works there is what is called a refringerator, or condenser, which consists of a considerable length of pipe, through which the gas has to pass, surrounded on the outside with cold water, for the purpose of extracting as much as possible of the heat from the gas. The last process to complete the manufacture of gas for the consumer is that of purification, by which the remaining gaseous impurities which have escaped the condensers, not being condensible, have to be removed by chemical action. For this purpose two methods are in use, one being that of passing the gas through lime-water—being a mixture of one part slaked lime to 20 or 30 parts of water, being of a consistency very similar to plasterers' lime-wash. The other is that called the dry process, in which the lime is slaked, allowed to cool, and as much water added as to cause it to feel damp, and to retain its shape on being squeezed in the hand, similar to garden mould, or brown sugar. In each of these plans the gas is passed through successive vessels, until it is thoroughly purified from the sulphur and ammonia with which it is contaminated. The weight of the gas-holder is generally such as to produce a density, or pressure, on the gas of about 2 oz. per square inch, producing an upward pressure on the cover of the purifier, of 17 lbs. per square foot, and which is, consequently, held down by suitable fastening to the body of the box.

As obstructions occasionally occur in the condenser or other pipes, between the purifiers and the retorts, by the deposition of napthaline tar &c., all well arranged works should be furnished with a self-acting escape for the gas, which is being continually generated by the retorts, placed in some conspicuous situation, so that it may be instantly seen when such a contingency takes place. All that is required for this purpose, is an upward opening in the pipe at the end of the hydraulic main, with a water-joint to receive a cylindrical cover, like an inverted cup, dipping into the water-joint, and fastened down. Of course, the depth of this cup, or the altitude of the water, must be more than equal to the resistance arising from all sources, such as the friction of the gas through the condensers, the altitude of water resistance in the wash vessel, the purifiers, and gas holders.

The gas-holder, being merely a vessel of large capacity for containing the gas as purified, is of a most simple kind, not susceptible of much variety, the form first used being still continued, consisting of two parts. The first consists of a circular vessel or tank, in the ground, with upright sides of brick or stone, and rendered water tight by being plastered all around with plastic clay; the pipe conveying the gas from the purifiers is carried down a dry well, rather below the level of the bottom of the tank; at the lowest extremity of the pipe in the well, there is a small close vessel for receiving the liquid ammonia which becomes condensed, and in which is inserted a hand-pump, to draw it off. The inlet pipe is continued under the wall of the tank, and carried upwards to a few inches above the water level. The gas holder is a sheet-iron cylinder, open at the bottom and closed at the top, about a foot less in diameter than the tank; it is made of iron, about 1-16th of an inch in thickness, the top being rather stouter, and supported by rafters, suspension truss-rods, &c., and is kept upright in rising by rollers and guide wheels The great increase in the demand for gas has correspondingly increased the size of the gas-holder; for whereas 50 ft. diameter was 20 years since considered excessive, they are now made upwards of 100 feet, and of corresponding hight. To save the covering so large a superficial quantity of ground, the telescopic gas-holder was invented. This will contain two, three, or four times the cubic contents of the tank, according to the number of slides, and each of them is rendered gas-proof at the edges by having a trough, all round which fills with water when down in the tank, and into which a flange on the top of the next dips, thus making a water seal. It has been observed, that the weight of the gas-holder compresses the gas to a density equal to three or four inches of water, but this must be varied to suit the conditions of the district, the distance between the stations of manufacture and consumption, &c. In addition to this, the immense quantity necessary to be sent out in the beginning of a dark winter evenings when almost every light is in full blaze, requires very nice management so to proportion the pressure that every one may have fair and ample quantity. This was at first done by a common valve, regulated by hand, but it soon became apparent that a better contrivance was necessary. The gas governor, was, therefore invented. This apparatus is fixed at the gas station, between the gas holder and the mains; though not self-acting, it is perhaps as nearly so as possible, to meet the various circumstances of demand. It consists of a small gas-holder, balanced by a number of shifting weights, by which its specific gravity, when more or less immersed in the water, regulates the supply to the demand, under whatever pressure it may be adjusted. The gas enters through a centre pipe in which there is an iron cone suspended; the top has a plate, with a hole perfectly circular, to fit the base of the cone. It is, therefore, clear that if this cone is drawn up close, no gas can escape—but if, on the contrary, it is quite down, a full flow will take place. The superintendant, therefore, in the beginning of the evening takes off as many weights as will adjust the annular orifice between the cone and the cap-plate, to produce the pressure required, which pressure is indicated by a guage in the top of the vessel. The gas in this governer is of course under the constant pressure of the main gas-holder.

(*To be continued.*)

For the Scientific American.

Japanning and Varnishing.

Japanning is the art of covering bodies by grounds of opaque colors in varnish, which may be afterwards decorated by printing or gilding, or left in a plain state. It is also to be looked upon in another sense, as that of ornamenting coaches, snuff boxes, screens, &c. and it is, therefore, a very important art and of great advantage to our country. I shall, therefore, endeavor to give a number of good receipts for the practising of this art, and interline the same with directions regarding the different branches.

All surfaces to be japanned must be perfectly clean and leather should be stretched on frames. Paper should be stiff for japanning, such as *papier mache* of France.

The French prime all their japanned articles, the English do not. This priming is generally of common size. Those articles that are primed thus, never endure as well as those that receive the japan coating on the first operation, and thus it is that those articles of japan work that are primed with size when they are used for some time, crack, and the coats of japan fly off in flakes. A solution of stroug isinglass size and honey, or sugar candy, makes a good japan varnish to cover water colors on gold grounds

A pure white priming for japanning, for the cheap method, is made with parchment size and one third of isinglass, laid on very thin and smooth. It is the better of three coats, and when the last coat is dry, it is prepared to receive the painting or figures. Previous to the last coat, however, the work should be smoothly polished

When wood or leather is to be japanned, and no priming used, the best plan is to lay on two or three coats of varnish made of seed lac and rosin, two ounces each, dissolved in alcohol and strained through a cloth. This varnish should be put on in a warm place and the work to be varnished should if possible, be warm also, and all dampness should be avoided, to prevent the varnish from being chilled. When the work is prepared with the above composition and dry, it is fit for the proper japan to be laid on. If the ground is not to be white the best varnish now to be used is made of shellac, as it is the best vehicle for all kind of colors. This is made in the proportions of the best shellac five ounces, made into powder, steeped in a quart of alcohol and kept at a gentle heat for two or three days and shaken frequently, after which the solution must be filtered through a flannel bag, and kept in a well corked bottle for use. This varnish for hard japanning on copper or tin, will stand for ever, unless fire and a hammer be used to burn or beetle it off.

The color to be used with shellac varnish may be of any pigments whatever to give the desired shade, as this varnish will mix with any color.

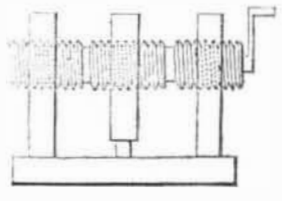
WHITE JAPAN GROUNDS.

To form a hard perfect white ground is no easy matter, as the substances which are generally used to make the japan hard, have a tendency by a number of coats, to look, or become dull in brightness. One white ground is made by the following composition. White flake or lead washed over and ground up with a sixth of its weight of starch, then dried and mixed with the finest gum ground up in parts of one ounce gum to half an ounce of rectified turpentine mixed and ground thoroughly together. This is to be finely laid on the article to be japanned, dried and then varnished with five or six coats of the following: two ounces of the whitest seed lac to three ounces of gum anima reduced to a fine powder and dissolved in a quart of alcohol. This lac must be carefully picked. For a softer varnish than this, a little turpentine should be added and less of the gum. A very good varnish and not brittle, may be made by dissolving gum anima in nut oil, boiling it gently as the gum is added and giving the oil as much gum as it will take up. The ground of white varnish may of itself be made of this varnish, by giving two or three coats of it, but when used, it should be diluted with pure turpentine. Although this varnish is not brittle, it is liable to be indented with strokes and it will not bear to be polished, but if well laid on it will not need polishing afterwards. It also takes some time to dry. Heat applied to all oils, however, darkens their color, and oil varnishes for white grow very yellow if not exposed to a full clear light. Gum copal is a fine varnish, and a description of which I shall give in my next. G. R.

New York, Dec. 13, 1847.

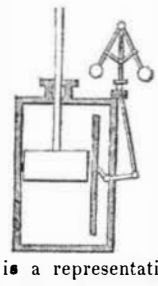
MECHANICAL MOVEMENTS.

Screw Arrangement.



The above cut represents an arrangement of screws, in which the two extremes are supposed to be of the same degree of fineness, or number of threads in the inch, but the central part which carries a moveable nut is of a different fineness, in which case the central nut will not be traversed the distance of the threads which pass through it, but the difference between the fineness of the central screw and those at the two extremities. A similar arrangement it will be observed, will thus enable us to divide minutely by means of screws, without such very minute, or fine threads as would otherwise be required. For minute measurement screws are the best mechanical means yet adopted, aod were it not for extending this article to an undue length we might describe its beautiful application to astronomical purposes.

The Governor.



The above is a representation of a useful governor for pumping engines in which the work may be suddenly varied. The solid piston here represented does not fit tight to the cylinder, which being filled with water is compelled to escape through the space when the passage on the right hand is shut and thus work is thrown on the engine; but supposing the governor to resume its proper position, the valve in this side passage is opened and the piston traverses without resistance.

For the Scientific American.

Chrome Black on Wool.

For a long period it had been considered impossible to dye a black, either on cotton or wool, without iron or copper for a basis, or mordaunt. Recent discoveries, however, have brought to light a better method of dyeing black than by any of the old plans, by using the bichromate of potash as a mordaunt, in place of the sulphates of iron or copper.

For a hundred pounds of clean white woollen yarn, use 3 lbs. of tartar, 3 of alum and 4 of the bichromate of potash. Boil the yarn in this one hour, handling well, (cloth as well as yarn,) then take it out, wash and boil it one hour more in the liquor of 20 lbs. of logwood, when it will come out a most beautiful black. The bluer the shade that is wanted, the less chrome is used. The goods must be white, or some light color to make a good black by this process. This color is not known to a great many practical dyers. It avoids that oxidising corrosiveness which weakens and impairs the strength of fibre in those goods dyed with solutions of iron.