Thus: Temperature of room, 70°; less temperature outside, 0°; difference, 70°. Again: Temperature of steam pipe, 212°; less temperature of room, 70°; difference, 142°. Thus: 142÷70=0·493, or about one half a square foot of glass-heating surface to each square foot of glass or its equivalent. For each additional mile and a half in the average velocity of the wind above fifteen miles per hour add ten per cent. to the heating surface.

In isolated buildings, exposed to prevailing north or west winds, there should be a generous addition of the heating surfaces of the rooms on the exposed sides, and it would be well to have it in an auxiliary heater, to prevent over-heating in moderate weather.

In windy weather it is well known to the observant that the air presses in through every crack and crevice on the windward side of the house, and should they take a candle and go to the other side of the house they will find that the flame of the candle will press out through some of the openings. Thus the air in a house blows in the same general direction as the wind outside, and forces the warmed air to the leeward side of the house; this is why the sheltered side of a house is often warmer in windy weather.

Conditions which tend to the warmth of a house in windy and cold weather without stopping the leakage of air under doors or around windows are: 1st, blinds on the windows inside; 2n, blinds on the windows outside; 3rd, window shades and curtains; and, last, papered walls. The leakages are really blessings in disguise in houses which are not systematically ventilated.

Lead or zinc paint should not be used on heaters; several coats of lead paint may destroy their heating power from fifteen to twenty per cent. Ochre and oil, or varnishes mixed with color, are the least harmful.

How the Body is Built up.—The muscle and fat of the body, remarks the *Journal of Chemistry*, are derived from the food, and animal heat is evolved from their combustion or their combination with the oxygen admitted by the lungs. When the muscles are inactive, slow combustion goes on; and for every grain of carbon burned, a perfectly definite amount of heat is produced. When the muscles contract, the combustion is quickened, and the additional heat is liberated in the muscles themselves. If external work be done, as in lifting a weight or hammering a nail, the heat is no longer developed in the body, but transferred to the weight lifted or the raised hammer, and is liberated when they fall, and the heat thus liberated is exactly equal to the combustion inside the body. Thus the body is an apparatus efficient beyond all others in transforming and distributing the energy with which it is supplied, but possesses no creative power. A man weighing 150 pounds, by the consumption of a single grain of carbon can lift his body to a height of eight feet, and by the consumption of two ounces, four drachms, twenty grains, to a height of 10,000 feet. Mayer maintains against Liebig and others, that the muscles in the main play the part of machinery, converting fat into the motive power of the organism. He saw that neither nerves nor brain possessed the energy necessary to animal motion, and believed they held fast or let loose muscular energy as an engineer, by the motion of his finger in opening or closing a valve, liberates and controls the mechanical energy of a steam engine. These views are now quite generally accepted by scientific men.

Horse Power of Water Falls.—Stephen Roper gives the following rule for finding the horse power of water falls: Multiply the area of the cross section of the water fall in feet, by its velocity in feet per minute; this product will give the number of cubic feet flowing through per minute. Multiply this by 62½ pounds, the number of pounds in a cubic foot of water; multiply this last product by the fall in feet, and divide by 33,000. The quotient will be the horse-power of the water fall. Example: With a stream or flume 10 feet; depth, 4 feet; area of cross section, 40 feet; velocity in feet per minute, 150. Then, 40x150=6,000 cubic feet of water per minute; 6,000x62½=375,000 pounds of water per minute. 10x375,000=3,750,000 foot pounds of the water fall; 3,750,000+33,000—113 7-11 horse power of water fall.

A New Steam Packing.—A packing for the joints of steam pipes and like connections, consisting chiefly of India-rubber, plumbago and iron filings, has been recently introduced. It is applied in a semi-fluid state, soon vulcanizes or hardens by the heat, and, being metallic, is unaffected by oils. When vulcanized, its surfaces may be joined by using naptha as a solvent. It can be put between undressed surfaces, thus, in many cases, fitting is rendered unnecessary.

Replies to Queries.

QUERIES.

[1001.]—I should be glad to obtain information through your columns as to the best way to take buckles out of a saw.—Amateur.

[1002.]—I have been trying to make black and gold picture frames, but have not been able to produce a perfect or a smooth surface, any information, Mr. Editor, you can afford me on this subject will be most acceptable.—W. S.

[1005.]—I have been informed that veneers can be dyed through and through; is this so? If so, will you or some fellow reader explain the process?

Editor *Scientific Canadian*, Montreal.

[1007.]—I have a flute, the fittings of which, being solid silver, make it very valuable, but which has a crack of some three inches length in its middle joint. As to how to fill this up without splitting the wood to a still greater extent I am puzzled. Glue I have tried; but it only melted by the moisture which settled in the interior of the flute whilst playing upon the instrument. Some advice as to the solution of my difficulty, through the columns of your valuable journal, will very greatly oblige

A Subscriber.

REPLIES.

[1000.]—Can fix his chalk drawings beautifully by brushing a thin solution of shellac in spirit upon the back.—Designer.

[1003.]—The Editor of the *Scientific Canadian* is preparing one in classified sheets. State the class of works you wish for.

[1004.]—The treatment of mild cases is similar to that of diphtheria; but there are violent cases, beginning with convulsions, delirium, and fainting fits, which carry the patient off so soon, that the physician has no time to save him. It is, in fact, a form of scarlet fever, of which the first symptom is dying. Such cases probably originate in the inability of the system to throw out the poisonous material which cause the eruptions. When these appear soon after the breaking out of the disease, it is, if not a favorable symptom, at least a sign that there is hope of recovery. These eruptions should be promoted, and in no case interfered with, by giving the patient a bath—a mistake which we know several physicians to have prescribed for children, who died soon after. Taking cold is also dangerous, for the same reason, as it may cause the eruptions to disappear prematurely, and the result is most always convulsions and death. Therefore the patient should be kept in a room having a constant temperature, with even more care than is necessary for diphtheria. The first symptoms are a feeling of exhaustion and vomiting, a few chills, and then a high fever with a small, irregular and intermittent pulse of 120 to 140. When the eruptions appear the fever diminishes. If nausea and vomiting continue give small pieces of ice, the same as in diphtheria. In scarlet fever the vomiting is often very distressing, and there is no better way to control it. Be careful in regard to the diet; begin with rice-water, then beef-tea, and as soon as milk agrees let the patient have it, especially if it be a child.

[1005.]—The best way to burn slabs is on a common grate, with a blank plate 12 inches wide at each end, and grates 4 feet long and ½ inch thick. For burning sawdust to the best advantage, a different furnace is required. It should be of fire brick, detached from the boiler, with an opening in the top for feeding. The grates should be arched plates, perforated with holes. A good size for the given boiler would be 3 feet wide by 5 feet long. In mills using such furnaces it is found better economy to give away or destroy the slabs than to attempt to burn them under the boilers, the sawdust being ample and admitting of mechanical feeding.

How to Judge Leather Belting.—On cutting a piece of belting leather, one will notice the network of hide fibres interlacing eaeh other, and which, before tanning, were surrounded with gelatine. These fibres give the hide its great tensile strength, and any considerable displacement of them by the transformation of the hide into leather impairs this quality. A piece of good belt leather, therefore, when freshly cut, should look bright, with the intervening spaces between the fibres fine, even and regular. The texture should be uniform throughout, and with the utmost solidity there should be great elasticity.

—*Scientific American.*