There is still another cause of deterioration in the atmosphere, and one which few probably know or think about. The skin is a secreting organ, and is constantly secreting aqueous vapor, it is usually in the form of vapor and dissipated as soon as formed, consequently is insensible, and is therefore called "insensible transpiration." At times, however, it collects in minute drops, and is then known as "sensible perspiration." Carbonic acid also escapes through the skin. The amount thus secreted is estimated at ten grains Troy per minute. This quantity of matter at a temperature of 69 degrees Fahr., will require about 2,600 cubic inches of air per minute to dilute it.

Now, having considering the causes of deterioration in the atmosphere around us owing to our own respiration, let us see the total amount of pure air required to keep the air we breathe in a proper condition.

100	cubic inches	to replenish oxygen consumed.
20,000	"	dilute carbonic acid exhaled.
1,700	"	carry off moisture exhaled.
2,600	"	" secretions of skin.
24,400		

Thus we see it is absolutely necessary to have 24,100 cubic inches, or 14 cubic feet of fresh air every minute to avoid rebreathing air depleted of its oxygen, or taking back into the system carbonic acid and organic matter which has been exhaled. This is not such a very large quantity, as it is represented by the contents of a cube 2½ feet in the side. If we give ourselves 15 or 20 cubic feet, so much the better. If two persons are in the room twice as much, or thirty cubic feet, will be necessary; and if three persons are present three times as much, and so on. If the room be crowded the circulation is impeded, and we should allow thirty cubic feet for each person.

Unfortunately, since we have for many good and sufficient reasons abandoned the custom our forefathers had of going to bed at the same time as the chickens, we require artificial light in our homes in the evenings.

As this artificial light is produced entirely by combustion, oxygen is absolutely necessary to its sustenance. A powerful gas burner consumes about four cubic feet of gas per hour, and requires eight cubic feet of oxygen, which means forty cubic feet of air, for this purpose. But the result of this combustion is the production of four cubic feet of carbonic acid, requiring 4,000 cubic feet of air to dilute it to harmlessness; 1450 grains of aqueous vapor have also been produced, requiring 200 cubic feet of air to hold it in solution. Thus for every gas burner in a room we require 4,208 cubic feet of air per hour, or about 70 feet per minute, a quantity represented by a cube 4 feet by the side.

Open fire-places are another fruitful source of bad ventilation. I have no doubt this statement will astonish many who have always been given to understand that an open fire-place was a panacea for all faults of ventilation.

An ordinary fire requires about 1000 cubic feet of air per minute to support combustion, and to carry off the gasses produced. Where does this air come from? The fact of the continued burning of the fire proves that it gets its supply of oxygen, whatever else may have to go without in consequence. A little air comes in through cracks, and around doors and windows, and sweeps across the floor to the fire-place, making the drafts around our feet of which we complain so much, but comparatively little comes this way, especially since the introduction of double windows and weather strips. It must, therefore, come down the same flue that the poisonous gasses are rising through, and, therefore, will retard their ascension, and even drive them back into the room.

THE MOTIVE POWER OF THE FUTURE.

It is a recognized fact that the steam engine makes use of only a small fraction of the amount of fuel that is burned to run it. The nature of the machine is such that this fact is a necessary one. The fault does not lie in the workmanship, for the actual loss of power from imperfections in this respect is found (by the indicator) to be only about twelve or fifteen per cent. The cause of the low efficiency lies too deep to be overcome by any mechanical device, and it has often been remarked that the motor of the future must work on an entirely different principle.

Mr. Edison has invented a motor which transforms heat into mechanical energy without the intervention of either boilers, pistons or cylinders, and he is very hopeful of improving it so that it may become of practical use. We have examined drawings of it, however, and have become skoptical. The motor is electrical in nature, and in order to make it run it is necessary to heat and cool a piece of iron very rapidly. We doubt if this can be satisfactorily done.

The hot-air engine is very inviting, but men like Ericsson and Siemens, after years of thought, have not brought it into successful competition with steam, although they were well acquainted with the theory of its action, and were vastly better prepared to make experiments than the fathers of the steam engines were.

The wind-mill is too uncertain in its action to compete with steam, though the fact that it consumes nothing must become a very weighty consideration in its favor when our coal supply gives out.

The tide-mill has never been very widely adopted, and hardly anyone thinks of it seriously as a rival to steam; but it is nevertheless possible to construct one that can produce power enough for the entire United States. A reservoir forty miles square, at or near the head of the Bay of Fundy, where the tides are very great, would contain sufficient water to generate 700,000 horse power for twelve hours; and this might be distributed electrically and sold in every state in the Union. When coal has become scarce the construction of such reservoirs may be attempted, so that power and light, and perhaps heat also, generated in Nova Scotia, may be sold all over the continent.

Power obtained in this way would not come from nothing. If a tide plant like that we have suggested is ever constructed, it will lengthen the time of day. It will slow down the earth's rotation just as certainly as a big gear wheel would, if placed on the earth's axis, and made to drive machinery; though the effect would be so slight, owing to the immense size of the earth, that the increase in the length of day would not be measurable for thousands of years.

The gas engine has proven itself very convenient in many places, and oil and powder engines are also in use; but all of these use fuel, so that, equally with the steam engine, fail to solve the great problem that must face the world sooner or later, when the coal is gone. The engine of the future must draw its energy from some of the forces of nature, and it seems that it must be operated by wind, waves or tides, or by rivers, ocean currents or the direct rays of the sun.—*Power.*

THE SILK DRESS COAT.

Apropos of the published announcement that silk dress coats have come into fashion at Paris, and the old broadcloth is relegated to the grey-beards and the waiters, the Listener recalls meeting a gentleman at an entertainment a fortnight ago who wore one of these silk-coats. The Listener being always a long way behind the fashions, had never even heard of silk dress coats, and his curiosity awakened a little bit at the sight of this one. There is no denying that the garment was very handsome; it was made, of course, not of shiny cloth, but of heavy, corded silk, which at a little distance gave no other impression than that of rich, black broadcloth. A day or two afterward the Listener chanced to meet his tailor—or his tailor chanced to meet him; which was it? At any rate, in the course of the conversation, the immediate topic of which the Listener sought to change as soon as possible, he took occasion to ask about the silk coat. "Yes," said the tailor, "it's the latest Parisian agony. I suppose we shall have them presently. The head of our house brought one over from Paris on his last trip. The suit is superb." What a harvest, by the way, the change of style will make for the tailors if it is generally adopted? It would have the advantage, at first, of serving to distinguish guests from waiters, but that distinction it would not possess long. Before many months the waiters would blossom out in silk coats.—*Boston Post.*

MUSICAL ECHOES.

THE "REDEMPTION."—The composer calls his work a "Sacred Trilogy," but there can be little doubt that, from its importance and dimensions, it will be more often termed an "Oratorio." In justice to M. Gounod, too, it would be well to remove an impression which we have found to exist, that, because the composer has most emphatically declared the "Redemption" to be "the work of his life," he employed the whole of his artistic life in writing it. The best reply to this will be again to quote the words of the author in a note appended to the printed copy of the Oratorio: "It was during the autumn of the year 1867 that I first thought of composing a musical work on the Redemption. I wrote the words at Rome, where I passed two months of the winter 1867 8 with my friend Hebert, the celebrated painter, at that time Director of the Academy of France. Of the music, I then composed only two fragments: 1. The March to Calvary, in its entirety; 2 The opening of the first division of the third part—the Pentecost. Twelve years after, I finished this work, which had so long been interrupted, with a view to its being performed at the Festival at Birmingham in 1882." The truth is that the Oratorio sprang originally from the desire of a deeply religious man to color with a musician's art the solemn events upon which Christianity is based; and that although, no doubt—as a painter frequently observes in nature materials which he afterwards moulds into a definite form—M. Gounod had often previously reflected upon these sacred scenes with the mind of a musician, it is only within the last twelve years that they have assumed tangible shape

It is a proof of the earnestness with which M. Gounod has worked at this Oratorio, that instead of satisfying himself with a libretto prepared to his hand he decided to compile it for himself, thus moulding the subject into the form which he conceived would be best suited for musical illustration. That he has thrown it into a dramatic shape is, we think, one reason why the interest is never for an instant lessened; the vividness of the events being so heightened by the personality of those who take part in them as materially to deepen their solemn import upon the listeners. One distinguishing feature in the composition is that, although the incidents are related by two Narrators—a tenor and bass—their music, instead of being used as a mere link between the several important pieces occurring in the work, is intimately connected with the most melodious and sympathetic orchestral figures, so that the narrative is carried forward equally by the voice and instruments. The work is divided into three parts—the Passion, the Resurrection and Ascension, and the Pentecost—preceded by a short Prologue, representing the Creation, the Fall, and the Promise of Redemption. That the composer has approached his theme with an earnest feeling for its sacred character is manifest throughout the composition—which, as we have already said, has occupied his mind for twelve years—and in no respect is this more shown than in the fact of his purposely abstaining in h.. choral movements from any display of contrapuntal knowledge, beyond that which seemed naturally demanded for the due musical illustration of the scenes and incidents of the religious drama. The exquisite theme which, in the fashion of the day, may be termed the *leit motif*, expressive of the Redemption, appears first in the Prologue, and runs, like a thread of