Germ-ane.

The *Phrenological Journal* has coined the above word to meet recent microscopical discoveries, and proceeds to describe some of them as follows: We are living in an ocean of infectious germs. So the microscopists tell us. With the recent improvement in lenses and methods of examination, a world of minute life has been revealed that should be most startling to every one who reads about the spores, bacteria, bacilli, micrococci, etc., etc., that render whatever we eat or drink tremulous with parasitic life. The atmosphere teems with an infinite detail of germs, each one ready to pounce upon our soft tissues for a contribution to its greedy maw.

Every breath takes in a countless host of these creatures to riot on our delicate "innards." What fastidious appetites the brutes must have! for some show a special preference for dainty protoplasmic bits of liver, or kidney, or heart; while others make imperative demands upon the choicest of our neurilemma, or are found at table in the most retired chambers of the brain. What are we to do about it? Must all our fair dreams of development, progress, civilization, be regarded as arrant delusions; and must all our hopes of health and longevity go down before the advancing hosts of invisible imps that Koch and Pasteur, Crudelli, and Schmidt and Grassi tell us are only the vanguard of zymosis and contagion?

One tells us that we must beware of flies; even that familiar little impertinent that has buzzed in our homes for centuries, has made himself welcome to everything nice on our dining table, is teeming with creatures whose names are witnesses to their terrible characters—as the *tricocephalus dispar, oxyuris vermicularis, tænia solium, oidium lactis*, and so on. Even our books and newspapers, freshly drawn from the vender's shelves, and apparently pure and bright, are loaded with infectious little scamps. A German, who squints through high angled objectives. points a new moral to the old apostolic warning of evil in many, by assuring us that the loose change we may jingle in our pockets is coated with animal life, very dangerous to health; and then, O oyster and clam eater! know that in the tissues of your favorite bivalve lurk those relentless foes of family peace, scarlatina, diphtheria, and other frightful things whose habitat is the human fauces!

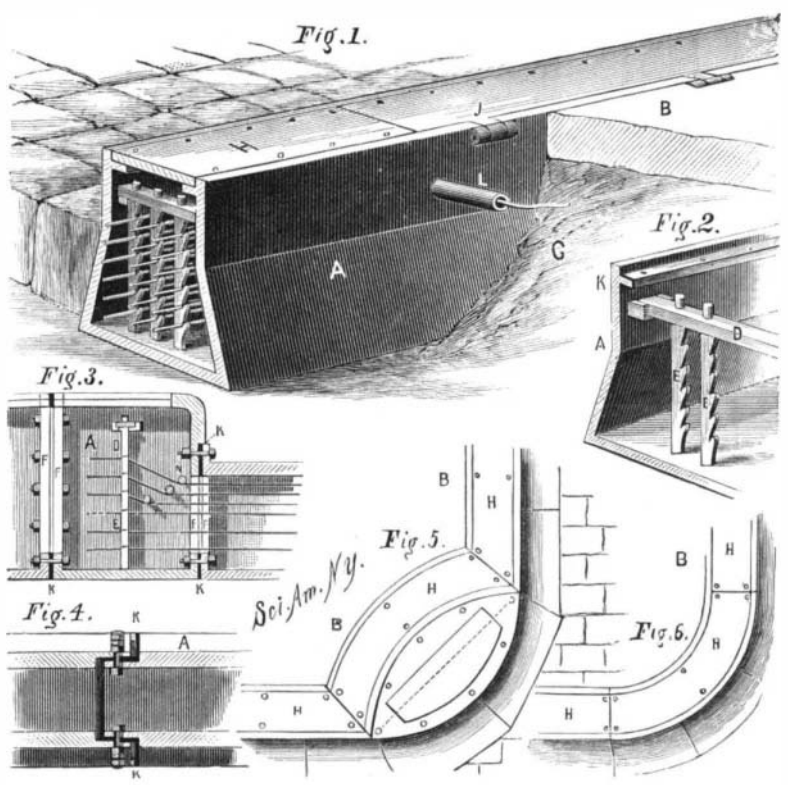
We tremble as we contemplate the situation. What are we going to do about it? Oh, let the manufactures of disinfectants be multiplied; let the disease-breeding atmosphere be made redolent with sulphur fumes, carbolic acid, chloride of lead, zinc, copperas! and let everything that is germicidal be thickly spread over our food and drink! Hurry, hurry, hurry, ye chemists, with your potent mixtures, and relieve us from being the unwilling habitations of lively bacteria and bacilli, of tænia and ascaride, who are sworn against our mortal comfort and physical integrity.

COMBINED CURBSTONE AND TELEGRAPH WIRE CONDUIT.

In the accompanying engraving, Fig. 1 is a perspective view of the combined curbstone and conduit, showing the wires in position; in the second figure the wires and cover are removed; Fig. 3 is a vertical section taken at a street corner; and Figs. 5 and 6 are plan views at street corners, the former being an inlet corner and the latter the usual rounded corner; Fig. 4 is a horizontal section illustrating the method of securing together the conduit sections in order to permit expansion and contraction. The hollow curb conduit sections, A, made of cast iron or other suitable material, are formed with vertical sides above the street pavement to form the curb, and those portions sunk in the ground have outwardly flaring sides to insure against displacement and provide ample space. The cover, J, is about flush with the sidewalk. Between the cover and the top of the ledges is placed a water tight packing. The wires are supported by a series of vertical racks, E, located at suitable intervals apart. The lower ends of the racks enter sockets in the bottom of the conduit, while their upper ends pass through holes in cross stays, D, whose extremities rest in brackets in the sides. The ends of the conduit sections are flanged and bolted together. packing being inserted between them.

When it it necessary to provide for longitudinal expansion and contraction of the several sections, they are made with overlapping ends, and are secured by bolts passing through slots in one of the flanges. Packing is placed between the joints. The wires are inserted from the open top of the conduit, and rest in the teeth of the racks; after they are in position the cover is bolted down. When it is desired to conduct one or more wires into a building small lateral pipes, L, are connected to the side of the conduit. With this construction the wires are always easily accessible, and the tearing up of the pavement in order to reach particular points is obviated. The two plan views show clearly the methods of rounding corners. When the conduit crosses the street where the curb ends, those wires which are above the line of the depressed part are directed downward (Fig. 3), and kept in place by means of transverse studs, *n*.

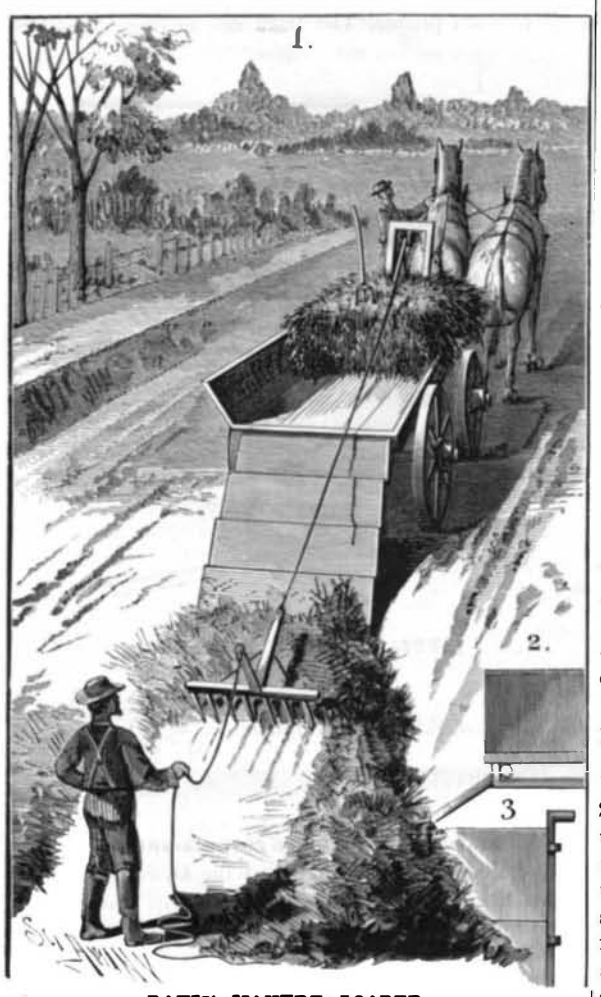
This invention has been patented by Mr. James S. Woodward, of 132 Chestnut Street, Philadelphia, Pa.



WOODWARD'S COMBINED CURBSTONE AND TELEGRAPH WIRE CONDUIT.

MANURE LOADER.

At the tail end of the wagon box is arranged an inclined apron, upon which the manure is hauled up into the box by a rake, to which is connected a rope extending over a guide pulley suspended over the front end of the box by an upright frame. Upon the other end of the rope are whiffletrees for hitching on a team. The rake is pulled back by means of a cord fastened to the head of the rake. The apron is so



DAVIS' MANURE LOADER.

arranged as to slide under the bottom of the wagon on guides, but it may be made detachable. The apron is preferably formed of sheet metal or other plates having hooks attached at the upper corners, which slide upon side bars having outwardly bent ends (Figs. 2 and 3). The upper ends of the plates are turned down and their lower ends turned up. The ends of the side rods slide on the guides beneath the wagon, while the plates slide under each other. By this plan a simple and efficient contrivance is obtained for loading manure into the wagon, and by its use manual labor is greatly economized. This invention has been patented by Mr. Henry C. Davis, of Willow Grove, Pa.

The Brazilian War Steamer Riachuelo.

An inspection has just taken place, says the London *Times*, of what has been publicly pronounced on high authority to be one of the most valuable additions to the armor-clad vessels of the world that can be imagined. This is the Riachuelo, Brazilian armor-clad turret ship, which may be taken as being the most perfect fighting ship afloat. The Riachuelo is a twin-screw ship of 6,000 tons displacement and 6,000 horse power, and she possesses in speed, coal endurance (or the capability of steaming without recoaling), and the arrangement and range of fire of her guns special advantages which we believe have not been previously attained in combination in any other ship. She is 305 feet long, 52 feet extreme beam on water line, and 30 feet extreme depth, her displacement tonnage being 5,700 tons at load line. Her draught of water at load line with 400 tons of coal in her bunkers is 19 feet 6 inches. Her estimated speed with 872 tons of dead weight on board is 15 knots an hour, but on her official trials she attained a speed of 16¼ knots with a natural draught, and 16⅜ knots with a forced draught. She is protected by armor 11 inches and 10 inches thick respectively, and her armament consists of four 9 inch 20 ton breechloading rifled guns in two revolving turrets. and six 6 inch breechloaders, besides fifteen Nordenfelt machine guns. She also carries Whitehead torpedoes.

Looking a little into the details of her construction, we may observe that her hull is built entirely of Siemens-Martin steel, and that her armor is compound or steel-faced, and consists of a belt 250 feet long and 11 inches thick amidships, where it protects engines, boilers, and magazines. It is then reduced to 10 inches thick, while for a depth of 4 feet below water line the armor is partly 10 inches and partly 7 inches thick. Beyond the 250 feet of side armor, at both ends inclined armor 3 inches thick is placed internally at an angle of fifteen degrees, and reaching from the top of the side armor to the stem and stern respectively. This 3 inch armor is so arranged that it measures and equals 10 inches of vertical armor if struck in a horizontal position. The inclined armor is useful for supporting and giving additional strength to the ram forward, while aft it protects the rudder head, tiller, and steering gear. A horizontal deck of 2 inch steel armor runs through the ship and joins the inclined armor at each end. On this are two oval breastworks built up of plates and angles, and protected by 10 inch armor plates and teak backing.

Within the breastworks are two revolving turrets similarly built up and protected, and in each of these are two of the 20 ton guns. A very important feature in connection with these breastworks is that they are *en echelon*, and are so carried out as to enable the guns in each turret to command an unbroken fire for 180 degrees on their own side of the vessel, and 50 degrees on the opposite side. Thus the whole four guns can be brought to bear ahead or astern, while an all-around fire can be always maintained with two guns, and all four of them can be used for broadside firing on either side of the ship. The guns are loaded by hydraulic machinery, and the turrets are revolved by similar means. The six 70 pounder guns are placed on the upper deck, while of the fifteen Nordenfelt machine guns, five are for use in the mast tops, and the remainder are placed on pedestals so as to keep off torpedo boats. The torpedo guns are arranged to fir from 5 ports, 4 broadside and 1 right aft.

The engines of the Riachuelo are of 6,000 horse power indicated, and of the vertical twin screw type. Each set of engines has one high pressure cylinder of 52 inches diameter placed between two low pressure cylinders, each 74 inches diameter, with a 3 foot stroke, and making from 80 to 90 revolutions per minute. Steam is supplied from ten boilers working at 90-pound pressure, and containing a total heating surface of 19,400 square feet. Although designed to give, when working at her full power of 6,000 horses, a speed of 15 knots an hour and to have at that speed a coal endurance for five days' working, she developed on her trials a 15 knot speed with only 4,500 horse power. Hence at that speed she can run a distance of 4,500 miles without recoaling. In other words, the coal supply of 800 tons is sufficient for 12 days' steaming at 15 knots an hour.

Diagrams of this ship and other particulars will be found in SCIENTIFIC AMERICAN SUPPLEMENT, No. 438.

Steel Made and Reworked.

Some tests have been made of steel from the roll and from the hammer as compared with steel that is annealed and turned to size. It appears from these tests that the commercial steel, untouched by annealing heat, or by the turning tool, is better in its resistant qualities than the annealed and turned material. Unannealed steel is tougher—it resists torsion better—than annealed steel. This fact was constant through a large number of tests of the steel made by five of the most prominent and best known manufacturers. Further trials proved the fact that steel as it comes from the hammer is better for certain tools than the same steel annealed, turned, and after worked. A square bar of commercial steel centered and cut to thread made a better tap than the same bar annealed and turned round, and then four-scored and retempered. It is possible that for certain tools—lengthwise tools—as taps and reamers, steel might be forged in bars to size and shape, with advantage, not alone as to saving of lathe work, but as to value of the finished tool. If steel makers can be induced by sufficient orders, it is probable the experiment will be made on a scale large enough to establish the question of its value. The claim of those who have made the tests is that the "skin" of the steel as it comes from under the hammer is stronger than any after coating by the oxidizing of tempering.

Tucker Bronze.

A New Haven correspondent sends us the following very complete answer to a recent inquiry: Tucker bronze is the result of the compound oxidation by heat of cast iron and linseed oil. The cast iron is cleaned, polished if desired, coated thinly with linseed oil or varnish containing linseed oil, and subjected to a heat sufficient to oxidize the iron, say 420°, for a light yellowish color, and higher for darker tints. The color, which is modified by the oil, may be of any desired shade which can be derived from the action of heat on iron. By carrying the heat to 600° and repeating the operation, a quality of black japan is obtained which can be hammered without injuring its polish. Carriage buttons are made in this way.

The finish is very durable and, on work partly polished, beautiful.

It is the common way of finishing all kinds of cast iron house furnishing goods. Tucker, the inventor, obtained a patent in 1863, which has been the subject of much litigation. He committed suicide some time ago by breathing illuminating gas through a rubber tube, attached to a gas burner.

IMPROVED FIRE ESCAPE.

The engraving shows a flexible ladder fire escape, designed mainly for use from the window sills of buildings, which was recently patented by Mr. William Jensen, of Victoria, British Columbia, Canada. A flexible steel wire rope ladder of any required length is made up of three longitudinal strands—the outer ones of which diverge from each other in a downward direction—that are connected by cross strands to form steps. At every eight feet is placed a rigid step, consisting of a steel bar, in order to keep the ladder well spread. This construction combines lightness with strength and makes a fireproof ladder which, when extended from the window sill to the ground, has all the necessary stability without the aid of side braces, the lower, spreading end forming a wide base. By means of long steel pins driven in between the paving stones the lower end of the ladder is fastened to the ground; the inclination of the ladder not only facilitating the ascent of firemen, but also protecting persons ascending or descending from being burned by any flames issuing from the windows of the lower stories of the building. The entire fire escape is galvanized in order to protect it from dampness, and each longitudinal strand is guaranteed to sustain a load of 3,500 pounds.

The opposite end of the ladder is fastened to the barrel of a portable windlass (shown very clearly in the small cut) of a suitable size to sit upon the window sill. The barrel is mounted in a frame consisting of side standards united by stay rods and stiffened by front braces. The frame is formed into long legs which, when the windlass is placed on the sill, enter corresponding cast iron sockets inserted in the sill, thereby firmly holding the windlass in place. The sockets have stoppers to prevent dirt from collecting in them when the fire escape is not in use. The barrel is operated by a handle on one or both ends, and on removing the lower pins the ladder may be easily wound up and the whole apparatus packed away in a box ready for immediate use in case of danger. The box is kept inside the room, and may be of an ornamental or useful character, and may be carried from window to window as required. The weight of windlass and ladder for a five-story building is only from 80 to 85 pounds, the length being about 60 feet. In a trial in San Francisco, the ladder was placed in an upper window of the Appraiser's building, lowered, and the spikes driven in the ground in the space of one minute, ready for people to ascend.

This invention has also been patented in England, where it is meeting with much success. Further information may be obtained by addressing the patentee.

Opening of a New Electric Street Railroad.

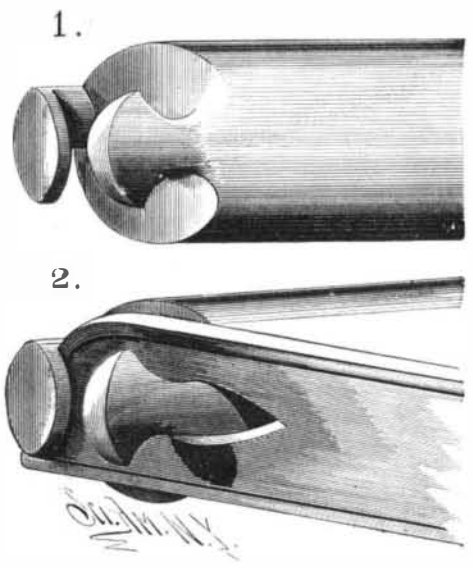
The first electric railroad for public use in America went into operation in Cleveland, O., July 26, in connection with the East Cleveland Street Railroad Company, who have just completed a mile road. The experiment was so successful that the company expect to change their entire system, comprising over twenty miles, into electric roads. The system used was a combination of the Brush and Knight & Bentley systems, and the current was carried on underground conductors, laid in conduits like those of cable roads. The cars were started and stopped and reversed with the greatest ease. Any number of cars up to fifteen can be run at one time on a single circuit and from one machine.

Wide Reach of a Tidal Wave.

A correspondent in the Fiji Islands writes us that a notable tidal wave reached there on October 6 last, the date of the great tidal wave, 25 feet high, and the eruption of Mount St. Augustin, in Alaska. The tidal wave in Alaska occurred at 8:25 A.M., and that at the Fiji Islands, about 4,500 miles to the southwest, at 11:45 A.M. At the latter place there were three successive waves, with intervals of ten minutes, which, at the ordinary period of low water, reached nearly to the high water mark. The occurrence of this disturbance of the sea a few hours later on the same day as the eruption of Mount St. Augustin, and the formation of a new island in its vicinity, suggests that the tidal wave at both places proceeded from the same cause.

TRACE FASTENER.

The ferrule fitting on the end of the single tree is provided on its end with two prongs, the forward one of which is formed with a recess in its top and bottom edges, thereby making a vertical end flange, and the rear prong has a flange parallel with the end of the ferrule and projecting downward and toward the front. In the end of the trace is a longitudinal eye tapered toward the ends, as is also the end of the forward prong. The trace can be easily placed on



LINDSAY'S TRACE FASTENER.

or detached from the ferrule, and since no spring or movable parts are used, the device cannot get out of order.

This invention has been patented by Mr. Ralph E. Lindsay, of Neillsville, Wis.

How Tin Plates are Manufactured.

The following is the process at the Dyffryn Tin Plate Works, Morriston, near Swansea, Wales:

In the first place we have what is termed bar iron, several feet long, about 7 inches wide, and from one-half to five-eighths of an inch in thickness, rolled according to the plates required at so many pounds per foot. It is cut in what may be termed a jack-in-the-box or steam shear, say about nineteen pounds, to a piece which will eventually be rolled into sixteen sheets of 20 inches long by 14 inches wide, 112 of such sheets forming a box, and weighing when tinned nearly one cwt.

This piece of iron is first placed in a reverberatory furnace, heated to redness, put through the chilled rolls, and rolled in what is termed thicks five times; reheated, and rolled in singles twice; doubled, reheated, and rolled three times, doubled, reheated, and rolled twice; doubled, reheated, and rolled in eighths twice, until they are stretched out to the required length and thickness. The length of the bar exceeds by about one inch the width of the sheet to be made, so as to allow for the shearing process, and the bar is therefore rolled with its axis parallel to that of the rolls. Great attention is necessary in the construction and management of the mill furnaces, so that the heating of the bar and sheet for rolling may be effected with the utmost regularity, and without the formation of scale on the surface of the bars or sheets; for when scaling takes place from the draught in the furnace being too keen or the heat raised too high, the quality of the iron is injured; the scale, if subsequently rolled into the iron, leaves a rough surface on the plates in the after process of separating and pickling. The plates are then sheared, and the rough edges taken off. The iron of nineteen pounds or thereabouts makes sixteen sheets, which, being cut in halves, leaves eight sheets in a piece closely wedged. Girls with small iron hatchets open or separate them. They are then termed black plate. From one ton of bar iron about 16¾ cwt. of black plate is made; the loss is termed shearings, and is worked up again in the forge fineries. The plates are next sent to be pickled, *i. e.*, immersed in heated dilute sulphuric acid, known as oil of vitriol.

The plates are placed in a cradle or receptacle, lifted by a hydraulic, then dropped down into a round wooden or lead tank containing the acid; the cradle is then made to revolve by means of steam power, to enable the liquid to rush between the sheets, which revolution is retained. They are lifted again by the hydraulic, dropped into a tub, a little apart from the last, containing water only, the cradle revolving as in last tub, so that the water may rush between the sheets to cleanse or wash away all trace of the acid; when taken up again, the plates are clean and bright as silver.

The plates are next subjected to a bright red heat, which lasts from twelve to twenty-four hours, in closed iron annealing pots in a reverberatory furnace; they are well covered on the top to prevent the plates from being burnt, the heat is kept as high as it can be without softening them to such a degree as to the cause them to stick so fast together as to prevent their separation when cold.

They next pass singly through cold rolls, three, four, or more times, as may be deemed requisite. These rolls are highly polished, and must be set in accurate order to give the plates a perfectly flat set and well polished surface. Again they are annealed or softened at a lower temperature than the first, as their surfaces would be damaged by being in any degree stuck together. Pickled again as before, excepting that the liquid is considerably weaker than previously, placed in cast iron troughs containing clean water renewed by a stream constantly flowing through—they are then taken in hand singly, and scoured if necessary with sand and hempen pads before being delivered to the tinman.

Now comes the last process. The sheets are iron only so far. They next reach the tin house, and are placed in a trough containing clean water, ready for the tinman, as he is termed, who then picks them up and puts them singly in a grease pan containing palm oil, to soak, and after being there for a short time, the tinman places the sheets in a large iron pot containing molten tin, with a covering of palm oil. Here it unites with the tin, to which it has a strong affinity; when he has performed his part the plates are handed over to the next man, called a washman, whose pot contains pure molten tin; after they have soaked in his pot a little, he raises them with a tongs on to the hob as he requires them, brushes the surfaces of both sides of each sheet, and after dipping them into another pot containing molten tin again, they are sent through rolls which work in a large pot containing palm oil, and the speed at which the rolls move regulates the quantity of tin to be put on each sheet. They are afterward raised from the rolls (under which they have been passing) by a youth called a riser, handed to two young women who rub them in bins or boxes containing bran, one after the other, which takes off the grease; another girl, called a duster, gives them a further polish with a skin duster, and takes them to the assorting room, where every plate passes inspection, and if not up to the mark is sent back for rectification. After passing through that ordeal, they are counted and weighed and made up into boxes.

JENSEN'S IMPROVED FIRE ESCAPE.

Bleaching Sponges.

As well known, chlorine and its compounds are unfitted for bleaching sponges, since they give the latter a yellow color, harden them, and cause them to lose their fineness. What is usually employed is an aqueous solution of sulphurous acid. This treatment takes seven or eight days, and requires considerable manipulation. Some recent researches made in Germany seem to indicate that the bleaching of sponges may be more easily and quickly effected by means of a solution of bromine in water. One part of bromine requires thirty parts of water to dissolve it. It will be only necessary, then, in order to have a concentrated solution of bromine, to pour a few drops of liquid bromine into a bottle of distilled water, and then shake it up. The sponges are immersed in this solution, and, after a few hours, their brown color will disappear and give place to a much lighter tint. Upon treating the sponges a second time in the same way they will acquire the desired shade. They are still further improved by afterward dipping them into dilute sulphuric acid and then washing them in several waters.—*Annales Industrielles.*

Machines for Rolling and Curing Tea.

A correspondent writes us that five different machines have been invented and are in use in India for this purpose, there being more than a thousand such machines employed there.