GLASS TUBING.

The manufacture of glass tubing is surprisingly simple. The glass blower takes a small quantity of melted glass from the pot with his blowing tube, rolls it slightly on a marble slab to give it a cylindrical form, he then adds a small quantity of glass from the same pot, and blows the enlarged mass while rolling it, taking great pains to keep the shape cylindrical. If tubes of large caliber are required, the inside diameter of the cylinder is enlarged, and the glass is allowed to cool slightly before drawing. For tubes of very small caliber, such as thermometer tubes and other capillary tubes, the internal diameter of the cylinder is decreased and the glass is used very warm.

In making a piece of glass tubing the assistant places a ball of glass against the end of the glass cylinder by aid of his blowing tube. Now the men, each holding an end of the glass cylinder by means of their blowing tubes, begin to separate, walking backward. The cylinder is thus lengthened, and at the same time made smaller in diameter, and the diameter, of course, depends upon how much the tube is drawn out.

When the tube has attained the right size it is generally too warm and soft to admit of laying it down without destroying its shape; it is therefore cooled by means of a fan, as shown in Fig. 1. When it becomes sufficiently cool it is laid upon a series of equidistant parallel wooden blocks of uniform height, where it remains until it becomes cold. It is then cut into lengths with a diamond or a file. If the tubes are to resist great pressure or changes of temperature, they are annealed with great care. They are sometimes plunged into boiling linseed oil and slowly cooled.

FIG. 1.—COOLING GLASS TUBES.

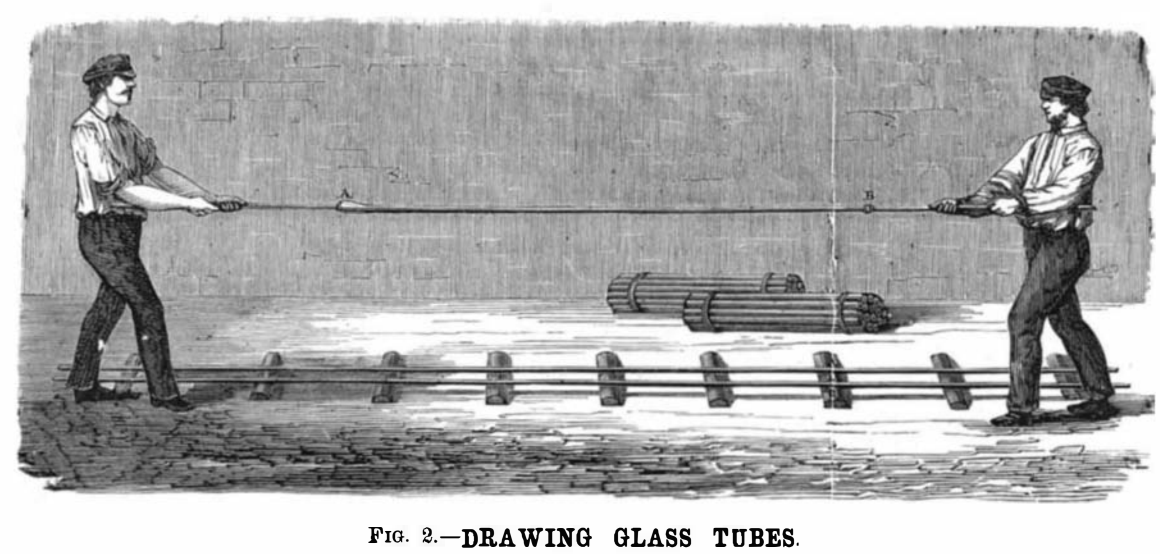

FIG. 2.—DRAWING GLASS TUBES.

Reading Room of the British Museum.

The dome of the British Museum reading room, in which the electric light is now used, is 140 feet in diameter and 106 feet high. In this dimension of diameter it is only inferior to the Pantheon of Rome by 2 feet; St. Peter's being only 139; Sta. Maria, in Florence, 139; the capitol at Washington, 135½; the tomb of Mahomet, Bejapore, 135; St. Paul's, 112; St. Sophia, Constantinople, 107, and the Church at Darmstadt, 105.

The new reading room contains 1,250,000 cubic feet of space; its "suburbs," or surrounding libraries, 750,000. The building is constructed principally of iron, with brick arches between the main ribs, supported by twenty iron piers, having a sectional area of 10 superficial feet to each, including the brick casing, or 200 feet in all. This saving of space by the use of iron is remarkable, the piers of support on which the dome rests only thus occupying 200 feet, whereas the piers of the Pantheon of Rome fill 7,477 feet of area, and those of the tomb of Mahomet 5,593 feet. Upwards of 2,000 tons of iron have been employed in the construction. The weight of the materials used in the dome is about 4,200 tons, namely, upwards of 200 tons on each pier.

The uprights or standards of the bookcases in the British Museum reading room are formed of wrought iron, galvanized and framed together, having fillets of beech inserted between the iron to receive the brass pins upon which the shelves rest. The framework of the bookcases forms the support for the iron perforated floors of the gallery avenues, and which are generally 8 feet wide, the central 6 feet being appropriated to the perforated floor, and the remainder being a clear space between the back of the books and the flooring, by which contrivance the light from the skylights (in all cases extending to the full width of the avenues) is thrown down the back of the books on each story, so that the lettering may be easily discerned throughout the book ranges. The shelves are formed of iron galvanized plates, edged with wainscot and covered with russet hide leather, and having a book fall attached. They are fitted at each end wih galvanized iron leather, covered, and wadded pads placed next the skeleton bookcase framing, to prevent injury to the binding when the books are taken out or replaced. Between these pads the skeleton framing of the cases forms an aperture by which a current of air may pass and ventilation be kept up throughout. The shelves rest upon brass pins, the holes for which are pierced at three quarters of an inch apart from center to center; but by a contrivance in cranking the shaft of the pin, which may be turned upward or downward, this interval is practically halved, and the position of the shelves may be altered three-eighths of an inch at a time.

The reading room contains three miles lineal of bookcases, eight feet high; assuming them all to be spaced for the averaged octavo book size, the entire ranges form twenty-five miles of shelves. Assuming the shelves to be filled with books, of paper of average thickness, the leaves placed edge to edge would extend about 25,000 miles, or more than three times the diameter of the globe!

Slag Boiler Covering.

Mr. Franz Buttgenbach, the well known metallurgist, gives the following method for the utilization of blast furnace cinder as an insulator for steam pipes, etc.: Mix 150 parts of cinder dust, 35 parts by weight of fine coal dust, 250 parts of fire clay, and 300 parts flue dust, with 10 parts of cow's hair, add 600 parts of water into which 10 to 15 parts of raw sulphuric acid has been poured, and make a stiff dough of the whole. This is thrown in small amounts upon the warmed pipe, hardening rapidly. Upon this rough coat a second, third, etc., is laid, according to the thickness which is to be used. By the action of sulphuric acid gypsum is formed, and the silica, rendered free, hardens. The mass becomes as hard as porcelain, and is still porous. It adheres firmly, and never cracks. Mr. Buttgenbach states that he has tested its merits by ten years' use, and has found it to meet all requirements.

AGRICULTURAL INVENTIONS.

An improvement in sulky-plows has been patented by Mr. William J. Meharry, of State Line, Indiana (Sheldon, Illinois, P. O.). The object of this invention is to furnish an improved sulky attachment for plows, which shall be simple in construction, may be readily attached to any ordinary plow, will materially lighten the draught, and will allow the plow to be readily controlled.

Messrs. John J. Howell and Osnel H. Wienges, of Fort Motte, S. C., have invented an improved handle, which is so constructed that it may be applied to hoes, rakes, and other similar garden and farm implements, and which may be easily and quickly detached from one implement and attached to another, and when attached will hold the implement firmly and securely.

An improved farm gate has been patented by Mr. George Johnson, of Waucousta, Wis. This is an improvement in the class of horizontally swinging farm-gates, which have suitable attachments for holding them at different elevations for the purpose of avoiding snow or other obstruction, while being opened or closed. The invention relates to the construction of the attachments or devices which hold the gate in different vertical adjustments.

NEARSIGHTEDNESS AND THE COLOR OF THE EYES.—M. Nicaté stated, at the meeting of the French Society for the Advancement of Science, that as one of the results of his examination of 3,434 eyes in relation to myopia, at Marseilles, this defect was observed far more frequently in light than in dark eyes, blue and gray eyes furnishing 18 per cent, and black and brown eyes only 11·27 per cent.

Purifying Gelatine.

Impurities in gelatine may be classified under two heads—mechanical and chemical—the latter being far more difficult to remove than the former, inasmuch as they are more or less in combination with the material itself. Fortunately they do not appear to exert the same injurious action on the emulsion as the mechanical, which, although simply in a state of suspension, are yet exceedingly difficult to remove by simple filtration, especially after the emulsion is formed, as many of them are in quite as fine a state of division as the bromide itself; hence it is clear that any means which may be adopted to remove the one will also remove the other.

The mechanical impurities in gelatine principally consist of lime in the form either of the sulphates, carbonates, and phosphates, fat or grease, sometimes animal fiber, and always that very indefinite compound "dust." This latter impurity is generally present in considerable quantity owing to the sheets or flakes, while in the jellied form, being exposed on nets of string or wire in a strong current of air to dry, when, as a matter of course, any dust that comes in contact with them adheres and dries into the gelatine. In some of the English manufactories wire nets are employed, but on the continent those made of string are principally in use, and fibers of that material adhere to and are detached with the gelatine. It is said that these nets are greased to prevent the flakes from sticking. If this be the case it will account for some of the fat generally present in gelatine. We are told that it is the custom with some of the continental manufacturers to wash the surface of the sheets of their finest kinds with warm water after they are dry so as to remove the extraneous surface matter.

Although, as we have said, it is almost impossible to remove the insoluble matter by mere filtration, owing to the viscousness of the solution, yet it may be entirely eliminated by adopting the process commonly employed in the culinary art for clarifying jellies. This consists of mixing with the solution of gelatine some albumen of white of egg, and then raising the temperature sufficiently high to coagulate the albumen, which in coagulating imprisons the insoluble particles. The whole is then put into a flannel bag, and suspended in front of a fire, when the solution passes through perfectly clear and transparent, even if an opaque sample of gelatine have been used, and at the same time all fatty particles will be retained by the coagulated albumen. In practice, however, it will be found very difficult to treat successfully thick solutions in this way, as they will not pass through the strainer in the same manner as thin ones, such as are used for jellies, and also that strong solutions set much quicker and at a higher temperature than weak ones, so that some other plan must be adopted to avoid the necessity of filtering the solution if a strong one require purification.

The method we have employed with perfect success does not require filtration at all, yet the solution is rendered perfectly bright and transparent, and free from all solid particles as well as fatty matters. For this purpose the gelatine to be purified is placed in cold water until it has become swollen. It is then transferred to a beaker placed in a water bath heated to a temperature of 110° Fah.—not higher—until it is dissolved; then some well-whisked white of egg is stirred in. The proportion we have used has been two ounces of albumen to each four or five ounces of dry gelatine. Now, with a whisk, or, better still, one of the American egg beaters, convert the whole into froth. To do this easily it may be necessary to heat the solution somewhat, so as to render it more limpid; but care must be taken that it does not rise beyond 120° Fah., otherwise the albumen will be coagulated before its time. After the whole is converted into froth the temperature of the water bath must be quickly raised to nearly boiling point, and then allowed to remain undisturbed for some time.

As the albumen coagulates it will rise to the surface of the solution, carrying with it all the solid impurities, leaving the lower part quite clear. This may take some little time, according to the strength of the solution; but the temperature must be maintained until it is clear. It may then be allowed to cool, and the whole turned out (which may be easily done by placing the beaker in water for a few seconds and then inverting it), and the top part cut off and rejected. The other part may then be used direct for the emulsion, or it may be cut into thin slices and dried in an atmosphere free