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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 291,

For the Week ending July 30, 1881.

Price 10 cents. For sale by all newsdealers.

DR. GRISCOM'S FAST.

At noon, July 12, Dr. John A. Griscom completed, at Chicago, a self-imposed fast of forty-five days. During the fast he drank 1,433 ounces of water, or about two pounds a day. When he began he was in fine physical condition and weighed 197¼ pounds. At the close of the fast he weighed 147½ pounds; his pulse was 66, respiration 15, temperature 98° Fah. On the first day of his fast his pulse was 84, and his temperature 100°. He suffered but little during the fast, and his strength held out wonderfully. To the last his muscular power exceeded that of most men, and his miud was perfectly clear.

The faster was watched by a number of reputable physicians, and a scientific record of his condition was kept from day to day. The official summary of the record, it is promised, will add materially to the physiology of fasting, while certain of the results are said to be fatal to some of the accepted theories of medical men.

It will be observed that—if the evidence of Dr. Griscom's case holds generally—a man in good physical condition, subsisting upon water and his own store of flesh, consumes about one pound of solid food a day when leading a fairly active life. This closely coincides with the figures given by physiologists. For an average man at ordinary labor, Dr. Letheby estimates, on the experiments and observations of a large number of investigations, a daily requirement of 5·688 grains of carbon and 307 grains of nitrogen, or nearly six-sevenths of a pound; while, for active labor, the carbon and nitrogen required weigh together about one and one-fifth pounds. Dr. Dalton's observations indicate a more liberal diet as necessary for a man in full health taking free exercise, his quantities being equivalent to 16 oz. meat, 19 oz. bread, 3½ oz. butter—or nearly 2½ pounds of mixed food, and about three pints of water.

It would seem from these figures that the absorption of food from one's own bodily store of flesh costs considerably less energy than the digestion and assimilation of food in the usual way. In any case, a man in good health, with fifty pounds of surplus flesh, can safely reckon on nearly as many days of life, in case of enforced abstinence, or for voluntary abstinence, as for the cure of disease.

The purpose of Dr. Griscom's fast, he says, was to impress people with the utility of fasting and the possibility of long-continued fasting without severe pain. He believes that much of the sickness and physical distress men suffer from may be attributed to the overcrowding of the system with food and food products, and that very many maladies may be cured simply by abstaining from food for a longer or shorter period. The daily observations upon the blood of Dr. Griscom are said to prove the important fact that the relative number of blood corpuscles is not materially diminished by fasting; and there is reason to expect that, when the details of the physicians' observations are digested and published, the sanitary value of fasting—and of eating less, habitually—will be scientifically established. As a remedy for obesity, fasting—partial or complete—would seem to be both safe and efficient; but it must be persisted in for longer periods than have heretofore been thought prudent. Curiously, the distress of hunger seems to vanish after a few days' abstinence.

AN ANCIENT AQUEDUCT REOPENED.

After a breach of 1,600 years the aqueduct built by the Emperor Augustus to supply Bologna with water was restored to use June 5. Nineteen hundred years ago the imperial engineers tapped the Setta near its junction with the Reno, about eleven miles from Bologna, and brought its water to the city through an underground passage. They followed the course of the Reno, tunneling the hills, sinking their work beneath the beds of the precipitous torrents which rush from the mountains into the river, and bringing the waters to the gates of the city, where they were divided, one portion going to supply the public baths, and the other probably destined for the fountains of streets and public squares.

The work of tunneling and the masonry were so thoroughly well done that both stonework and brickwork are still as solid as the rock itself, the only considerable breaks being where the turbulent Reno had washed away with its clayey banks several portions of the aqueduct, or where the headlong torrents which rush down into its stream had excavated their own beds and carried away the artificial substructure.

The restoration of this important work is due chiefly to Count Gozzadini, who caused an accurate survey of the aqueduct to be made about twenty years ago, and in 1864 published the results of the investigation in an elaborate memoir. Since then the work of restoration has been going on with a thoroughness and skill calculated to make the new work as enduring as the old. The aqueduct was originally made of brick and stone cemented with lime and volcanic sand, and the unbroken portions remained as hard as granite.

INCONVENIENCES OF ELECTRIC STREET RAILWAYS.

The hope that electricity might prove an acceptable substitute for horse power in operating street railways meets with an unexpected rebuff in the working of the electric railway at Berlin. The electricity, it will be remembered, is conveyed to the carriages by one rail and returns by the other rail. The current being of low tension the electricity does not leave the track except when connection is made between the two rails. Accordingly, either rail may be safely touched, stepped on, or walked on by men or animals. But when both rails are touched at the same time, as easily happens when a horse crosses the track, an unpleasant if not dangerous shock is received. Where the Berlin road crosses wagon roads at grade it has been necessary to make a special arrangement to avoid this difficulty by putting one rail out of circuit and connecting the adjoining rails electrically by means of a covered conductor. For elevated or for depressed roads this objection does not hold; and the electric railway promises to fill a wide field of usefulness in such connections.

THE GAFFNEY BOILER EXPLOSION.

This accident, which took place June 1, was very fully illustrated and described in the SCIENTIFIC AMERICAN, July 2. On that occasion we commented upon the erroneous nature of the verdict rendered by the coroner's jury, which reads as follows:

"The inquest appointed to inquire as to the causes of the deaths of F. C. Harbeson, Frederick Dusher, and Robert Bradley, on June 1, 1881, find that they came to their deaths by an explosion of a boiler at the dye works of Gaffney & Co., situated on Collins street, opposite Tucker street, and that the explosion was due to the improper use of cast iron in the flat head of the boiler. We also find that no skilled attendant was employed to care for the boilers, and that the attendant performed other duties that withdrew him at times from the care of the boilers. The inquest consider that the Hartford Boiler Inspection and Insurance Company are especially censurable for the incompetence and negligence of its agents who inspected and certified to the safety of this boiler, and they urgently recommend that the proper authorities take measures to prevent the recurrence of disaster so terrible in its results."

In the course of our remarks we called attention to the fact that the steam-stop-valves were found, after the explosion, to have been shut; and we suggested that this closure of valves and the probable inoperation of the safety valves produced an over-pressure of steam—it being the dinner hour—which resulted in the bursting of the boiler.

It will be noticed that the jury find that no skilled or licensed attendant was employed to care for the boilers; and that the inexperienced person who fired them had other work to perform that took him away from the boilers at times. The jury do not condemn this method of running boilers, nor do they find any fault with the proprietors for employing unskilled persons. Most engineers, we think, would say that the strongest boiler in the world might burst when run in the careless manner certified to by this jury.

We also blamed the jury for neglecting their plain duty in not subjecting the two remaining boilers, which were uninjured, to proper tests as to strength.

One of these jurymen, Mr. Nystrom, who assumes to be an engineer, sends us a communication, which we publish elsewhere, in which he throws new light upon the reasons why the jury brought in this verdict. He says "the boiler head evidently burst by shrinkage or expansion strain in the casting." The other members of the jury appear to have accepted this as correct, but it looks to us as erroneous. They appear to have had no data, and made no experiments to determine the value of this opinion.

From Mr. Nystrom's letter it would also seem that both himself and the others of the jury were fully satisfied without making the trials just what the results of such tests would be; and, consequently, did not go to the trouble of making them. Mr. Nystrom says: "Such an experiment would have been of no practical use, for the jury would probably have found that the shell of the boiler bursted without injuring the head."

Those who read the interesting report given in another column, of a recent test, such as we suggested, will see how little reliance can be placed upon the books or the opinions of an engineer like Mr. Nystrom, who had the easy faculty of appealing to his own imagination for information rather than to the practical teachings of actual experiment.

Mr. Nystrom states that the Hartford Boiler Insurance Company has ordered its inspectors in Philadelphia not to insure flat cast iron headed boilers over thirty inches in diameter. If this is so, we shall have less respect for the judgment of the managers of that company than heretofore. There are so many boilers now running having flat cast heads, they work so safely and so well, that it seems absurd for anybody to undertake any crusade of alarm against them. We have no expectation that boiler-owners will be affected by any such proceedings. The true position is that expressed by the City Solicitor of Philadelphia, who advised the City Inspector, when, in his judgment, a boiler is safe, to approve it and give a certificate, without regard to the mode of construction.

Messrs. Sidebotham & Powell are certainly entitled to great credit for the open and impartial manner in which their recent test was conducted. It is but an example of the pains they take to ascertain the value and strength of the materials they use; and it will add to the high reputation they have long enjoyed for superior excellence in boiler work of all kinds.

Harris' Mechanical Movement.

This ingenious piece of mechanism, described in our last week's issue, was recently patented by Mr. Joseph Harris, Jr., of Harrison Square, Boston, Mass. By some mistake we omitted the inventor's address in the article referred to.