

MECHANICAL INVENTIONS.

Mr. Thomas Long, of Boston, Mass., has patented an improved centrifugal drying machine, which can be charged and discharged without stopping the machine. The invention consists in a conical perforated hood attached to a studded receiving plate contained in the upper part of the hood and attached to the top of the shaft of the machine, which receiving plate throws the sugar or other material down upon the annular bottom of the hood, which bottom is attached to arms fastened to a sleeve surrounding the shaft and resting on the shoulders of a number of springs attached to the lower thicker part of the shaft, accordingly as the bottom of the hood is to be in a raised or lowered position. When this bottom is to be lowered the above-mentioned springs are pressed outward by means of a sleeve with a lower beveled edge and mounted in a fork of a pivoted lever.

An improved indicator for scales has been patented by Mr. Valentine M. Fulcher, of Hughes Springs, Texas. This improvement dispenses with the slides and provides for automatic indication of weight. This invention consists in a weighted rocker and indicating arm combined with a scale beam, by which it is operated.

Mr. Robert J. Mitchell, of Girard, Ill., has patented an improvement in thill couplings. It consists in a packing strip of leather and an angular concaved block made of compressible material. The leather strip is pressed upon the thill iron by the concaved block.

IMPROVED STEAM ENGINE.

The Innis Manufacturing Company, of Oil City, Pa., has, for several years, been making a specialty of building a 9 x 12 engine for oil well drilling, the design of which is represented in the accompanying engraving. This engine is fully secured by patents, and is made only by this company, who now have about 1,500 in use in the oil region. These engines having given such universal satisfaction, the Innis Manufacturing Company have determined to introduce them for other uses. The demand in the oil regions for this particular size has been such as to enable this concern to arrange tools to build them on the duplicate plan, using templates and gauges for all the parts, thereby reducing the cost, while unnecessary finish is dispensed with to meet the wants of a cheap steam power. All of the working parts are strictly first class. The cylinder, valve bore or chamber, exhaust chamber (which also acts as a portion of the heater), and the supports or leg of the cylinder, are all cast in one piece, to which the bed is firmly bolted. The valve, which is of the piston kind, is placed directly below the cylinder, and the exhaust chamber directly below that. By this arrangement the cylinder readily frees itself of condensed water, as the ports are open from the bottom of the cylinder downward to the heater when exhausting. There is a steam passage around the outside of the cylinder and under the jacket that conducts the steam into the central port of the valve, from which it passes up into the cylinder from the ports near the end alternately as the valve travels back and forth, and exhausts down past the end into the exhaust chamber or heater.

The valve (which is seen lying on the engine block) is claimed by the inventor to be a great improvement over the ordinary piston valve. It really acts as its own steam chest, being always full of steam up to as nearly boiler pressure as practical. It is a long hollow shell, very thin and light, having a large amount of bearing surface in proportion to its weight, and consequently subject to but very slight wear. We are informed that one in the manufacturer's shop, after five years' constant use, appears as good as new. It being a balanced valve, the wear of the eccentric and all the valve gear is very slight. The bed is of a very rigid form, being trough-shape, the top edge of which forms the lower slide for the crosshead, and is on a line of the center of the cylinder and main shaft, and takes the strain in a direct line of the power applied. The pump is worked in the usual way from the crosshead. The heater is composed of four one-inch pipes, the entire length of cylinder and bed, and delivers the water to the boiler very hot. Pump and heater are dispensed with when not required. All parts are easily accessible.

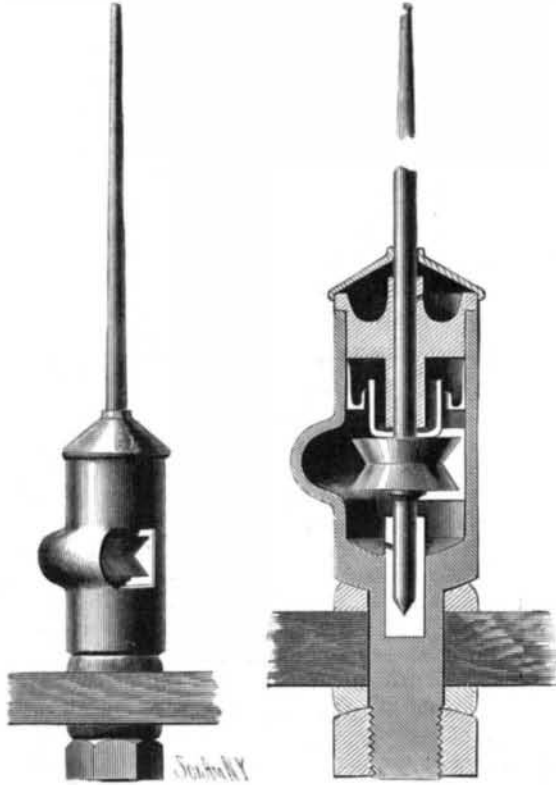
This engine is very strong and rigid, and is at the same time inexpensively constructed. Further particulars may be obtained by addressing the manufacturers as above.

NEW DANISH POLAR EXPEDITION.—The Danish Chamber voted, March 17, an appropriation to help pay the expenses of an Arctic expedition, which is to start from Copenhagen in July next.

IMPROVED SPINDLE.

The engraving shows, in elevation and in section, an improved device for supporting and lubricating the spindles of ring spinning frames, lately patented by Mr. Walter I. Tinkham, of Taunton, Mass.

The step supporter is provided with a screw shank having a nut for clamping it to the spindle frame. A tubular standard extends upward from the step support, and has fitted in its upper end the bolster in which the spindle runs. The tubular standard is larger in internal diameter than the wheel, and has two openings for the driving beam.

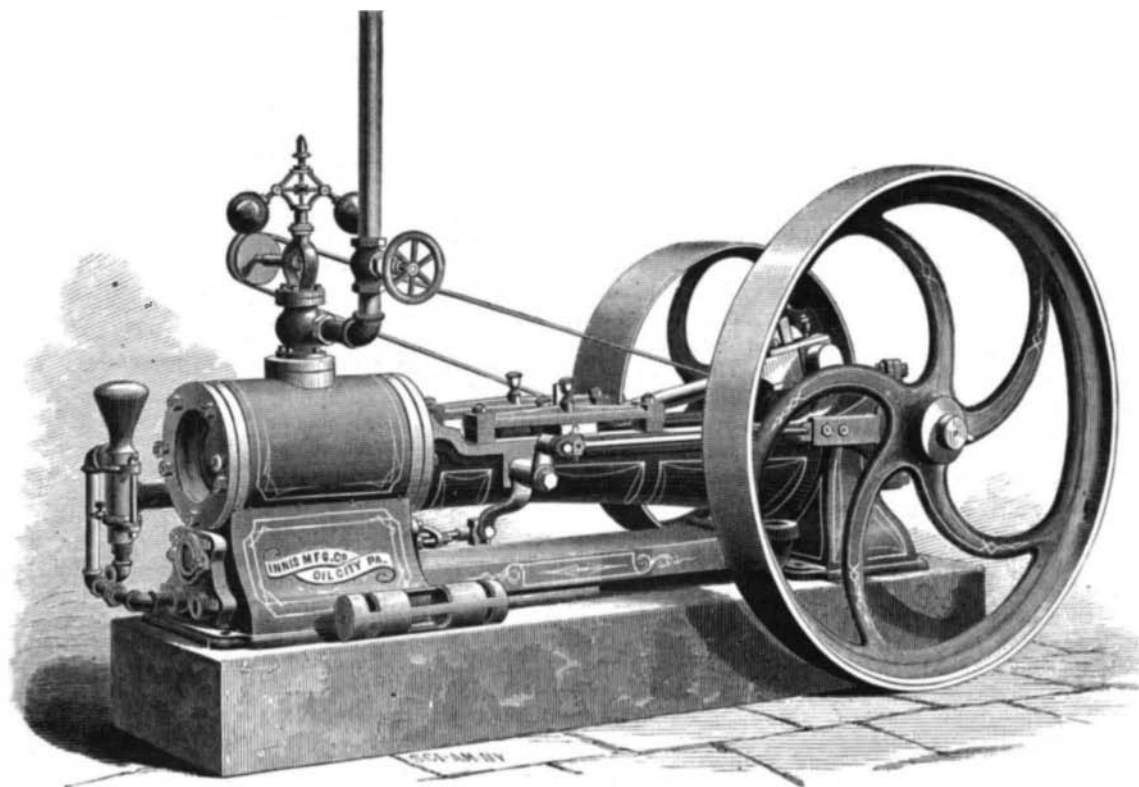


TINKHAM'S IMPROVED SPINDLE.

In the top of the bolster there is an annular oil receiving trough communicating by a small hole with the bearing of the spindle. The bolster has a cap, which confines the oil and excludes dust from the annular oil trough and from the bearing of the spindle.

Concentric with the spindle, and just above the wheel, there is an oil intercepting cup, which revolves with the spindle. This cup is encircled by another cup arranged in the tubular standard, and having discharge openings, which deliver the oil to the inner surface of the tubular standard, down which it flows to lubricate the spindle and step.

The oil cup of the bolster being supplied with oil, the bearing surfaces of the bolster and the part of the spindle within it will be lubricated. The oil escaping and flowing from the bolster down the spindle will be caught by the in-



INNIS' STEAM ENGINE.

tercepting cup, which, revolving with the spindle, will by centrifugal force cause the oil to rise and flow out of it and into the surrounding stationary cup or receiver, and through the holes in the bottom of which the oil will be discharged against the inner surface of the bore of the standard, or so as to drop down to the bottom of the bore without falling upon the whirl or the driving band. From the bottom of the bore the oil will flow into the step and lubricate it and the spindle foot, the step being perforated so as to allow the oil to pass freely into it.

Novel Barometers.

In the January number of the *Archives des Sciences* Professors Dufour and Amstein describe a simple registering barometer now in use in the Meteorological Observatory of Lausanne. It depends on displacement of the center of gravity of a glass tube containing mercury. The form of the tube may be described as that of an L leading down to a U by a vertical portion. The lower end is open. The tube swings in the plane of its angles on a horizontal axis placed above the center of gravity; with increased barometric pressure it inclines to the right, with decreased pressure to the left; and these movements are recorded by means of a style attached to the U part and applied to a moving strip of paper. By a simple contrivance the pendulum of a clock is made to impart a slight shock every second swing to the tube, so as to destroy any adherence of mercury. The instrument is easily made and proves very sensitive and trustworthy.

A description of a barometer for distant points of great altitudes which could be read by means of the electric current was given at a late meeting of the Royal Scottish Society of Arts. The electric barometer consists of twenty-five tubes placed side by side on a board or round a pillar. Into each of the upper ends is fused a fine platinum wire, dipping down by tenths of an inch, so as to get a range of twenty-five tenths, or two and a half inches, with the whole instrument. A wire is taken from each of the twenty-five wires, carefully insulated from each other, together with a return wire from the cistern ends. In all twenty six wires are made into a cable and continued to any convenient place for the observer. In the observing apartment the wires are separated and attached to a dial, which is connected with an electric bell and battery. If the barometer were placed on a hill and a cable taken therefrom to the observer, the height of the mercury would be ascertained by finding the shortest wire, when in circuit, which would ring the bell. To arguments which might be urged that readings of tenths were not fine enough, it might be said that such readings were better than no observations at all.

How to Increase the Light of Gas Flames.

Mr. W. Lascelles Scott lately stated that he had arranged an ordinary fish-tail burner at an angle of from 60° to 45°, and allowed finely divided alkaline earths to percolate through the flame; and he found that without any increased consumption of gas, a fairly marked increase of light resulted. The mean results of several experiments were as follows: With a normal flame of 16.71 candles, the addition of pure lime gave 17.95, of magnesia 17.13, and, curiously enough, of an intimate mixture of lime and magnesia, a larger increase than either separately, namely, 18.23. The same mixture, with the addition of ten per cent of another earth, gave 18.34. With a specially constructed Argand burner, the flame being conical, the light was raised from 62.4 candles, burning gas alone, to 67.3 with the addition of lime only, and with lime and magnesia to 68.5.

Daniel Drawbaugh's Telephones.

The People's Telephone Company has obtained the testimony of about one hundred and thirty witnesses at Harrisburg, Pa., to show that Daniel Drawbaugh, who resides in the adjoining county of Cumberland, invented the first magneto-telephone, and its side of the great case will soon close in this city with the examination of an expert electrician who has tested all of Drawbaugh's inventions. The testimony given thus far goes to show that Drawbaugh invented at least half a dozen speaking telephones before Bell conceived the idea that sound could be transmitted by electricity. Drawbaugh, according to this testimony, began thinking about sound transmission in 1861, and in 1867 invented a machine which carried sound by means of a voltaic battery. In 1871 he made a magneto-electrical instrument which transmitted speech, and which is said to embody all the principles of the Bell telephone of today. In 1874 and 1875, it is claimed, he made marked improvements on this invention before Bell had any thought of telephonic communication. Since the Bell telephone went into

operation Drawbaugh has invented a machine which he claims, according to tests made, will carry speech at least one thousand miles, and will not be affected by atmospheric influences. This same instrument, he thinks, can be made to transmit sound an indefinite distance. The American Bell Telephone Company, which is resisting the claims of the People's Company will begin taking testimony in a few weeks. In New York, next summer, it will be decided whether Bell or Drawbaugh invented the first magneto telephone.—Operator.

The Composition of Glass.

Glass is a salt, every salt being the result of a combination of an acid with an alkaline base—that is, an alkali or alkaloid of organic nature. In the case of glass the acid is silica or silicic acid, and the base a mixture of an alkaline with an earthy base, such as lime, or with the oxide of one of the heavy metals, such as lead. Silica exists in nature in such minerals as flint, agate, rock crystal, or quartz. Its character as an acid was first clearly established by Berzelius. This does not appear until it is at a red heat, when it acts very powerfully, and, expelling other acids, combines with bases to form solid compounds or salts called silicates. Glass may be made by substituting boracic acid for silica. It is remarkable that while the silicates formed by nature crystallize, those made by art do not. Potash and soda are the most important ingredients, next to silica itself, in glass. They act as a flux, rendering the glass easy to melt. Lead renders glass brilliant, clear, and fusible, but in excess softens it. Lime increases the density, hardness, and luster of glass. Carbon in the form of charcoal aids the fusion. Glauber's salt with lime is sometimes used instead of soda, and muriate of soda, or common salt, is extensively used as a flux for coarse ware. A small admixture of the black oxide of manganese is essential in making flint glass, its property being to clear and purify the mass from the discoloration caused by particles of carbon and iron. For this reason it is called the "glassmaker's soap," as it appears to wash away all impurities. In excess, manganese causes reddish color. This may be removed by agitating the glass. Coarse green glass is, however, made white by an excess of manganese. The purple-pink windows sometimes seen in dwelling houses are made so with manganese. As a general principle, the glass is less fusible and offers greater resistance to the action of water and acids the larger its proportion of silica and alumina, while the contrary results from an excess of potash, soda, baryta, lime, magnesia, or oxide of lead. Luster and the refractive power of glass are produced in the highest degree by lead glass, next by baryta, next by potash, and least by soda glass.

A very important invention was made by M. De la Bastie, which has been fully tested and verified by scientific men in London and New York. It consists of plunging hot glass, manufactured in any form, into hot oil, or a heated oleaginous compound. When cool it becomes almost as tough as metal, so that a cup or mirror made of it may be thrown violently many feet or dropped on a stone floor without receiving any injury. When very violently broken it separates into granulated fragments, without sharp edges, so that the danger of being cut by it is much diminished. The process does not affect the transparency or beauty of the glass in any way.

The base of all glass is sand, and the quality of this is of great importance. Formerly calcined and powdered flints were used, but now sand procured from mines in various places is used. To fit it for use it is dried or burned, sifted, and washed. Much fine sand is taken from New Jersey to France.

• In preparing the frit, saltpeter, binoxide of manganese, and arsenic are sometimes used to purify the melted metal. Red lead (minium, Pb_2O_3) has the same effect in the compound glasses, which renders it superior to litharge. Lime, soda, and potash are used in all their forms. Coal, wood, or peat is the common fuel, great care being taken to exclude the smoke or carbonaceous deposits, and to use only the best qualities. In some furnaces powdered resin is employed to great advantage.

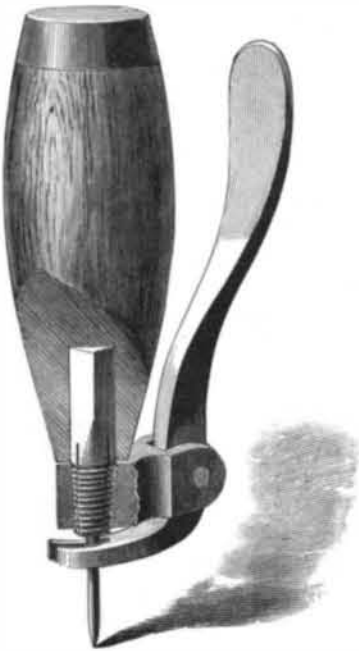
In the manufacture of French window glass a mixture is used of 100 parts quartz sand with from 30 to 40 parts of dry carbonate of sodium (or as much sulphate with charcoal, and 30 to 40 parts of chalk. German window glass consists of a double silicate of chalk and potassa: 100 parts of quartz sand, 50 parts of pearl-ash, from 25 to 30 parts of chalk, and 2 parts of niter. In many mixtures common salt is an ingredient. According to A. F. Gehlen it is prepared with 100 parts quartz sand, 50 parts of dry Glauber's salt, 17.5 to 20 parts of lime, and 4 parts of charcoal. Peligot's formula is: Silica, 69.06; lime, 13.04; soda, 15.2; alumina, 1.18. An analysis of ancient window glass from Pompeii gave: Silica, 69.43; lime, 7.24; soda, 17.31; alumina, 3.55; oxide of iron, 1.15; oxide of manganese, 0.39, with traces of copper. No fixed proportion of materials can, however, be agreed upon, and the manufacturer has to determine the amount of real alkali in every fresh supply of ash.

The manufacture of window glass, though conducted here for more than seventy years, was for many years conducted under difficulties from the alleged superiority of the English crown glass. After a time such improvements in the manufacture of cylinder or sheet glass were made in England that it was regarded as equal in quality and brilliancy to the crown glass, and could of course be made of larger sizes; but the Pittsburg manufacturers have far surpassed in size and in uniform thickness the English. The largest size of sheet glass ordinarily made in England is 50x30, or possibly 35 inches. At Pittsburg sheets 70x40 inches, and of uniform thickness of seven to the inch, are not uncommon. These are the "double strength," and are very remarkable for their uniformity. In the dexterous handling of these immense cylinders, and so managing them as to make them of uniform thickness and freedom from blemishes (a very difficult matter), the American manufacturers have been remarkably successful. They are also free from the liability to rust or devitrification, caused by the excess of alkali in the glass, which has been so serious an

objection to much of the German and some of the English window glass.—*Glassware Reporter.*

NEW PEGGING AWL

No one having seen a shoemaker tugging to remove his awl from his work will fail to see the utility of the invention shown in the engraving. It is a simple and effective device for withdrawing the pegging awl from the shoe sole after it has been driven in to make a hole for the peg, and it also serves the purpose of a wrench for securing and releasing the awl. The sleeve which usually screws on the awl-holding chuck is provided with an arm to which is pivoted a right-angled lever, the longer arm of which extends upward along the side of the awl handle, while the shorter arm is forked



LOGAN'S PEGGING AWL.

and extended beyond the awl. After driving in the awl, pressure on the longer arm of the lever by the hand grasping the handle forces the shorter arm of the lever against the work and withdraws the awl with very little exertion.

This invention was lately patented by Mr. Thomas H. Logan, of Lowell, Mass.

NOVEL STRIKING MECHANISM FOR ELECTRIC BELLS.

The device shown in the engraving provides for a long stroke of the bell hammer, with the movement of the hammer always in one direction. The hammer is made in the form of a segment of a ring, and is carried by a shaft driven by a weight or spring. The hammer is released and stopped by an escapement controlled by an electro-magnet.

The hammer, A, is pivoted loosely to a curved arm placed on the shaft and carried by a pawl engaging a ratchet on the



BOWERS' STRIKING MECHANISM FOR ELECTRIC BELLS.

shaft. The outer end of the hammer is free to swing in and out through a limited distance, but is held normally at the inner limit of its movement by a spring which also holds the pawl into engagement with the ratchet.

On the end of the curved arm there is an escapement pin, c (see Fig. 2), and on the armature lever, B, are two lugs, a b, placed one for contact with the end of pin, c, when the armature is down, and the other for contact with it when the armature is raised in contact with the magnet. The contact of the lugs, a b, by pin, c, arrests the hammer and prevents its being revolved by the weight.

The curved hammer is below the edge of the bell, at one side, in such position that the hammer strikes at about the

end of its upward movement. As the shaft carries the hammer the centrifugal force acting on the long arm overcomes the resistance of the spring acting against the short arm, and throws the end of long arm outward, so as to come in contact with the bell; this checks it and allows the spring on short arm to force the end of long arm inward, when it passes the bell and moves on until arrested by the pin, c, and lug, a. When the armature is raised by closure of the magnet circuit the lug, a, is raised above pin, c, and the lower lug, b, brought behind the pin. When the armature is released by breaking the circuit the lug, b, is carried down, and the pin, c, being released, the hammer revolves, and the blow is struck at completion of the revolution.

This invention was recently patented by Mr. George E. Bowers, of Fitchburg, Mass.

Proposed Telegraph Stations in the Ocean.

A Frenchman, M. Menuisier, has just proffered a novel and bold plan for enabling vessels crossing the Atlantic to communicate with the mainland. Lay, he says, a telegraph cable between Samt Nazaire, Bordeaux, and New York, with branch in mid ocean to Panama. Every sixty leagues, the average daily distance covered by a ship, connect to the principal cable a vertical cable ending in a buoy at the surface. To the right and left of the principal cable lay two branch cables, ten to twenty leagues each, ending in a vertical cable with buoys. These branches would form two crosses with the main cable. The chances of ships sighting buoys would thus be frequent. Each buoy has a number, and its position in mid-ocean is known from special tables. When a ship passing near a buoy wishes to telegraph it connects its apparatus wire, one with the wire of the buoy, the other with the buoy itself, which serves as an earthwire. Thus the ship might communicate with a central post which should be established on an island or rock, or a ship moored according to M. Menuisier's system. A vessel in distress near one buoy might, through the central station, get help from a ship passing near the next buoy. The difficult matter would be the buoy. How would it resist storms that have broken cables? M. Menuisier has not yet described it in detail, but says it is pronounced quite successful by competent navigators. It is luminous by night, sonorous in fog, and easily accessible in any weather.

American Manufactures in Australia.

While the United States, by means of exorbitant duties, preclude our manufacturers from competing on a fair footing with American-made goods in the States, our cousins are not slow in pushing their goods wherever there is an opening. The following articles are imported into New South Wales from America by a Sydney firm:

Axes, squaring axes, hunters' hatchets, lath and shingling hatchets, mattocks, picks, shovels and spades, sugar cane knives, Boynton's saws, Disston's saws, trowels, wrenches, scythes, hay rakes, hay forks, scythe, ax, pick, hoe, hammer, spade and shovel, and broom handles, digging forks, millet brooms, cattle bells, turpentine, resin, wood-working machinery, angle boring machines, iron planes, American tacks, tinned and blued; Hungarian nails, finishing nails, bolts and nuts for carriage work, spirit levels, mouse traps, clothes wringers, gate latches and hinges, sewing machines, kerosene lamps, Fairbanks' scales, grindstone fixings, tin-smiths' tools and machines, novelty braces, oil stones, farriers' hammers and adz-eye hammers, clothes pegs, clocks, plated goods, carriage woodwork and ironwork; leather, japanned and enameled; enameled duck and drill; locks, drawback, rim, mortise and pad; lock furniture, lift and force pumps, lanterns, hat and coat hooks, tinned wire-work, lemon squeezers, egg whisks, axle grease, buggy axles, firmer chisels, miter boxes, rolling pins, wood and glass, glass reflectors, sash fasteners, shelf brackets, bronzed barrel bolts, sash lifts, draw pulls, carpenters' mallets, door springs, pruning shears, carriage jacks, metallic hair and horse brushes.

Our informant adds that the above list might be greatly extended. The cause of this profitable import business carried on by the Americans with our Australian colonies is not far to seek. They generally excel our manufacturers of such articles by giving them a finish and adaptability to local requirements which we have yet to learn. It is not the first time that this has been pointed out.—*Iron.*

SOME little time ago Miss Frances Power Cobbe, who has so identified herself with the cause of anti-vivisection, called on a distinguished man of science in London to endeavor by persuasive speech and viva voce argument to gain him over to her cause. Three points were observable in Miss Cobbe's outward presentment, namely, she had an ostrich feather in her bonnet, a bird of paradise on or near her muff, and she carried an ivory handled umbrella. Consequently the distinguished man of science replied as follows: "Madam, charity begins at home. When you have given up wearing ostrich feathers, which are plucked from the living bird, causing the most exquisite pain; and birds of paradise, which, in order to enhance their beauty and luster, are skinned alive; when you have abjured the use of ivory, because you know that the tusks are cut out of the dying elephant's jaw—then, and then only, come and upbraid me with the cruelty of my operations. The difference between us is, madam, that I inflict pain in the pursuit of knowledge and for the ultimate benefit of my fellow creatures; you cause cruelty to be inflicted merely for your personal adornment."