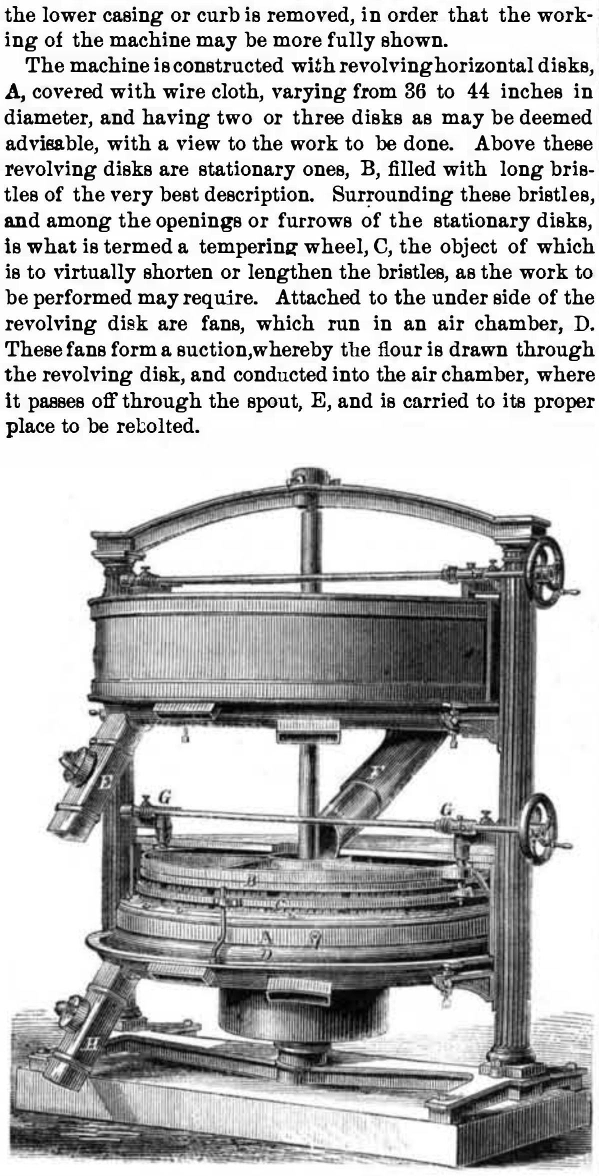
CLARK & ELTING'S "EXCELSIOR" BOLT AND DUSTER.

This machine, of which the engraving is a representation, is designed by the inventors to supply a want long felt by the milling fraternity, viz., a machine which will extract the flour from middlings as well as bran, and at the same time allow the flour so extracted, or at least a large portion of it, to pass into the best grade of flour; in other words, a machine, which will increase the yield without injuring in the least the quality.

That the Clark & Elting machine accomplishes this result, the testimony of such mills as the celebrated "Passaic," of Newark, N. J., the "Pearl," of Pittsburgh, the "Star and Crescent," of Chicago, the "Plants," of St. Louis, the "Boston City," of Boston, and many others of equal reputation, bear ample witness. In the accompanying engraving half of the lower casing or curb is removed, in order that the working of the machine may be more fully shown.

The machine is constructed with revolving horizontal disks, A, covered with wire cloth, varying from 36 to 44 inches in diameter, and having two or three disks as may be deemed advisable, with a view to the work to be done. Above these revolving disks are stationary ones, B, filled with long bristles of the very best description. Surrounding these bristles, and among the openings or furrows of the stationary disks, is what is termed a tempering wheel, C, the object of which is to virtually shorten or lengthen the bristles, as the work to be performed may require. Attached to the under side of the revolving disk are fans, which run in an air chamber, D. These fans form a suction, whereby the flour is drawn through the revolving disk, and conducted into the air chamber, where it passes off through the spout, E, and is carried to its proper place to be rebolted.



The brace and middlings pass off between the disks, by centrifugal force at the periphery, and so are reconducted by the spout, F, to the eye of the lower disk, that the same operation may be repeated. The disks are arranged in such a manner that by means of worms and screws, G, they may be adjusted at will while the machine is in motion. Thus the machine is under the control of the miller to just the same extent as the millstone.

The meal is taken from the return reel at the point where it begins to show specks (the main object being not to return any specks to the superfine reel), and is carried into the eye of the first disk, which is so set as to clean the stuff all it will bear, to run into the best flour.

The tailings of this disk are then returned to the next disk, by the spout, F, and the same operation repeated, and so on to the third disk, if a three-disk machine is used, and the tailings from the last disk are carried to a separating reel, by the spout, H, where the division of middlings, shorts, and bran, is made. By this operation, it will be discovered, that not only the quantity of the best flour will be increased, the color improved, greater clearness obtained, but that the amount of middlings to be reground will be materially lessened.

The middlings to be reground will be sharper, rounder, and cleaner, than it is possible to make them with bolting cloth. And it will be discovered that the same number of bolting reels will do more work than by the previous method; since the removal at once of the middlings frees the cloth, and prevents the particles which before were being worked over and over, from being returned to accumulate.

The machine was patented through the Scientific American Patent Agency, February 12, 1861, and is now in successful operation in over three hundred of the principal flour mills of the country. It was brought to its present perfected condition by the Elting Bolt & Duster Company, of Cincinnati, the sole manufacturers of the machines and owners of the patent, to whom all communications should be addressed.

A CORRESPONDENT recently returned from the East says:—"In Turkey, in Asia, the only mode of measuring distances is by the walking gait of a horse, and the traveler is told, when he inquires the distance to a given village or city, that it is so many caravan *days* or *hours*, which of course is not uniformly the same. This to a stranger is a great annoyance."

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HEAT AND COLD.

BY JOHN TYNDALL, ESQ., LL. D., F.R.S.

Lecture IV.

In our last lecture I intended, if time permitted, to explain the action of the geyser of Iceland, but at the end of the lecture I found that the time was insufficient for the purpose; and I promised then to explain this wonderful spring in the lecture of to-day; but when I came to look at the other matter before me, I found that it was so abundant that I really could not get the subject of the geyser into it.

"The surface of Iceland slopes gradually from the coast toward the center, where the general level is about 2,000 feet above the surface of the sea. On this, as a pedestal, are planted the Jökull, or icy mountains of the region, which extend both ways in a northeasterly direction. Along this chain the active volcanoes of the island are encountered, and in the same general direction the thermal springs occur, thus suggesting a common origin for them and the volcanoes. From the ridges and chasms which diverge from the mountains, mighty masses of steam are observed to issue at intervals, and where the escape takes place at the mouth of a cavern, and the resonance of the cave lends its aid, the sound of the steam is like that of thunder. Lower down in the more porous strata, we have smoking mud pools, where a repulsive, blue-black, aluminous paste is boiled, rising at times into huge bladders, which on bursting scatter their slimy spray to a hight of fifteen or twenty feet. From the base of the hills upward extend the glaciers, and on their shoulders are placed the immense snow fields which crown the summits. From the arches and fissures of the glaciers, vast masses of water issue, falling at times in cascades over walls of ice, and spreading for miles and miles over the country before they find definite outlet. Extensive morasses are thus formed, which add to the monotony of the dismal landscape. Intercepted by the cracks and fissures of the land, a portion of these waters is conducted to the hot rocks underneath; here meeting with the volcanic gases which traverse these underground regions, both travel together, to issue at the first convenient opportunity, either as an eruption of steam or as a boiling spring.

"In the Great Geyser, we have a tube ten feet wide and seventy feet deep; it expands at its summit into a basin, which from north to south measures fifty-two feet across, and in the perpendicular direction sixty feet. The interior of the tube and basin is coated with a beautiful smooth plaster, so hard as to resist the blows of a hammer. The first question that presents itself is, how was this wonderful tube constructed? How was this perfect plaster laid on? A glance at the constitution of the Geyser water will, perhaps, furnish the first surmise. In 1,000 parts of the water the following constituents are found:

Silica	0·5097
Carbonate of Soda	0·1939
Carbonate of Ammonia	0·0083
Sulphate of Soda	0·1070
Sulphate of Potash	0·0475
Sulphate of Magnesia	0·0042
Chloride of Sodium	0·2521
Sulphide of Sodium	0·0088
Carbonic Acid	0·0557

"The lining of the tube is silica, evidently derived from the water; and hence the conjecture may arise that the water deposited the substance against the sides of the tube and basin. But the water deposits no sediment, even when cooled down to the freezing point. It may be bottled up and kept for years as clear as crystal, and without the slightest precipitate. A specimen brought from Iceland and analyzed in this institution, was found perfectly free from sediment. Further, an attempt to answer the question in this way would imply that we took it for granted that the shaft was made by some foreign agency, and that the spring merely lined it. A painting of the Geyser, the property of Sir Henry Holland, himself an eye witness of these wonderful phenomena, was exhibited. The painting, from a sketch taken on the spot, might be relied on. We find here that the basin rests upon the summit of a mound; this mound is about forty feet in hight, and a glance at it is sufficient to show that it has been deposited by the Geyser. But in building the mound, *the spring must also have formed the tube which perforates the mound;* and thus we learn that the Geyser is the architect of its own tube. If we place a quantity of the Geyser water in an evaporating basin, the following takes place: in the center the fluid deposits nothing, but at the edges where it is drawn up the sides of the basin by capillary attraction, and thus subjected to a quick evaporation, we find silica deposited; round the edge we find a ring of silica thus laid on, and not until the evaporation has continued for a considerable time, do we find the slightest turbidity in the central portions of the water. This experiment is the microscopic representant, if the term be permitted, of nature's operations in Iceland. Imagine the case of a simple thermal spring, whose waters trickle over its side down a gentle incline; the water thus exposed evaporates speedily, and silica is deposited. This deposit gradually elevates the side over which the water passes, until finally the stream has to choose another course; here the ground becomes elevated by the deposit, as before, and the stream has to move forward; thus it is compelled to move round and round, discharging its silica and deepening the shaft in which it dwells, until finally, in the course of centuries, the simple spring has produced that wonderful apparatus which has so long puzzled and astonished both the traveler and philosopher.

"Before an eruption, the water fills both the tube and basin, detonations are heard at intervals, and after the detonation a violent ebullition in the basin is observed; the column of water in the pipe appears to be lifted up, thus forming an eminence in the center of the basin, causing the water to flow over its rim. The detonations are evidently due to the production of steam in the subterranean depth, which, rising into the cooler water of the tube, becomes suddenly condensed and produces explosions. Between the interval of two eruptions, the temperature of the water in the tube gradually increases, but even immediately before an eruption, at no part of the tube is the water at its boiling temperature. How then is an eruption possible? Bunsen succeeded in determining the temperature of the water a few minutes before a great eruption, and his observations furnish the key of the entire enigma. A little below the center he found the water within two degrees of its boiling point, that is, within two degrees of the point at which water boils under the pressure of the atmosphere, *plus the pressure of the superincumbent column of water.* The actual temperature at thirty feet above the bottom of the Geyser, was 122° Centigrade, its boiling point 124°. We have just alluded to the detonations and the lifting of the Geyser column by the entrance of steam from beneath. These detonations and the accompanying elevation of the column are, as before stated, heard and observed at various intervals before an eruption. Imagine, then, the section of water at thirty feet above the bottom to be raised six feet by the entrance of a mass of vapor below. The liquid spreads out in the basin, overflows its rim, and thus the elevated section has six feet less of water pressure upon it; its boiling point under this diminished pressure is 121°; hence, in its new position, its actual temperature (122°) is a degree above the boiling point. This excess is at once applied to the generation of steam; the column is lifted higher, and its pressure further lessened; more steam is developed underneath; and thus, after a few convulsive efforts, the upper part of the column of water, through the sudden boiling up from the middle downward, is ejected with immense velocity, and we have the Geyser eruption in all its grandeur. By its contact with the atmosphere the water is cooled, falls back into the basin, sinks into the tube through which it gradually rises again, and finally fills the basin. The detonations are heard at intervals, and ebullitions observed; but not until the temperature of the water in the tube has once more *nearly* attained its boiling point is the lifting of the column able to produce an eruption.

"In the regularly formed tube the water no where quite attains the boiling point. In the canals which feed the tube, the steam which causes the detonation and lifting of the column must therefore be formed. These canals are in fact nothing more than the irregular continuation of the tube itself. The tube is therefore the sole and sufficient cause of the eruptions. Its sufficiency was experimentally shown during the lecture. A tube of galvanized iron six feet long was surrounded by a basin; a fire was placed underneath and one near its center to imitate the lateral heating of the Geyser tube. At intervals of five or six minutes throughout the lecture eruptions took place; the water was discharged into the atmosphere, fell back into the basin, filled the tube, became heated again, and was discharged as before.

"Sir George Mackenzie, it is well know, was the first to introduce the idea of a subterranean cavern to account for the phenomena of the Geyser. His hypothesis met with general acceptance, and was even adopted undoubtingly by some of those who accompanied Bunsen to Iceland. It is unnecessary to introduce the solid objections which might be urged against this hypothesis, for the tube being proved sufficient, the hypothetical cavern disappears with the necessity which gave it birth.

"A moment's reflection will suggest to us that there must be a limit to the operations of the Geyser. When the tube has reached such an altitude that the water in the depths below, owing to the increased pressure, cannot attain its boiling point, the eruptions of necessity cease. The spring, however, continues to deposit its silica, and forms a *laug* or cistern. Some of these in Iceland are of a depth of thirty or forty feet. Their beauty is indescribable; over the surface a light vapor curls, in the depths the water is of the purest azure, and tints with its own hue the fantastic incrustations on the cistern walls; while at the bottom is observed the mouth of the once mighty Geyser. There are in Iceland traces of vast but now extinct Geyser operations. Mounds are observed whose shafts are filled with rubbish, the water having forced a way underneath and retired to other scenes of action. We have, in fact, the Geyser in its youth, manhood, and old age, and death, here presented to us: in its youth, as a simple thermal spring; in its manhood, as the eruptive spring; in its old age, as the tranquil *laug;* while its death is recorded by the ruined shaft and mound, which testify the fact of its once active existence.

"Next to the Great Geyser, the Strokkur is the most famous eruptive spring of Iceland. The depth of its tube is forty-four feet. It is not, however, cylindrical, like that of the Geyser, but funnel-shaped. At the mouth it is eight feet in diameter, but it diminishes gradually, until near the center the diameter is only ten inches. By casting stones and peat into the tube, and thus stopping it, eruptions can be forced, which in point of hight often exceed those of the Great Geyser. Its action was illustrated experimentally in the lecture, by stopping the galvanized iron tube before alluded to loosely with a cork. After some time the cork was forced up, and the pent-up heat converting itself suddenly into steam, the water was ejected to a considerable hight; thus demonstrating that in this case the tube alone is the sufficient cause of the phenomenon."

Thoughout the lectures that have been hitherto given I have had occasion to admire the attention and patience of my younger hearers. My hearers are of different ages, but al-