opments of the last decade, dynamic currents of very high intensity are everywhere in use, and these have been found to be deadly, though of comparatively low potential. It is to such currents as these that imperfectly protected wires are carrying above the streets. When the dynamos are running, contact with wires conveying such currents is liable to be fatal. A broken wire that has fallen so as to reach from the top of a pole to the street has now come to be regarded as dangerous by the populace. The dread is only too just. Repeated deaths have proved it so.

It is futile to attempt to restrain the march of progress. No advance in practical science is more remarkable than the development of electricity. Goethe's prediction, true for so many years, is now being falsified. He said that electricity would only be applied to the minor uses of life. Now engines are driven by it, and the difficulties in the way of its application to outdoor locomotors are gradually disappearing. The electric light is practically complete in its development. But while no effort should be made to restrict the uses of the current, the fact that it is dangerous should not be overlooked. The rival exploiters of different systems claim each a higher degree of safety, or more properly a less degree of danger for his own installation. The direct and alternating current advocates are engaged in active attack upon each otheron the basis of the relative harmfulness of the two systems. One engineer has suggested a species of electric duel to settle the matter. He proposes that he shall receive the direct current, while his opponent shall receive the alternating current. Both are to receive it at the same voltage, and it is to be gradually increased until one succumbs, and voluntarily relinquishes the contest. The absurdity of the suggestion, which is made in apparent earnestness, shows how decided the war has become. Back of it all the fact remains that the working current of the day, direct or alternating, is dangerous. One solution seems adapted to protect the public. It is to properly dispose of the wires underground.

In examining the effects of the dynamic current upon the systems of animals, several points of interest have been developed. One such point is the small amperage required for a fatal result. Thus, with a current of 536 volts electromotive force a dog with a resistance of 11,000 ohms was killed. This reduces to a current of less than 0·05 ampere, leaving out of consideration the resistance of the dynamo. A horse weighing 1,230 lb. was killed by a current of about 0·06 ampere. In the case of the alternating current, the question of time seems to enter. A current requires a certain period to destroy life, which period varies with the current intensity. These data go to prove how slight a contact with the wires may be fatal. Sooner or later the plan of a modern city will have to provide some effective system of subways. The overhead wires will be a perpetual menace, will be the cause of death and injury.

But a few days have elapsed since a forcible illustration of these dangers occurred. A storekeeper in Meriden, Conn., started to take in some articles of clothing that had been hung up in front of his store. It was raining at the time. He was thrown violently back by an electric shock as soon as he attempted to remove a knit jacket. He soon recovered and continued his work only to receive an additional shock which scorched his hand. The attention of bystanders was excited, and it was found that brilliant flashes of light could be drawn from the iron front of the store. On investigation it was found that an electric light wire had come in contact with the wet awning, and thus had caused the trouble. Here at least is a case where it would be hard for the electric light company to plead contributory negligence.—*Scientific American.*

THE MANUFACTURE OF LARGE BELLS.

It may not be generally known, says a writer in *Stoves and Hardware* that there are only five concerns in the United States engaged in the manufacture of church, school, and chime bells, and that the Hy. Stuckstede Bell Foundry Company, St. Louis, claims to be the largest of the five. In fact, it is not an industry that calls for many factories, as a well made bell will last almost for ever, and hence but little has ever been said about them in public print. Nevertheless, the process of manufacture is one full of interest, and worthy of more than passing notice.

A visitor to be in a bell foundry, where nothing but large bells are manufactured, experiences peculiar, if not weird, sensations. Not many workmen are employed, and as they move around, with apparently noiseless motion, occasionally stepping in the full light of the open furnace door, showing their begrimed faces, and all the while the soft, resonant tones of the bells being tested, in his ears, the impression is one far removed from churches and church chimes. There is no conversation or bandinage, or loudly expressed orders, for the workmen's duties keep them separated, and, as the floor is of clay, there is not even the sound of a footfall. This is the first impression received by a *Stoves and Hardware* representative on his visit to the works above mentioned. A casual glance gave no indication of the work being done. A lot of bells, of various sizes, distributed over the floor, a larger number of moulds, a pile of cast iron mountings, and a furnace with a deep pit in front of it is all that is to be seen, yet here some of the finest chimes in this country have been made.

Contrary to the popular idea, the exact musical tone of a bell depends neither upon the metal nor upon any change in it after being cast. If the bell should not be of the exact pitch, there is no alternative but to melt it over and recast it until the proper tone is secured. Hence, it is clear that the greatest care must be exercised, and the most thorough skill displayed.

The first operation, and the one upon which success depends, is the forming of the moulds. They are made according to plans which are at first prepared to demonstrate the weight, thickness, and dimensions necessary to produce the required tone. The moulding is done entirely by hand, without the use of patterns. For the inside, the shape is made up of loam, which is merely sand mixed with enough clay to make it cohesive. With nothing but a trowel, a paddle, and his hands, the operator moulds the loam into the desired shape, working from the bottom toward the apex. The work is necessarily slow, as great care must be exercised, as any variation from the plans would inevitably ruin the effect, and frequent measurements are taken to see that there are no deviations. The surface is now covered with black lead. This is mixed into a thick paint, or mortar, and applied with a brush. Each coat must be allowed to dry, and successive coats applied until it reaches a thickness of about three-quarters of an inch, or until the desired shape is accurately secured. The outside half of the mould is built up of loam in the same way, only in this case no coating or plumbago is used. The exterior mould fits over the inside mould, the space between the two determining the thickness of the bell. The moulds being finished, they are placed in position in a pit in front of the furnace. At the apex or at the point where the bell would be hung, an opening is made in the outside mould of about two inches in diameter. A trough then carries the molten metal directly into the mould.

The furnace is very similar to those generally used in melting large quantities of brass. The melting pot is built between two fire-boxes, so constructed that the heat strikes the sides