HEATING THE HUMAN BODY.

The normal internal temperature of the human body is very near 100 degrees, independent of the temperature of the surrounding air. By respiration the continuous process of slow combustion is kept up,—the oxygen of the air uniting with the carbon of the blood passing through the lungs, to form carbonic acid. As in any case of combustion, overheating takes place unless provision is made for the distribution of the heat generated, so that the body is kept at its normal temperature only by the abstraction of heat from it. The actual heating of the body is not the ultimate object of heating, but in reality provision is made for the abstraction of heat generated by the vital functions, without making too great a demand upon the physical endurance of the individual. Three means are provided for the healthful dispersion of heat from the human body. First: By radiation into the air and surrounding objects. Second: By conduction, principally to the air immediately in contact with the body. Third: By evaporation of moisture from the lungs, throat and skin. Under the conditions of summer air, the last two are generally about equal, but the greater part of the heat is dissipated by the first means. Air is nearly a perfect non-conductor of heat, but radiation takes place through it readily. We may enter a room having a temperature of 75 degrees, with walls at 50 degrees, and feel chilled, simply because heat is rapidly radiated from the body, through the air to the colder walls. In comparatively dry air equality of temperature is kept up by a steady but imperceptible evaporation from the skin. In moist air this rapid evaporation is prevented, and the water is deposited as perspiration, the air being too heavily laden to take it up. On the other hand when the air is in motion, it increases both the evaporation and conduction by the constant bringing of fresh air to take the place of that already moistened or heated. If, under any circumstances, one of these three means fails to abstract heat rapidly enough, the removal by the other means is increased, and equilibrium of temperature kept up. High humidity has the effect of modifying very materially the temperature at which comfort may be secured. The excessive humidity of the atmosphere in the west and south of England has, owing to the reduced evaporation from the body, the effect of making a temperature of 56 deg. in that country as comfortable as 80 deg. in the dryer climate of Canada or Minnesota. In this country, where some means of heating is usually required during about seven months of the year, the amount of heat necessary and the economy exercised in supplying it are vital questions. Convenience and economy can best be secured by an intelligent union of the heating and ventilating systems.—From "Ventilation and Heating," by B. F. Sturtevant Co., Boston, Mass.

ESSENTIAL ELEMENTS IN THE DESIGN OF DAMS.

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(Continued from last issue.)

Curvilinear Plan.

The list of important dams, both ancient and modern, that have a curved plan, is a long one. With but few exceptions, these dams have been designed as gravity sections, and the curving has been done to afford additional safety. The ratio of length of radius to length of chord for gravity sections varies from 2.43 in the case of the Beetaloo dam to .8 for the Villar dam, with a vers. sine of .063 and .156 respectively. It is not easy to see wherein much advantage is gained by using an arch with a vers. sine of .063, but a vers. sine of .156 should add strength; and in the case of a short dam, with 131 feet length of crest, as in the Verdon dam, loads may be delivered to the abutments.

The most apparent advantage, however, would come from the fact that a considerable amount of curvature would enable the structure to transmit moving loads. To do this would not entail the delivery of an enormous load to the abutments, or even power to carry a concentrated load and maintain its form while delivering unequal reactions, but simply, that if the one portion pressed forward at the top (in the manner described in a previous article), so as to give it a greater forward movement than another part, that the arch form would tend to preserve the alignment, and maintain equality of such movement; and again, if different coefficients of friction exist at different parts of the length of the dam, that the curved form would enable the structure to act as an arch, thrusting back to portions that had a good coefficient of friction. This may be over a portion ten, twenty, or fifty feet of its length. If a dam be provided with considerable top width, so as to be able to preserve its alignment, and be equipped for transmitting moving loads, it would require no curving on plan.

It is clear from this, then, that a dam with a narrow top should be curved on plan.

Amongst curved dams there are the following:—

	Date.	Radius.	Base.	Crest.	Proportion.	
1. Alicante	1579	371'	30'	190'	371/190 = 2	Spanish
2. Elche		205'	60'	230'	230/203 = 1.12	"
3. Villar	1870	440'		546'	440/546 = .8	"
4. Hijar	1880	210'		236'	210/236 = .89	"
5. Zola	1843	158'	230'	205'	158/205 = .77	French
6. Furens	1858	'828'	30'	328'	828/328 = 2.5	"
7. Pas Du Riot	1872		curve	not	given	"
8. Ternay	1865	1312'	"	"	"	"
9. Ban	1867		"	"	"	"
10. Verdon	1866	108'		131'	108/131 = .82	"
11. Pont	1883	1312'		495'	1312/495 = 2.6	"
12. Chartrain	1882	1312'	curve	not	given	"
13. Gileppe	1869	1640'	269'	771'	1640/771 = 2.5	Belgian
14. Remschied	1889	410'	curve	not	given	German
15. Einsiedel	1890	1310'		590'	1310/590 = 2.22	"
16. Betwa	1873		curve	not	given	India
17. Beetaloo	1888	637'		580'	1414/580 = 2.43	Austral'
18. Geelong		300'		226'	300/226 = 1.33	"
19. San Mateo	1887	637'		680'	637/680 = .956	Am.
20. Bear Valley	1884	300'		450'	300/450 = .66	"
21. La Grange	1890	300'		320'	300/320 = .93	"
22. Sweet Water	1886	222'		380'	222/380 = .6	"
23. Hemmet	1891	225'	40'	280'	225/280 = .8	"
24. Butte City	1892	350'		350'	350/350 = 1	"