longer than has generally been supposed, that we are all eating too much, and that for a family remedy, fasting affords a better, safer, and more economical cure than the taking of all sorts of patent medicine, to which many people are so much addicted, he has done a really good work.

We recommend to our readers the perusal of the full account of the fast.

EFFECT OF STARVATION ON THE BLOOD.

Further observations upon the gradual improvements of Dr. Tanner's blood have made it necessary to modify the statements made at the close of the article on this subject in the last number of the SCIENTIFIC AMERICAN (see page 128). It was noticed that the quality of the blood varied greatly in different specimens obtained from day to day, and even in specimens drawn the same evening. It was at last found that if the blood was drawn from a very small puncture, from which it had to be pressed out forcibly, it was found to be in a much worse condition than if drawn from a deeper puncture from which it flowed freely. It is evident that in the first case it was drawn only from the capillaries, and in the second case from the larger vessels, in which a regular circulation takes place. This appears to prove that the abnormal corpuscles linger in the capillaries, and that it takes time to remove them therefrom, while in the larger vessels, in which free circulation takes place, restoration may already have been accomplished to a considerable extent. Close observation appeared to show that this restoration was taking place in two ways, by a cleaning and healing process of the affected corpuscles, and by the formation of new ones. The first was proved by the observation of corpuscles in all stages of the healing process from the most abnormal to the perfect smooth ones. Some of those which had become free of fungoid spores appeared, however, to have suffered considerably, some were partially destroyed, some were only half or parts of perfect corpuscles, and no doubt such will be either eliminated from the system or the defective parts healed up. Which of these takes place is a question. The second process of restoration was proved by the appearance of fresh and small corpuscles, looking very smooth and perfect, and bearing the stamp of youthfulness upon their appearance—we would almost say countenance—a freshness which became more striking the higher the magnifying powers were by which they were observed, in comparison with the affected corpuscles, in which the higher powers showed the imperfections more strongly.

This corroborates what other microscopists have observed in regard to the formation of new young blood corpuscles. It has, however, been denied by others who failed to observe it; but this is merely negative testimony, of which there appears to be a great deal in the medical profession; it proceeds from a kind of conservatism, which lies at the basis of all the medical intolerance manifested by the so-called regular school against all supposed innovations, even among their own brotherhood.

A striking illustration was offered in this regard by the discovery of Prof. Cohnheim, of Kiel, who found that pus globules could originate from the white blood corpuscles, but whose observations were most strenuously opposed at first by the majority of the profession, who could not see it. It may be mentioned here, as it has some relation to Dr. Tanner's fast, by which fast the number of his white blood corpuscles was more than quadrupled. It is well known that persons subject to privation of food have a strong tendency to pus formation and running sores, and if starvation increases the number of white corpuscles, these combined facts appear to support Cohnheim's theory. The opposition against it was, however, set at rest by Dr. Bastian, in London, and Surgeon Woodward, U. S. Army in Washington, who verified Cohnheim's observation, and by Huxley, who adopted it in his great lecture on protoplasm.

The number of white corpuscles did rapidly diminish after the fast in Dr. Tanner's blood, and was soon reduced to the normal proportion; but the interesting change in the red corpuscles and their very gradual restoration during a length of time, is a contribution to science which Dr. Tanner has given after the end of his fast, and this should be acknowledged.

MAKING PROFITS OUT OF HUMAN WEAKNESS.

It is not only among lawyers that a certain class is found who induce quarrelsome or avaricious people to go into lawsuits by telling them they are right and must seek redress by law. They do this only for the purpose of obtaining their professional fees, in place of giving them the honest advice to settle amicably, by mutual agreement, as *in nine cases out of ten would be far better.*

We find the same class of men among doctors, who, when people mention some slight ailment, make them believe that they are sick, or soon will be very sick if they do not take a certain course of medical treatment which they will prescribe. They also do this for the purpose of obtaining a professional fee, in place of giving them the honest advice to fast for one or two days, to take rest, and to stop drinking and smoking, if they are addicted to these vices. *In nine cases out of ten this would be far better.*

The lawyer of this class makes the client believe that he has been wronged, and the doctor makes the patient believe that he is very sick. They all have their own profit in view, and play upon human weakness, which, in some individuals, consists in combativeness, in others in imaginary weakness of body, and again, in others, in conceit about their mental accomplishments.

There is no profession in which men can make money out of it by telling people about their weakness of mind. The only mental weakness of which people sometimes complain is defective memory, but they will never complain about defective judgment or defective common sense. This agrees perfectly with what a German physician has lately argued in an essay, that insanity is a blessing, as the insane live in an ideal sphere, which usually is far happier than the reality in the world of trouble through which they have passed and which made them insane. But the fools outside the asylums, which largely outnumber those in confinement, are happy also, while the sensible people have all the cares. How far it is right to attempt the cure of the insane is another question. The German physician referred to considers it an act of unkindness, if not cruelty, to restore the happy lunatics in asylums again to this world of troublesome realities, while we consider the cure of the lunatics out of the asylums an impossibility. Already Solomon had found this out when he said: "Though thou shouldst bray a fool in a mortar among wheat with a pestle, yet will not his foolishness depart from him."

NEW APPLIANCE FOR HARBOR FIRES.

The recent total loss of the steamer City of New York by fire in this harbor, as well as the extensive destruction of property at Hunter's Point caused by the going to pieces of the burning bark Nictaux, suggest the urgency of new appliances for our harbor fire service, which, had they been in use, would have greatly limited the damage.

If the fire boat Havemeyer had been provided with a ram, so as to be able to scuttle the burning ships as soon as it became evident that the engines were unable to subdue the fire, the ships as well as the cargoes would have been saved with comparatively little loss.

To furnish the Havemeyer with an orthodox ram now would scarcely be advisable, as she has not been built for that purpose, and therefore would have to undergo alterations which would necessitate her withdrawal from service for a considerable time. There is, however, a simple way of fitting her with a ramming apparatus without altering her at all. A long, heavy floating spar, lashed to her side, and protruding from twenty to thirty feet from her bow, might be carried on board, to be used when called for. Experiments alone can decide whether she will be able to bear the strain of the collision when this spar is fastened by strong ropes, which will not part by the contact, or whether the ropes ought to be so thin as to part by the shock. Perhaps it might be found most practicable to cut the lashings a second or two before the collision takes place, and leave it to the impetus of the spar alone to break the burning vessel's side, and enable the Havemeyer to steer clear of the wreck.

The shortest way to scuttle a ship, however, would be the application of *small torpedoes* loaded with some high explosive, for instance dynamite. The torpedoes could be constructed just powerful enough to knock a hole of certain dimensions in a ship's bottom, and might be applied either by a spar from the Havemeyer direct, or, when practicable, they could be fastened to the burning vessel by competent men in a rowboat, and then be exploded by electricity from a safe distance. In cases where the vessel's cargo consists of naphtha or other highly inflammable substances, the spar ram would have to be resorted to.

We have no doubt that General Abbot, commanding the United States Engineer Battalion at Willetts' Point, would be willing to instruct our fire commissioners about the proper charge of dynamite required for the operation, and the authorities of the Brooklyn Navy Yard would be able to give every facility and the best advice for rigging the necessary torpedo spar on board the Havemeyer.

RAIN THEORIES.

Some years ago, at the occasion of a long continued drought, several individuals published suggestions in the papers for means to produce rain. One which was brought prominently forward was that some big fire should be made. According to the theory suggested, the ascending hot air currents, aided by the water formed by the combustion of the hydrogen present in most all ordinary fuel, a copious rain would surely result. As an argument it was brought forward that rain storms have often succeeded large battles, when a great deal of gunpowder was burned. Unfortunately for this theory the amount of hydrogen present in the charcoal of gunpowder is so insignificant as practically to amount to nothing, while the chief products of its combustion are carbonic and sulphurous acids, with free nitrogen and some sulphide of potassium. Statistics also do not sustain the assertion that rains always follow great battles, as there are scores of instances that this was by no means the case. Unfortunately for the theory of the party who suggested the starting of fires for the promotion of rain, shortly afterward the woods took fire in several parts of the Northwest, and even also in New York State, as is frequently the case after long continued drought, but not the least impression was made, and rain did not fall for a long time afterward.

Mr. Bell's suggestion that a single timely rain would pay the cost of one of his rain-towers, described on page 113 of the SCIENTIFIC AMERICAN, may be very true, and that a nation who could control the rain would "prove her wealth and grandeur," but the questions are: Would such a tower have any influence on the rain at all? Are there not local and temporary circumstances which produce ascending and descending air currents much more powerful and extensive than can be produced by any number of such towers? What will the moisture amount to which can be conveyed by an ascending column of air of twenty feet diameter? How will we saturate this ascending air with moisture, or subtract the moisture from the descending clouds so as to diminish their enormous bulk before bottling them up? A mere superficial consideration of these and similar questions shows already the absurdity of the idea, and we would not think it worth while to answer them if the answers did not enable us to incorporate some useful practical ideas.

These questions are answered by the solution of the simple problem in physics, How much moisture such a tower can throw in the atmosphere? and this is easily found. Let us suppose that the inventor is able to saturate this air with moisture, which he cannot do, but for the sake of argument we will suppose the circumstances as favorable as possible, and grant that he succeeds to do this. Let this air have the medium temperature of 60°, then, as it has been demonstrated that such air when saturated can contain not more than seven grains of water per cubic foot, every cubic foot of air thrown upward through the tower will bring so much watery vapor in the atmosphere. As the interior shaft is 20 feet diameter, or nearly 300 square feet surface, and we suppose that he succeeds in moving this air upward at the rate of 15,000 feet per hour, he well get 15,000 × 300, or 4,500,000 cubic feet of air, which for 7 grains per cubic foot gives 7 × 4,500,000 = 31,500,000 grains, or nearly 4,100 pounds of watery vapor per hour. An ordinary locomotive evaporates more than twice this amount, and being high pressure without condensation, throws it all in the atmosphere, so that every working locomotive is, in regard to the cloud-making watery vapor it evolves, equivalent to two of Mr. Bell's rain towers, if not three, as an ordinary locomotive evaporates as much as 12,000 pounds of water per hour, consuming to do this 2,000 pounds of coal, producing from 6,000 to 7,000 pounds of carbonic acid gas and a variable amount of water, from the variable amount of hydrogen in the fuel.

Let us now consider that several hundred locomotives are at present daily running over the plains of Colorado, Utah, and adjacent almost rainless districts, where the air is exceedingly dry, where in many regions there are no lakes or rivers within more than a hundred miles distance, and where most of the rivers always dry up in summer, and are in any case insignificantly small, so small indeed that there exists no navigation even for a row boat. We meet people born there who had never seen even a small sailing vessel or steamboat. Consequently there is no evaporation, and all the moisture in the air and the clouds, seldom seen, must be wafted there by the winds from more favored regions. If, now, in such a region some hundreds of locomotives blow watery vapor in the dry atmosphere at the rate of 12,000 pounds per hour each, which as every pound of steam occupies a place of 25 cubic feet, every locomotive throws 300,000 cubic feet of steam per hour in the atmosphere, which for 100 locomotives, working 7 hours per day, is 100 × 7 × 300,000, or 210,000,000 cubic feet of steam, which mingled with ten times its amount of air may make a respectable little cloud.

This estimate will explain why the climate has changed in many regions of the West, and rains have become more frequent where formerly they were too scarce, and all this since railroads have been built and railroad trains travel daily through the formerly rainless districts.

Natural Silver Plating.

A curious instance of natural silver-plating is reported from the Lord of Lorne Mine, of the American Flat section, Nevada. The sides next to the veins and the hanging walls of the ledge are covered with a thin coating of natural plating of pure silver as smooth as glass. The vein itself is narrow, and is being prospected by means of a tunnel. The superintendent says this peculiar feature of the inclosing walls is observable so far as the tunnel has followed the ledge. The ore of the vein itself is of a soft, easily-worked nature, showing considerable chloride as well as sulphurets, yet not giving very high assays. The filmy deposit of silver on the walls was evidently condensed and forcibly deposited there under immense pressure, as it has a smooth, burnished appearance.

Cotton Factories at Petersburg, Virginia.

The following interesting particulars are given with regard to the cotton industry of Petersburg, Va.: The Ettrick Manufacturing Company have 6,060 spindles and 250 looms, and give employment to 215 operatives. The annual consumption of cotton is 3,000 bales, with a yearly manufacture of 2,900,000 yards of cloth. The Matoacoa Manufacturing Company have 9,600 spindles and 260 looms, and give employment to 225 operatives. The consumption of cotton yearly is 2,500 bales, and they turned out last year 3,605,000 yards of cloth. The Battersea Manufacturing Company has 3,600 spindles and 100 looms, and employs 90 operatives. The annual consumption of cotton is 1,500 bales, and the yearly manufacture of cloth 1,300,000 yards. The Petersburg cotton mill has 3,288 spindles, 110 looms, and turns out daily nearly 5,500 yards of goods, such as fine sheetings, shirtings, and drillings. It consumes annually 1,000 bales of raw cotton. The Blandford factory, owned by the same company, located in Blandford, is run by steam, and turns out about 3,000 yards of cloth daily. The Mechanics' cotton factory has 3,600 spindles and 100 looms, and consumes a thousand bales annually, and the manufacture of cloth is 5,500 yards per day, or about 1,650,000 pards per annum.