companies by thus doing became almost exclusive occupants of the street, the householders being shut off. It is quite common for dwellers on our street railway routes to wake up on winter mornings, and find a compact bank of snow from three to four feet high along the front of their premises, deposited there during the night by the industrious railway people, aided by their powerful machinery.

On the part of the railway companies, it appeared, during the course of the recent legal proceedings, that the use of the plows and sweepers was necessary to the proper working of the roads; that the snow must be removed, or the passenger cars could not run; that their charters required them to run the cars; that if they were to be enjoined from clearing the tracks, the court would nullify the act of the legislature; that consequently the companies could not be legally prevented from clearing the snow, as they were in the habit of doing.

Judge Sedgwick, before whom the last proceedings came, has rendered a decision which, we think, will commend itself to the people by its plain, common sense, practical way of solving the difficulty.

He admits the right of the companies to clear their tracks of snow, and to pack it up at the sides of the streets as they now do; on the other hand, he decides that the companies must not obstruct the use of the streets, and requires them to remove their snow banks within a reasonable time after every storm. This decision gives general satisfaction, and fully meets the requirements of the case. It is true it imposes a laborious and expensive work upon the companies, as they are unprovided with special means for the removal. But we cannot doubt that some of our ingenious inventors will study out the proper machinery to do the business cheaply. With them we leave the subject. Whoever can devise the proper mechanism ought to reap a handsome reward. Now let us see what mechanical genius can do in the matter.

## HIGH GAS BILLS AND THEIR PREVENTION.

A conflict exists at present in Brooklyn, between the gas companies on one side and some of the gas consumers on the other. The price of gas has reached lately $3 per 1,000 feet, and even at this high cost has by many been found to be of poor and unsatisfactory quality. As a result, some people have abandoned the use of gas and substituted lamps.

It is well to remember that large gas bills are due not merely to the cost per 1,000 feet of the gas burnt, but to the number of feet consumed. As any one can easily learn to read his meter index from the instructions printed on the back of the bills rendered, it is presumable that the consumer is informed of the quantity of gas he is using, and hence cannot dispute bills which accord with the meter. But the meter is sometimes the object of the consumer's suspicion Now supposing him to be certain that no gas unknown to him has been wasted, the question of the veracity of the meter is easily settled by a simple test. The wet meter is simply a circular box filled with water to a point a little above its center. The axis carries a series of curved buckets, each capable of holding a definite quantity of gas, which is admitted at the central part of the meter, and which causes the buckets successively to rise, thus keeping them in continuing rotation. As the edge of each bucket rises from the liquid, the gas escapes and goes to the delivery pipe at the circumference, while the quantity so discharged is measured by the rotation of the bucket axis, acting on gearing which communicates with an index. Now to test this meter, provide any large airtight vessel, say a good sized jar, of which the exact content in cubic feet and inches is easily calculated. Fill this with water and reverse it, mouth down, in a good sized pan, on the bottom of which are two or three inches of water. The atmospheric pressure will keep the water in the jar. The connection between the house pipe and the meter being previously cut, and a piece of rubber tubing attached to the meter, lead the end of the tube into the throat of the jar. Turn on the gas, which will bubble up and displace the water. The moment all the water in the jar is driven out, stop off the gas. Fill the jar with water again, thus expelling the gas collected, and repeat the operation. Do this, say five times, until in fact the previously determined cubic contents of the jar, multiplied by the number of fillings, equals exactly (for example) 10 cubic feet. Now compare the result thus obtained with the indication of the index on the meter, allowing a slight margin in favor of the latter to compensate for any inaccuracy on your part, and the error of the meter, if any there be, will at once be apparent.

The causes of error may then be searched for; and generally the trouble is that the meter has either too much or too little water. This water is put in through a screw, on top of the front box and to the right. It should be admitted until it escapes from the vent in the side just below, when the same is opened. It sometimes happens that a plumber, in filling a meter, will fill above the vent, and yet not sufficiently raise the float (which is supposed to regulate the entrance of the gas and shut the same off when too much or too little water is the case). The effect of this is to diminish the cubic contents of the buckets, while the index shows no change in the number of revolutions of the drum. So that the consumer then pays for more indicated cubic feet than he has really consumed. To remove water, try the bottom screw, and take out the water from what is called the dry well. When there is too little water in the meter, its proper quantity is easily added, and the contents should just escape from the lower edge of the vent. In winter, the meter is very prone to freeze: this need not occur more than once, if the consumer will pour a little glycerin into the water after the thawing is accomplished. Sometimes also the water in old meters becomes thick, from the accumulation of tar and dirt from the mains. This causes a slow and unsatisfactory action, and should be remedied by cleaning the meter out and replacing the impure with fresh water.

There are various other causes of high gas bills, which the householder might well look to, but into which we cannot enter in any detail here. Prominent among these are the burners, a poor one of which may easily burn double the gas and not give half the light of one properly constructed. The ordinary type of burner, besides, burns out, and, through the enlargement of its orifice, soon becomes very wasteful of gas. Another cause of waste is due to people trying to read or work by several lights located in a high chandelier or fixture, instead of by one light brought near them. A single burner, one foot distant from the page of a book, will shed on that page thirty-six times more light than the same burner six feet away; or in other words, the single burner, located as first stated, will light up the page as brilliantly as six chandeliers, of six burners each, hung six feet from the book. The absolute quantity of light is the same at all distances, but it is spread out over an area which increases with the square of the distance from the flame; so that it is obvious that lights are used very wastefully when they are placed far away from the objects which they are to illuminate.

## A NEGLECTED INDUSTRY.—BEE CULTURE.

There is one industry in this country which is not overworked nor overcrowded, and which offers reasonably large and sure profits, because for its products there is always a demand. It is one which hundreds of people can carry on without interfering with their regular occupations, and which might serve to give employment to many now seeking labor, or additional income to others of straitened means. We refer to beekeeping, and we speak of it now because the opening of spring is a good time, for those who may heed our advice, to make a beginning. Out of the 40,000,000 people in this country, only 70,000 are beekeepers, and these send to market about 15,000,000 lbs. of honey and wax yearly. Now to see how enormously below the average, of what the country ought to produce, the above yield is, we have only to make a brief calculation based on the assertion of the late Mr. Quinby, one of the best and most reliable authorities on apiculture. He says that, on an average, every acre of ground ought to yield 1 lb. of honey—cities and all, be it remembered, because it has been practically demonstrated that the bees will find excellent materials for honey in the refuse and garbage as well as in the few green spots enclosed within brick and mortar walls. There are 1,897,146,240 acres in our national domain; and even if we deduct 50 per cent of this for utterly uninhabited localities, the yield should be about sixty times greater than it is. To proceed a step further, every pound of honey is worth, on an average, 25 cents, and each pound of wax, 30 cents. Taking the figures in the last census as a basis, the value of the annual product is: Wax $189,338, and honey $3,676,703, total $3,866 041. But this is only $\frac{1}{62}$ of the value which might be produced, and therefore the said possible value is worth $240 000,000, consequently there is a waste of $236,000,000 worth of valuable produce, which evaporates into the air. One well known authority plainly asserts that the amount of honey lost, in California alone, yearly, exceeds in value the quantity of gold gathered in the State during the same period. The census says that, in 1870, there were but 136 professional apiarists in the country; a monthly publication devoted entirely to discussion of bee culture is our authority for the statement that, altogether, 70,000 persons keep bees. Only 1 person, then, out of every 570 in the United States, is engaged in preventing the abovenamed waste, or, more strictly speaking, in trying to divert some of the evaporated value into his own pockets: 1 person in about every 300,000 is engaged in doing this as an exclusive business. The census says that there are nearly 290,000 clerks alone in the country, clerks and salesmen be it noticed, not employees in general, one to every 144 of the population. There is not a year elapses that does not see hundreds of young men and women swarming into the great cities looking for clerical employment, nor can a winter pass but that we are not brought face to face with terrible destitution, and merchants everywhere are compelled to deny, for their own immediate welfare, appeal after appeal which strongly excites both sympathy and charitable feelings. An advertisement in a daily journal of this city for clerical help results in answers by the hundred, as we personally know. Now is there not something wrong in a system under which, onone hand, an industry, not a new one born yesterday, but one almost as old as the human race itself, goes begging for people to follow it, the resources of which are suffered to run to absolute waste to the extent of millions of dollars yearly; and under which, on the other hand, thousands of the best part of the population manage to crowd into big cities and there starve because there is no honest labor for them?

We do not argue that each and everybody should instantly provide himself with an improved hive and a swarm of bees, and therein find sooner or later a fortune; we merely point out one industry, more thoroughly and uniformly neglected than any other that we now can recal. It is, moreover, in the development of industries of this kind that the solution of the much agitated woman question lies. Apiculture is one of the few pursuits that a woman is physically able to follow in its every branch; herein it is of especial advantage. Again, its development would prove a general blessing in that, besides enlarging the field of labor for every one it might serve to attract men, out from behind counters in millinery and dry goods stores, away from the cities and into the open air of the country where, in agriculture, man's natural calling, the muscles which Nature has given them, and denied the weaker sex, could be put to profitable use. We shall revert to this subject of bee culture in its more practical bearing at some future time.

## Mr. Edison's New Force.

*To the Editor of the Scientific American:*

I notice in your issue of January 29, 1876, some experiments conducted by a gentleman signing himself "Electron," who attempts to prove that the phenomenon observed by me, and which I have called etheric force, is due to the "extra" current from an electromagnet.

There are several sources of error, I think, in his experiment, among which may be mentioned bad insulation of battery or leading wires and binding posts, and the close proximity of the galvanometer to the vibrating apparatus.

Owing to the extreme delicacy of a mirror galvanometer, the sources of error are extremely numerous, and it requires long practice and careful manipulation to eradicate them. If "Electron" will use large gutta percha wires, take the reading of his galvanometer in another room, suspend his battery by insulating cords, use a large hard rubber base for his vibrator, and keep a sharp look-out for possible sources of error, he will obtain a brilliant etheric spark right through his galvanometer without a tremble of the spot of light.

In reply to your correspondent J. P. H., who sees nothing inexplicable in obtaining a spark from an uninsulated wire laid for a long distance upon wet earth and connected to a highly insulated source of power, I will state that his telegraph experiment is not a similar one. If he had disconnected one pole of his battery from all connection with anything except air, and placed his battery upon an insulated stand, he would hardly have succeeded in working with a relay or any other electric instrument under the conditions he mentions. With this, there is no chance for circuit, and it is the same with the source of etheric force.

Newark, N. J. THOMAS A. EDISON.

## Captain James B. Eads.

We give in another article a report from an authentic source concerning the progress of the Jetty-works at the mouth of the Mississippi, which shows a gratifying improvement in the channel so far as the works have been carried, and indicates that within a very short time we may expect to see the great river freely opened to navigation by vessels of the largest class.

The opening of the Mississippi will have a wonderful influence upon the material prosperity of the Republic, and will form a crowning event during this centennial year of our country's history. The region thus thrown open to the world's commerce is one of unsurpassed richness, capable of supporting an immense population.

To the noble engineer by whom, at his own cost, this great work was undertaken, the highest honors are due. In war and in peace, his commanding talents and remarkable sagacity have been devoted to patriotic labors, which have always resulted in public benefits of the most extensive, far-reaching nature; and he well deserves the nation's gratitude. We nominate for the Presidency Captain James B. Eads of St. Louis, the man of genius, of industry, and of incorruptible honor.

## A Curious Explosion.

The Virginia City (Nev.) *Enterprise* gives an account of the explosion of what was supposed to be simply a pail of water, or rather of ice. It was being heated near a forge so as to thaw the contents, when, just as it was being removed, it suddenly blew up, tearing the bucket to shreds and severely injuring two men near by. The local journal thinks that the casualty was due to nitroglycerin from a giant powder cartridge, which previously had been thawed in the vessel, forming an unremarked film on the inside. We doubt this explanation. There appears to have been nothing but a moderate heat applied, and that certainly would not have exploded the nitroglycerin. If the latter were present, it probably exploded through being on the outside of the bucket, and so suffering a shock by the latter being swung, by the person who was lifting it from the forge, against an obstacle.

## Dr. Henry J. Anderson.

The funeral ceremonies of Dr. H. J. Anderson, who died in India several months ago, were recently held in this city. Dr. Anderson was formerly a Professor of Mathematics in Columbia College, and, although not distinguished for any especially great work, was nevertheless a gentleman of remarkably wide scientific attainments, and a vigorous promoter of scientific research and progress. He went to Australia to observe the transit of Venus from a station of his own selection, north of Melbourne; and on the way home, at Lahore, India, while making explorations in the Himalaya mountains, he contracted, through exposure, the malady which terminated his life. He was seventy seven years of age, and was the oldest living graduate of the abovenamed college.

## Road Steamers.

Referring to the reward offered by the State of Wisconsin, of ten thousand dollars, for the invention of a road locomotive or steamer, capable of traveling five miles an hour on common roads, published in last week's SCIENTIFIC AMERICAN: In our SUPPLEMENT No. 6, issued this week, we give a drawing of the most recent English example of this kind of mechanism, from which it is possible that our inventors may derive useful hints.