RICHARD'S REGISTERING BAROMETER.

This instrument is provided with a series of superposed vacuum shells or drums, similar to those of aneroid barometers, which are screwed together at their centers. They are each furnished with an internal curved spring to resist the atmospheric pressure. These drums are distended or flattened under this pressure, and their motion is transmitted to a large needle by a very simple system of levers. This needle carries at its extremity a metallic pen of special form, containing a certain quantity of ink whose base is glycerine.

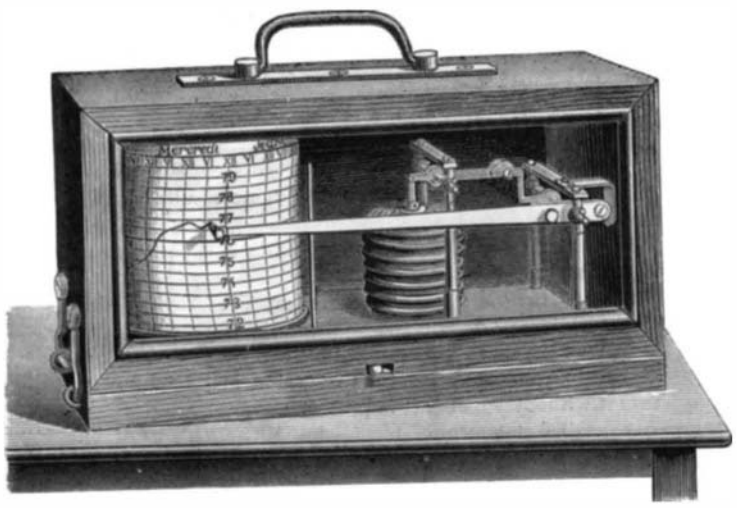
A cylinder carrying a barometric scale revolves in front of the pen, and in light contact with it. The cylinder makes a revolution in a given time, a week in the present instance. The pen is made to rise and descend by the dilatation and contraction of the drums of the barometer, leaving an interrupted tracing upon the paper. In this manner a diagram of barometric height is obtained, the reading of which is rendered easy by the arrangement of the barometric scale.

The rotating motion of the cylinder is obtained in this instrument in an entirely novel manner. The clockwork, instead of being fixed and communicating motion to the cylinder by gearing, is placed inside the cylinder and moves with it, and is revolved by means of a pinion projecting outward; the pinion has an epicycloid movement around a fixed wheel, placed upon the frame of the instrument.

Every week the observer changes the paper upon the cylinder, puts a little ink in the pen, winds up the clock movement, and the apparatus will work for another week without being touched.

The same system is applied to thermometers and hygrometers. The motive power of the pen is the only change that has to be made.

The indications of this instrument are exact, it is convenient to use, the operation of setting it in motion and of changing the paper may be accomplished in a few seconds and without any difficulty, and the pen will record for a month if necessary without being touched.—*Gaston Tissandier, in La Nature.*



REGISTERING BAROMETER.

REVERSIBLE TOOLS.

The engraving shows an improvement in the class of tools in which the bit or working part of the tool is pivoted in a forked handle and has two working ends, either of which may be used by turning it on its pivot in the handle.

Fig. 1 shows a bit of steel having on one end a penknife and on the other a file. Fig. 2 shows a combined gimlet, bit, and screwdriver. These tools are held in position in the handle by the ferrule. When it is desired to reverse them the ferrule is moved upward on the handle.

This invention has been patented by Mr. W. A. Wales, of Newton, Mass.

Oxygen Gas Works, Paris.

The question of the economical production of oxygen has much occupied the ingenuity of chemists. According to the *Revue Industrielle*, this problem is now in a fair way of being solved. There is at present in Paris an oxygen gas works which is capable of supplying nearly 11,000 cubic feet of oxygen daily. This is, of course, a small beginning; but it is a great advance from the scale of laboratory production to which this gas has long been confined. No details are yet available concerning the process adopted in the manufactory, nor is the lowest selling price stated. The cost is, however, said to be moderate, and capable of reduction if the gas is largely consumed. Our contemporary remarks on the importance of this subject, as a cheap supply of remarkably pure oxygen, such as is said to be that produced at the new establishment, will probably exercise a very considerable influence on the question of lighting as well as on the progress of metallurgy and practical chemistry. The gas as sold in Paris from this first factory on the new system is said to be very cheap, although the works may be considered somewhat as of an experiment. The most important thing about the present announcement is the fact that, under any circumstances, the production of good and cheap oxygen in abundant quantity is established.

Close Writing.

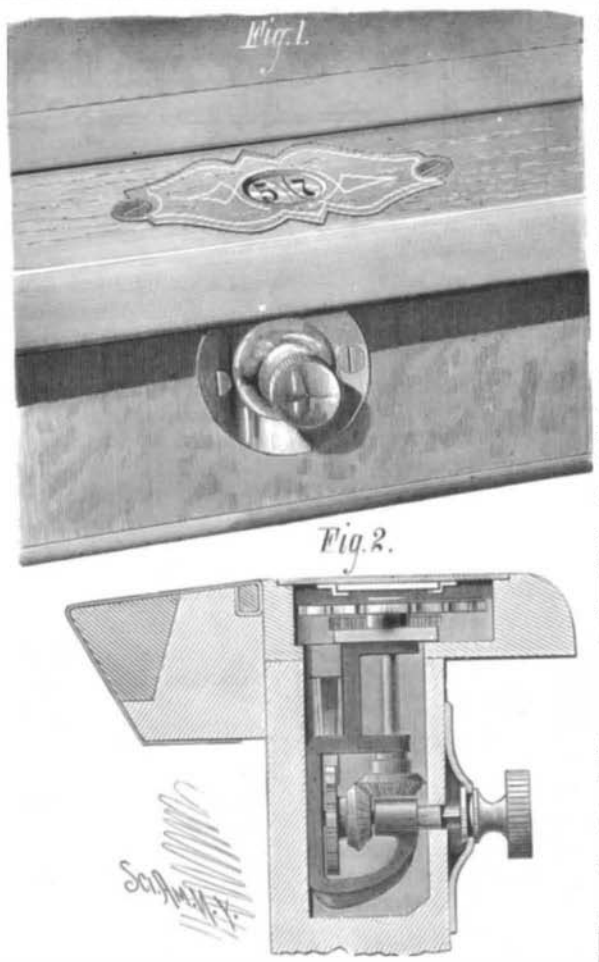
A German having "written" on a postal card an incredible number of words (25,000, we believe) in a style of stenography used in Germany, the author of the system set up the claim that it was superior to any other in use. The claim was disputed by the disciples of Pitman in England, and a prize was offered for the largest number of words written in Pitman's style on an English post card, the writing to be legible to the naked eye. The card of the winner, Mr. G. H. Davidson, is said to have contained 32,363 words, including the whole of Goldsmith's "She Stoops to Conquer," an essay on John Morley, and half of Holcroft's "Road to Ruin." It will be understood that probably not one of all these words was *written*, that is, had all its sounds expressed or even indicated. Such shorthand hints at words, but does not write them.

NEW GAME COUNTER.

The engraving shows a novel game counter which may be let into the top of the cushion rail of a billiard table, and is operated by a knob or handle at the side of the table.

The registering mechanism is much like that used in engine and other speed counters; the units wheel is provided with a single tooth, which, at every revolution, engages the tens wheel and moves it forward one place. The units wheel receives its motion from a vertical spindle, which, in turn, is actuated through miter gearing by a horizontal spindle having at its outer end a milled knob and at its inner end a notched wheel, which is engaged by a detent spring retaining the numbers in the dial aperture in the proper position or bringing them into that position after the hand is removed from the knob.

The apertured plate through which the figures are seen is formed so as to answer as one of the angle sights usually connected with the cushion rail.



COLLENDER'S GAME COUNTER FOR BILLIARD TABLES.

Fig. 1 represents the device in perspective, and Fig. 2 is a vertical section showing internal parts.

This invention was lately patented by Mr. H. W. Collender, the well known billiard table manufacturer of 788 Broadway, New York city.

The Longest Span of Wire.

The longest span of telegraph wire in the world is stretched across the Kistnah River from hill to hill, each hill being 1,200 feet high, between Bezorah and Sectanagrum, in India. The span is a little over 6,000 feet in length. The only mechanical contrivance used in stretching this cable across the river was a common windlass.

ENGINEERING INVENTIONS.

An improved car coupling has been patented by Mr. Thomas Noble, of Todd's Point, Ill. This invention relates to that class of couplers that are self-couplers; and it consists of a coupling link having a rack prolongation which is entered into the draw head and operated by a pinion, and of a swinging coupling pin operated in a vertical plane by a lever, wheel, or other suitable device.

An improvement in that class of steam vacuum pumps called "pulsometers," which are operated by steam pressure brought directly upon the liquid as the forcing element, while the subsequent condensation of the steam furnishes the lifting power to supply the pump, has been patented by Mr. Gardiner F. Badger, of East Orange, N. J. The invention consists of an improved valve seat designed for the induction and eduction water ways, and of improved devices for holding the valve seats and valve guards in place.

An improved car axle box has been patented by Mr. William G. Raoul, of Macon, Ga. The object of this invention is to provide an axle box for car journals of such design and arrangement as to dispense with the use of the wedge or key heretofore used over the journal brass, and to dispense with the button or collar heretofore used on the ends of the axle to receive the end thrust, and to provide the axle box with a close fitting lid or cover that can be opened and closed easily and quickly.

An improved furnace for locomotive and other steam boilers has been patented by Mr. John Alves, of Dunedin, New Zealand. The grate bars are set out from the tube sheet to leave an air passage between them, and a fire bridge is supported by the grate bars, and is provided with a vertical and inclined and horizontal slots and flange surmounting the air chamber.

An improved dumping scow, which can be dumped very easily, and will float well, has been patented by Mr. Francis Pidgeon, of Saugerties, N. Y. The invention consists in a dumping scow formed of two independent floats, which are connected by means of chains or ropes which pass from the bottom edge of the longitudinal side of one float to the bottom edge of the corresponding opposite side of the other float, which chains or ropes are attached to a windlass, by which the floats can be united or separated, as may be desired.

CANE WITH TOILET COMBINATION.

The annexed engraving represents a very handy combination of comb, brush, and mirror, with a hollow-headed cane intended especially for travelers' use. The comb and brush are confined in the tubular head of the cane by a screw cap in which is placed a convex mirror.

This invention was lately patented by Mr. Richard Lamb, of Norfolk, Va.

The Adirondack Survey.

Shortly before the ice broke up on Lake Champlain, the Superintendent of the Adirondack Survey completed a task in civil engineering which will rank among the most important and interesting feats of the kind ever performed in this country. A number of long lines have been run from the western shore of Lake Champlain back into the wilderness, some of them more than a hundred miles long, and involving several thousand stations. Two of these run from Mount Marcy to points on the lake at Westport and Ticonderoga, and it being found desirable to connect and compare them while the lake was frozen, arrangements were made to have observations taken at the water level at ten stations along the lake on the same day. The work was successfully accomplished, and a line of stations for levels was secured from Whitehall, 126 miles northward, observations being taken at Whitehall, Ticonderoga (Mount Defiance), Crown Point Landing, Port Henry, Westport, Willsboro, Port Kent, Plattsburg, Rouse's Point, and Fort Montgomery.

The Siamese Twins Outdone.

An Italian couple, Tocci by name, are at present exhibiting at Vienna a most remarkable specimen of their progeny, a pair of twins named Jacob and Baptiste. These boys are grown together from the sixth rib downward, have but one abdomen and two feet. The upper part of the body is completely developed in each; their intellectual faculties are of a normal character. Each child thinks, speaks, sleeps, eats, and drinks independently of the other. This independence goes so far as to admit of an indisposition of the one without in the least affecting the other. They are over three years old, in perfect health, and seemingly in excellent spirits.

The Annual Fire Loss.

During the past five years the United States and Canada have burned up, in 55,775 fires, property to the value of $406,269,700, the loss for 1877 footing up $100,000,000 nearly. The New York (insurance) *Chronicle*, which gives these figures, finds that the fires of 1880 were distributed as follows:

States and Territories.	Total Losses.	States and Territories.	Total Losses.
Alabama	$708,600	Montana	$34,500
Arizona	38,500	Nebraska	617,200
Arkansas	326,400	Nevada	394,200
California	2,841,200	North Carolina	1,089,300
Colorado	741,100	New Hampshire	773,100
Connecticut	1,374,300	New Jersey	2,605,400
Dakota Territory	102,400	New York	12,751,000
Delaware	372,600	Ohio	3 529,000
District of Columbia	72,600	Oregon	435,500
Florida	471,800	Pennsylvania	7,714,400
Georgia	321,100	Rhode Island	420,100
Illinois	3,912,400	South Carolina	1,232,300
Indiana	2,400,000	Tennessee	467,600
Indian Territory	19,000	Texas	1,337,600
Iowa	1,186,100	Utah	67,000
Kansas	658,000	Vermont	651,400
Kentucky	1,197,600	Virginia	1,238,100
Louisiana	874,800	Washington Territory	160,600
Maine	1,784,900	West Virginia	271,100
Maryland	1,065,800	Wisconsin	1,558,900
Massachusetts	4,890,100	Wyoming Territory	9,400
Michigan	2,348,000	Canada	5,194,600
Minnesota	2,872,800		
Mississippi	245,800	Total	$79,838,000
Missouri	3,190,800		

In round numbers the fire tax last year, in property destroyed, was $80,000,000, a very large portion of the loss being chargeable to our neglect of simple and obvious means of making houses less combustible. It would appear from the insurance statistics that liquor stores are most apt to burn, and groceries and hotels follow closely after, there being twice as many fires in these classes of buildings as in sawmills and drugstores, which come next in the list. It would be interesting to know the relative percentages of fires in different sorts of houses calculated on a numerical basis. The more hazardous classes of buildings, with the number of fires in each during the past five years, are given in the following table:

Groceries	2,281	Tanneries	225
Hotels	2,198	Vessels in port	240
Liquor stores	2,315	Photo galleries	235
Sawmills	1,098	Paint shops	222
Drugstores	1,019	Meat markets	218
Livery stables	858	Feedstores	213
Restaurants	820	Woolen mills	202
Flour mills	635	Confectioneries	204
Furniture factories	585	Shingle mills	180
Gin houses	614	Breweries	183
Carpenter shops	489	Cigar factories	168
Carriage factories	464	Grain elevators	171
Churches	434	Sash and blind factories	166
Blacksmith shops	468	Harness factories	158
Bakeries	462	Butchers' shops	141
Planing mills	448	Fancy notion stores	145
Lumber yards	381	Tobacco barns	149
Gristmills	341	Oil refineries	140
Iron foundries	315	Cotton mills	135
Ice houses	309	Grain warehouses	131
Railroad depots	308	Paper mills	137
School houses	304	Box factories	132
Oil derricks	300	Billiard saloons	127
Newspaper offices	262	Agricultural implement factories	120
Cooper shops	260	Slaughter houses	115
Machine shops	291	Tobacco factories	112
Public halls	256	Theaters	74
Printing offices	252	Meat Packers	86
Shoe factories	255		

The Fish Supply of New York.

The following statement, compiled by G. M. Lamphear, was read at the recent meeting of the American Fish Culturists' Association in this city. It shows the amount of the various kinds of fish received in the wholesale markets of New York for ten months from March 1, 1880, to January 1, 1881:

	Pounds.		Pounds.
Flounders	1,186,469	Pickerel and pike	516,317
Halibut	2,311,742	Yellow pike	151,001
Cod	5,269.607	Cisco	435,988
Pollock	611,295	Whitefish	872,144
Haddock	1,643,554	Brook trout	5,995
Frostfish or tomcod	58,831	Salmon trout	35,720
Blackfish	184.171	Catfish	36,267
Mackerel	3,236,197	Small fresh water fish	394,358
Spanish mackerel	346,678	Terrapin	1,219
Weakfish	1,213,141	Green turtle	2,494
Kingfish	10,732	Lobsters	1,311,981
Sheepshead	55.586	Scallops, Gallons,	29,499
Porgies	1,565.836	Turbot	86
Sea bass	284,602	Redfish	22,854
Striped bass	478,716	Perch	143,332
Bluefish	4,284,613	Buffalo fish	3,398
Smelt	575,005	Pompano	1,768
Salmon	150,642	Swordfish	1,285
Shad, Counts,	923,474	Small salt water fish	393,325
Herring, "	463,884	Mullet	11,658
Eels	993,248	Bonita	67,231
Sturgeon	46,170		
Black bass	36,943	Total	25,605,524

Needles by Heredity.

All sorts of physical and moral (sometimes immoral) traits have been charged to heredity. The problem of inheritance *in utero* now includes needles. The Louisville *Courier Journal* gravely tells of the wanderings of a needle which entered a young lady's foot nine years ago, and lately made its appearance in the thigh of her year-old baby. The needle was much corroded.

The Solar Parallax.

In a recent communication to the French Academy M. Faye tabulates the results obtained by different methods of determining the sun's mean parallax, as follows:

Geometrical methods. 8·82″.	8·85	by Mars (Cassini's method) — Newcomb.
	8·79	by Venus, 1769 (Halley's method) — Powalky.
	8·81	by Venus, 1874 (Halley's method) — Tupman.
	8·87	by Flora (Galle's method) — Galle.
	8·79	by Juno (Galle's method) — Lindsay.
Mechanical methods, 8·83″	8·81	by the lunar inequality (Laplace's method) —
	8·85	by the monthly equation of the earth — Leverrier.
	8·83	by the perturbations of Venus and Mars — Leverrier.
Physical methods, 8.81″.	8·799	Velocity of light (Fizeau's method) — Cornu.
	8·813	Velocity of light (Foucault's method) — Michelson.

Touching the relative accuracy of these results M. Faye concludes:

1. That the method of the physicists is superior to all others, and ought to be substituted.

2. That the value of solar parallax, $8\frac{8}{18}''$ (by physical methods), is now determined to about $\frac{1}{100}$ of a second.

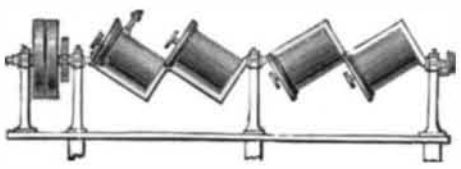
3. That the seven astronomical methods of procedure converge more and more toward that value, and tend to confirm it without equaling it in precision.

A detailed statement of Lieutenant Michelson's work will be found in his paper published in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 193.

Testing Broken Stone.

The *Bulletin du Ministère des Travaux Publics* describes in its current number a series of investigations conducted by the French Administration for ascertaining the resisting power of different classes of broken stone employed in the formation and maintenance of roads. These experiments were directed toward two objects; to ascertain the resistance of different classes of stone to wear and to shock; and their resistance to crushing. With regard to the first a standard of comparison is employed, and the stone is submitted to treatment in a testing machine of the form shown in the annexed sketch.

This machine consists of two groups of four cylinders each, mounted side by side on a bent frame, which terminates in horizontal shafts, at one end of which on one group are mounted pulleys and gearing for transmitting motion to the other group. The axial distance apart of these shafts is 16 inches, and the cylinders are about 7¾ inches in diameter and 14 inches long. In one of these chambers is placed a standard sample of porphyry, and in the other the stone to



be tested; the charge averages about 11 pounds. The machine is driven with a speed of about 2,000 revolutions an hour, and the stones are subjected to attrition, and also to a to-and-fro movement from end to end of the cylinder. After about five hours the cylinders are emptied and their contents are carefully washed, the fragments precipitated being divided by sifting into three classes—those which will not pass through openings 0·39 inch in diameter, those decreasing from this size to 0·07 inch, and the dust smaller than 0·07 inch. The first portion is returned to the stone being tested, and the third is weighed, the relation it bears to the original charge indicating the value of the material tested. Experiments showed that the best samples yielded 2 per cent of their weight in dust, and for this class of stone a coefficient of 20 was adopted. The compression tests were obtained by submitting cubes 1 inch square to the action of a hydraulic press. The best specimens rarely showed a resistance of more than 20 tons per square inch, and a coefficient of 20 was also adopted for stones of this quality. Altogether 637 samples of stone were tested.

Metallic Cars.

An enthusiastic writer in a Western journal calls attention to the urgent need of fireproof passenger cars, and expresses surprise that some of our enterprising iron and steel manufacturers have not already furnished the railroads with a model car of this description. He says that cars can be made of steel tubes and plates with the greatest facility, and that they would be stronger, lighter, and safer than the present wooden cars, with many incidental advantages in the way of heating, lighting, etc.

The question of employing steel and iron as material for the construction of freight and passenger car bodies is not a new one. There was quite a stir made about it a few years ago. It was not only discussed very generally in the newspapers and technical journals, but quite a large number of freight cars were actually built in order to test the different theories as to how these materials should be used for car bodies to the best advantage. These included box, gondola, and refrigerator cars, the floor and body framing of which consisted of iron tubing and iron and steel rods, held in position by bands and tie blocks, the outside being covered with sheet iron, and the inside sheathed with wood. Another form of construction consisted of channel iron I beams for floor frame, and heavy wrought iron bars for the super structure. The cars were from 30 to 34 feet in length, and weighed from 22,000 to 25,000 pounds. What kind of record these cars have made we are unable to say, but the inference is that it is not a very encouraging one, or it would by this time have been spread before the world. There has doubtless been some progress made as compared with the ruder constructions of an earlier period, but this improvement, so far as we can learn, has not been so much in diminished weight and greater proportionate carrying capacity as in a better constructive use of the material. It must, we think, be admitted that the results thus far are not such as to make metallic freight car bodies popular, and until they shall begin to supersede wood in this class of rolling stock there is not much chance for metallic passenger cars.

It is a common remark, even among railroad men, that iron or steel cars will some time or other come into general use, for the reasons that timber is getting scarce and more expensive, and that iron is already extensively used for truck frames and body bolsters. But the question of iron body construction does not depend upon the way in which trucks are built. The two are essentially unlike, and are subject to different conditions. It does not necessarily follow that because iron makes a good axle or crowbar, it will also make an equally good flagstaff or ax handle. Railroad cars, as compared with stationary structures, are subject to peculiar conditions inseparable from the uses they perform. These are rapid movement, a minimum of weight, liability to violent concussion, and the necessity of being easily and readily repaired. With respect to these, wood has the advantage over iron at the start. It is lighter, more compressible, will resist shocks better, and, in case of breakage, repairs can be made with less difficulty. Iron, it is true, will not splinter nor burn; a car made of it may not weigh more than a wooden one of the same size and capacity; it may last longer, resist shocks quite as well if rightly constructed, be worth more as scrap when worn out, and be repaired with less difficulty than is generally supposed. These arguments, however, amount to little so long as they are not sustained by a record of performance.

It would be no very difficult thing, as it strikes us, to make a model passenger car body entirely of iron or steel—frame, panels, roof, flooring, and seat frames, with no inside wood finish even. It could be beautifully ornamented inside and out with paint and varnish, and made to look very light, cheerful, and attractive. It would make a few beautiful "runs," and after a few rose-colored local notices in the papers would be lost sight of and forgotten, and the roads would go on ordering new wooden cars as before, without the least regard to the wonders performed by the model car in the way of somersaults down embankments. with no roasting or scalding of passengers as an accompaniment.

One great obstacle in the way of iron body construction is the fact that it can not be carried on without special shops, machinery, tools, and workmen. A new and distinct department would be necessary upon every road using, repairing, or building such cars. Machinery and tools for the purpose would have to be perfected by degrees, according to the methods of construction that experience should prove to be best. Wood working machinery, on the other hand, is already perfect, or nearly so, and car builders know just what kinds to put into a shop.

Another obstacle is the tendency to make iron construction conform to that of wood, when the difference in the two materials seems to require that the construction should also be essentially different for each. Our freight cars are designed almost exactly upon the same principles as our passenger cars, and with special reference to wood construction. It is manifest, however, that if iron cars are ever to be a success, the material must be used constructively *as* iron, and without reference to the peculiarities of wood construction. The design for a model iron passenger car that would really be a model for imitation would involve such a wide departure from present practice in order to meet the requirements of the new material that a first attempt could hardly be a success except by a miracle.

Meanwhile, railway passengers must rely mainly upon safety stoves and safety lamps in cases of collisions and overturns. An ordinary passenger car, with only a narrow door at each end for exit, allowing only one person to pass out at a time, is a regular trap whenever panic stricken occupants want to get out in a hurry. The material of the inside finish is also so extremely combustible that only a spark is necessary to set it in a blaze. The ends of the car are almost sure to be fired first, thus cutting off access to the doors. In shops and other buildings means are provided for extinguishing fires when they first break out, but no such means are at hand in the case of cars, unless from pure accident. The need of iron as a material of construction, or of some means by which wood may be rendered less combustible, is very great in respect to cars. But we do not expect any immediate revolution in the construction or warming of cars in order to secure greater safety. The mass of people seem to like things pretty well as they are, and will stick to the stoves, good, bad, and indifferent, and to the varnished and painted cabinet woods a while longer.—*National Car Builder.*

MISSISSIPPI SANITARY COUNCIL.—The third annual meeting of the Sanitary Council of the Mississippi Valley will begin at Evansville, Ind., April 20. Questions relating to quarantine and the transportation of contagion will be the chief subjects of discussion.

An Outfit for Mining Machinery.

A complete plant for mill and leaching works for the Rosario Mining Company, Mexico, was lately shipped by Parke & Lacy, of San Francisco, Cal., the engines, batteries, and, in fact, all the iron work having been made there by Prescott, Scott & Co of the Union Iron Works. The mill is a forty-stamp one, but so arranged and with sufficient power to be increased to eighty stamps. The whole reduction works, when ready to run, will have cost $150,000. The mines being about 100 miles from the sea coast, the contractors had made to order ten sixteen-mule wagons, with harness and all necessary appliances for handling the machinery. The engine frame weighing 11,000 pounds, a special wagon was made for it, and special wagons with saddles were made to take the two steel boilers, which weigh 7,500 pounds each.

As this outfit is exceptionally complete and expensive, the *Bulletin*, of San Francisco, has taken pains to obtain the following details with regard to the construction of the leaching works and other machinery, as well as of the processes to be employed in them.

The ore when delivered to the mill is first dried in the improved Stetefeldt drier. As soon as the ore is dried it falls into cars and is taken to the Eclipse feeders at the batteries. Two large dust chambers are arranged above the batteries, provided with sheet iron hoppers, and are connected with a Sturtevant exhaust fan, which draws the dust into them, where it is deposited at the bottom of the sheet-iron hopper.

From the battery the pulp is taken by screw conveyors and an elevator, first, into a hopper provided with a sifter or revolving screen, where coarse particles are sifted out and returned to the battery. The hopper is provided with a Standish feeder by which the pulp is discharged into the conveyor and elevator, which takes it to the Stetefeldt furnace. This furnace is of the largest size, with a shaft 6 feet square and 43 feet high, and a system of twelve dust chambers.

The building to cover the furnace, dust chamber, and cooling floor will be 46 feet wide and 102 feet long. The furnace will be built in the most substantial style, with a great many improvements in construction, which are the result of the experience at the Ontaro mill, Utah. It is calculated to roast from forty to fifty tons of ore.

The ore, after cooling, is taken to the leaching house in cars. The leaching house will be 104 x 38 feet. There are eight leaching tanks, of 12 feet in diameter, and the necessary tanks for precipitating and for the solutions. For the conveyance of the solutions back to the upper tank again for reuse, a novel method is employed, the usual pumping system being dispensed with. Below all the leaching tanks and vat is a tank connected with an air compressor, the pressure of air driving the liquid to the upper vat or reservoir. For the drying of the silver precipitate a centrifugal machine will be used.

The roasted precipitate will be melted in a reverberatory furnace with charcoal gas fire, this furnace being constructed with a peculiar removable hearth, so that the hearth can be readily repaired if it becomes injured by the matter which results from the melting of the bullion.

The plans for the furnace, drying kilns, leaching tanks, etc., were all made by C. A. Stetefeldt, and the position of the batteries and engines had to conform to these more or less.

The engine, which is now set up at the Union Iron Works, where it may be seen, is of the most improved design, having a box frame and being compact and neat in design. It is a 24 x 60 inch. The eccentric rods, valve rods, and cut-off rods all have first-class bronze for journals, thus giving a better bearing surface, with no liability to heat. The fly-wheel is 18 feet in diameter, and weighs 30,000 pounds. The main pulley is 16 feet in diameter, 43 inch face, and is made in eight separate pieces bolted together. The valves are made of bronze, and all the working parts of the cut-off are steel, and every nut used in construction is case hardened. The engine is fitted with Phillips' improved metallic packing. The valve motion and cut-off is that invented by Eugene O'Neill, chief draughtsman at the Union Iron Works.

There are also two 9 x 13 Eclipse ore crushers, eight swivel dump cars, and a No. 5 Knowles pump.

There is one pair of 54-inch diameter steel boilers, 16 feet long, with 46 tubes, 3½ inch, and with double steam drums, 40 inches in diameter and 12½ feet long. The stack will be 42 inches in diameter and 80 feet long. The Crosby steam gauge, water gauge, revolution register, locomotive clock, and the Edson time recording and alarm gauge will be set up in a handsome case in front of the engine. A set of tools, tube scrapers, extra shoes and dies, and a lot of miscellaneous articles, not procurable in Mexico, go with the plant.

Among other improvements forming part of this machinery is the feed water heater, which was devised at the Union Iron Works recently. It is 30 inches in diameter, 9 feet 8 inches high, and has 157 square feet of heating surface.

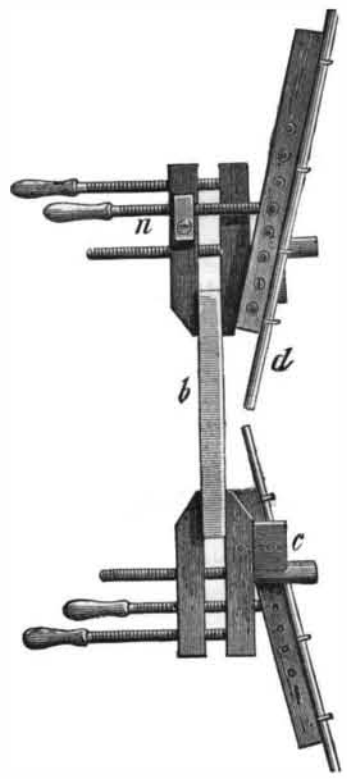
The mines of the Rosario Mining Company are located in the Rosario Mountain, a spur of the Sierra Madre, a distance of one hundred miles from the port of Ajiavampo, on the Gulf of California. The Rosario mines were discovered in 1852. They consist of a group of nine mines, under the following names: Dulces Nombres, San Jose, Bueno Fe, Carmen, San Genovera, Providencia, San Rafael, Sonorense, and Discubridora. They are on one vein, and together embrace a distance of 9,600 feet. The vein is 4,000 feet above sea level.

A MECHANICAL FINGER FOR USE IN THE PHOTOGRAPHING OF ENGRAVINGS.

Occasions frequently arise when it is necessary to have reproduced in *facsimile*, or to any determined scale, printed matter or engravings bound up in a large and thick volume. In order that the photographer to whom such work is intrusted may be enabled to accomplish it successfully, it is indispensable that the special page being operated upon be held in a firm and flat position in front of the camera. In the case of loose engravings or unbound sheets no difficulty is experienced; but when these form part of a book which is thick, heavy, and somewhat rigidly bound, then arises the difficulty of complying with the first condition in reproduction by aid of photography, viz., a position of flatness, rigidity, and rectangularity to the axis of the lens, by which it is to be reproduced.

At the last meeting of the Photographic Section of the American Institute Mr. Oscar G. Mason, of Bellevue Hospital, submitted for the examination of the members a piece of apparatus he had devised for this purpose, and which in practice he had found to answer in a most effective manner. He designated it "the photographer's compressor or mechanical finger," on account of the firmness with which it could be made to hold anything presented to it for the purpose of being copied, whether that were an anatomical or physiological preparation, or, as in the case now before us, a page in a bound volume.

To construct the mechanical finger or fingers—for two are required in most cases—is an operation within range of the powers of every one possessing even a modicum of mechanical ability. Three pairs of small cabinetmaker's handscrews are necessary. The size of those that will prove most useful for ordinary gallery work is that known in the tool stores as



"eight-inch handscrews." One of the three pairs is taken asunder, and each jaw sawed across in such a manner as to leave the threaded ends to form nuts for the lever screws of the two completed "fingers." The piece so removed by the saw should be left long enough to admit of being held in position on the lower jaw of the "finger" by a strong screw through one end, while the short end of the nut—which in small handscrews is usually too short for a second hole—may be held in position by a short dowel pin of one-eighth inch wire. This nut, as fixed in its place, is shown at *n* in the accompanying diagram, in which the whole arrangement is represented.

In this diagram *b* represents an edge view of the board upon which the volume is to be fixed while being photographed. Upon the upper jaw of the handscrew portion of the finger is firmly screwed a block, *c*, through which several holes are bored in a straight line, to admit of raising or lowering the fulcrum point of the finger to suit the thickness of the book or whatever other object is to be held in position. These, however, are very seldom required, as the lever motion is such as to accommodate the point of the finger for all thicknesses up to two inches. To this block, *c*, is attached by a strong screw or loose pin the finger box or lever, along the upper surface of which is a row of ordinary screw-eyes as used for the suspending cord of picture frames. Through this row of the "eyes," four of which is a sufficient number, is run a small rod of hard wood of such thickness as to slide easily, although not too loosely, through the screw-eyes, so as to admit of its being pushed out or withdrawn to the proper part of the book on which it is desired to make it bear. This point is then depressed to any desired degree by the action of the supplementary screw, attached as before described and as shown in the diagram. The finger rods of the apparatus exhibited at the meeting of the Institute were formed of round dowel pin wood of three eighths inch thickness.

When the book is large and heavy, to prevent the rod from making an indentation by its pressure, slips of stiff wood the length of the page are laid along the opposite margins, and upon these the full pressure of the finger is brought to bear. The board itself may be of any dimensions to suit the class of work for which it is required, from a pocket volume up to a large plan or map.

The numerous practical photographers who were present when this piece of apparatus was exhibited and described welcomed it as supplying a want that had long been felt, and that welcome was none the less cordial from the conviction that each of them could construct it for himself at a small cost. The board itself may be sustained in a vertical position on any convenient stand, or it may be suspended on the wall. When used by Mr. Mason in Bellevue Hospital it is erected on the adjusting rod of an ordinary head rest.

A New Type of Embroidery.

The attention which has been drawn to the novel style of embroidery, exhibited first in Boston and now in New York, by Mrs. Oliver Wendell Holmes, Jr., of the former city, would seem to be justified by the originality, boldness, and artistic promise of the work. The effects are produced by combining filoselle, worsted, silk, and cotton thread on a ground of satin. There is no regularity of stitch, no parallelisms of threads, no inclinations of an exact series of darnings, none of the usual formal methods in embroidery; yet the effects are striking and pleasing. There may be something of haphazard, hit-or-miss, about the work, says the art critic of a morning paper, still the effect is impressive, if not startling. "It is, in fact, the vigor of the work which gives the pleasure. Here is one striking piece, perhaps the best: On a dark blue silk ground, imitative of an evening sky, there stands out in the foreground the gnarled limbs of a New England fir tree. Dark masses of foliage, made by the thick laying on of masses of worsted, indicate the irregular growth. The sheen of the moon on the water is expressed by silvery lines of white thread, and off in the distance is the red lamp of some lighthouse. These are the conceptions of an impressionist, only instead of the facile brush and paint there is substituted for them needle and thread. Here are fields all aglow with the autumn weeds, where the golden russets form a rich, warm mass of color. Here is quite the opposite: A storm, a blizzard, with the stinging snow, expressed by driving lines of white thread. It is all realistic, with some little of a Japanese method, for there are water pieces with tumbling waves that look almost as if they had been made at Yokohama. Some of these embroideries shock just a little by the effects of the cold, clear skies, produced by the hard silk backings, for there may be criticism, for the work itself enters from its cleverness quite into the domain of art. Perhaps this new method of expressing things with a needle is only tentative so far, for other effects might be more happily produced by taking a softer worsted back, and not the hard silk background. Mrs. Holmes has certainly produced most novel effects, quite incomprehensible to masculine minds when the methods are understood. One would suppose, however, that no tyro could ever produce this kind of work, for the requirements to make such embroideries would be a keen eye for form, outline, and a very perfect appreciation of color and contrast. Of the originality of the work, even of the pleasant impressions derived from Mrs. Holmes' embroideries, there can be no doubt."

Buggy Beans.

Recently several cases of sickness occurred in Kingston, N. Y., it was supposed, by eating diseased pork. Specimens of the pork were sent to Dr. George F. Shrady, of this city, for examination, at the request of Dr. E. H. Loughran, Health Officer, Kingston. Dr. Shrady reported that he could discover no evidence of disease in the pork, and that it was entirely free from trichinæ. All of the persons who were made sick, as supposed, by the pork, also ate heartily of beans, the dish being baked pork and beans. After the report of Dr. Shrady the subject was allowed to rest, as the sick persons all recovered, though for a time it was feared that several of them would die. It was afterwards discovered that the trouble was caused by the beans, they being infested with small black insects. The bean which is thus infested presents on its surface a faint, black spot, underneath which one or more of the insects may be found. Persons who have eaten heartily of such beans have been taken violently sick with vomiting, accompanied by general weakness and prostration, which continues for a few days only.

James Tennant.

Professor James Tennant, F.G S., of King's College, London, one of the best known of British mineralogists, died February 23, having just completed his seventy-third year. His celebrity as a mineralogist was universal, and his special acquaintance with gems secured him the honor of recutting the famous Koh-i-noor diamond for Her Majesty, and the permanent appointment of Mineralogist to the Queen. Professor Tennant was the teacher of most of the eminent geologists and mineralogists of to-day, and was the author of several valuable works is his department of science. Among his writings are: "Catalogue of Fossils Found in the British Isles," "Art Gems and Precious Stones," a "Description of the Imperial State Crown Preserved in the Jewel House of the Tower of London," "Iceland Spars," and a "Stratigraphical List of British Fossils," with remarks on their character and localities. He was likewise joint compile with Professors Ansted and Mitchell of the "Treatise on Geology, Mineralogy, and Crystallography," published in 1857 in Orr's "Circle of the Sciences."