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THE BRUSH ELECTRIC LIGHT STATION-STREET ILLUMINATION IN NEW YORK.--[See page. 211.]

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## OUR DEEP SEA FISHERIES

Among the important items of the Sundry Civil Appropriation Bill of the late Congress was one granting $\$ 103,000$ for the construction of a sea-going steamer for the use of the U. S. Fish Commission. The vessel is designed for purposes of deep sea exploration, and will be constructed under the supervision of Professor Baird.
A considerable amount of good work in this direction was done last summer with the little Fish Hawk during an interval of forced inaction in the work of flsh hatching, for which she was specially designed. Taking advantage of spells of settled weather the Fish Hawk made three runs to the edge of the Gulf Stream, spending twelve bours on each occasion in deep sea work, but not daring to stay longer because of the unfitness of the little craft to endure rough weather. To do the work properly would require a properly equipped seagoing vessel, such as the appropriation provides for. Accordingly Mr. Copeland, naval constructor of the Lighthouse Board, has planned a vessel in which are embodied all the requirements of a staunch sea going boat, as small as the service will permit, but able to do any work of the kind re quired, and at the same time fitted for the hydrographic ervice of either the Coast Survey or the Navy Department when no longer needed by the Fish Commission. The pro posed vessel will be about 200 feet keel.
The method of deep sea research proposed by Professor Baird will embrace determinations of temperature and the depths of currents; the collection of objects from the se bottom and from the water at all depths, from the surface down; and the collections of samples of water at various depths for chemical and microscopical investigation. The emperature investigations, he thinks, will be of very great mportance, as the distribution and migrations of fish ar largely influenced by variations in the temperature of the water inhabited by them.
Among the problems to be solved by these investigation is the cause or occasion of the recent abandonment of the waters north of Cape Cod by the menhaden. Some 2,000 men in Maine were engaged in the menhaden fishery, and the capital invested by them approached $\$ 2,000,000$. The hopes of this industry depend upon the discovery of the cause of the change in the Labit of these fish, and whether the change is likely to be permanent.
The disappearance of mackerel from the Gulf of St. Lawrence is instanced by Professor Baird as another problem, the solution of which requires the use of a sea-going vessel If the Commission can determine the probability of a con tinued absence of the fish from the Gulf before the next con vention is held to consider the value of the Canadian fishe ries to the United States, the impending negotiations will be greatly simplified.
The Commission also hopes that by the thorough scientific study of the habits of our coast fishes, to be made possible by the new steamer, it may be possible to establish general principles by which the fishermen may know each year a what points to meet the incoming schools of mackerel and
menhaden, and thus save weeks of fruitless search for them.

## INDEX OF UNITED STATES PATENTS

One of the most conspicuous, at the same time one of the most commendable, of the acts of the Forty-seventh Congress was the passage of House bill No. 5,066, appropriating $\$ 10,000$ to be expended under the direction of the Commis sioner of Patents in the preparation of a classified abridgment of all the letters patent of the United States.
Such a work has long been needed, both in the Patent Office and out of it. Indeed for lack of it the efficiency of the Office has been materially diminished for many years; while an incalculable amount of wasted time and thought and money is traceable to the inability of inventors to discover what previous investigators have accomplished, or where they have failed, in the same lines of effort.
Last year more than 7,000 applications for patents, many of them representing, no doubt, years of patient investigation, were rejected for lack of novelty. A large part of the labor and cost which such reinventions entailed might have been saved, and many other more successful efforts might have been facilitated, had our inventors been furnished with the knowledge locked up in the Patent Office awaiting the key which is now provided for. And the 7,000 disappointed inventors represent probably but a small fraction of those who, during the past year, were engaged in more or less fruitless efforts to advance the useful arts.
This waste of intellectual energy and useless expenditure of means by a class which could least afford to spare them port for 1848 Commissioner Ewbank urged upon Congress the grave need of an index of patents, such as has now been tardily promised. At that time the number of rejected applications did not reach a thousand a year, yet the Commis. sioner could then justly say of the digest asked for:
"In a pecuniary point of view such a work is most desir able to this Office, to inventors, and the public at large. When made accessible to popular reference it will be the saving of millions. No State paper could surpass it in importance, nor in lasting value. Till it is done a majority of applicants for patents must continue to meet with some disappointment. The only safe rule with them is always to make themselves acquainted with what has been attempted before incurring any serious outlay. They should never presume that their devices have not entered other heads than their own until, by a searen encian other hean their
sumption remains in their favor unimpaired. No better advice than this can be given them. But how are they to follow it? Nineteen-twentieths have few or no reliable sources of information within their reach, and not one in a hundred can afford the expenses of a visit to Washington and a residence there for the purpose of consulting the Office records and library.
For thirty years and more this grievous barrier has lain at the very threshold of invention-thirty years, during which the world has been revolutionized and the scope of human life increased enormously by the successful efforts of nventors. Who can estimate the evil which has directly and indirectly resulted from the long neglect to do justice to he Patent Office, to inventors, and still more to the genera public, which, more than all the rest, is to be benefited by the work of the inventor and the highest efficiency of the patent system?
It is to be hoped that there will be no delay in the prose cution of the work of preparing and printing the digest which the new law provides for; and that, when printed, the work will be made easily accessible to every man who may wish to consult it.

## THE BARGE SYSTEM ON THE MISSISSIPPI

Mention was made in this paper recently of the sailing of fleet of barges from St. Louis with over 10,000 tons of rain ( $20,847,900$ pounds) for export by way of New Orleans. The fleet was towed by the steamer Oakland, which took, in addition to the eight grain barges, a capacious fuel barge. The largest tows last year were as follows: The Iron Moun tain and barges left St. Louis, April 10, with 300,000 bushels of corn, or $16,800,000$ pounds cargo. The same boat and barges, February 29, with 47,000 bushels of wheat and 210,228 bushels of corn, or $14,392,768$ pounds. The D. Gilmore, July 17, with 178,000 bushels of wheat and 311,000 bushels of corn, or $13,860,000$ pounds; and the Oakland August 10, with 230,158 bushels of wheat.
The shipments from St. Louis by barges for European ccount last year reached a total of $15,717,664$ bushels of wheat, corn, and rye. The shipments of the same sort in 1870 comprised only 66,000 bushels of wheat
The prospect of an extension of the operations of the St Louis and New Orleans barge line to Davenport, Iowa, next summer has led the Democrat, of the latter city, to investigate the progress and prospects of the barge system. It finds that at the close of 1880 there were four lines of towboat and barges engaged in transportation, aggregating 15 boats and 86 barges, with a total capacity in bushels of $4,690,000$ and $4,200,000$ per month to New Orleans. The boats and barges now building number 1 boat and 24 barges-of the latter, 22 having a capacity of 60,000 bushels each and2 of 50,000 each, which will increase the total capacity to $6,000,000$ bushels There are now four established barge lines from St. Louis to New Orleans for the transportation of grain for export, and bree of them are making the additions referred to above The four rank as follows in present and building capacity Mississippi Valley Transportation Company, 7 boats and 49 barges, with a total capacity of $2,520,000$ bushels; St. Louis and New Orleans Transportation Company, 6 boats and 50 barges, with a total capacity of $2,550,000$ bushels; the Anchor Line Company, with 2 boats and 12 barges, and a total capacity of 500,000 bushels; and the M. C. T. Company, with 1 boat and 9 barges, of 540,000 bushels capacity. The trips of the tows of these lines last year from St. Louis direct numbered 113, and these transported $5,913,272$ bushels of wheat and $9,804,392$ bushels of corn, including 45,000 bushels of rye. The number of barges to a tow would be about five, and the average cargo of each trip for the year 140,000 bushels.
All this vast trade has been made possible by the improvements of the channel of the Mississippi below New Orleans, particularly by the jetty system at the mouth of the river.

## LARGE CRAFT ON THE LAKES,

When the Congressional committee had under consideraion last winter the question of appropriation for the improvement of the harbor at Chicago, the Inter-Ocean of that city remarked that while eleven feet of water in Chicago River sufficed for the commerce of a few years ago, from fifteen to seventeen feet were needed now, to accommodate craft carrying from 50,000 to 70,000 bushels of grain
Seven or eight years ago a craft of 600 tons was considered large on the lakes; now Chicago alone owns many that are twice and three times as large. A list printed in the paper mentioned gives the names, tonnage, and values of nearly fifty vessels ranging between 800 and 1,000 tons, and more than fifty baving a capacity exceeding 1,000 tons Of these fifteen propellers are rated between 1,500 and 2,000 tons, and one at 2,082 tons. The values of these vessels range between $\$ 00,000$ and $\$ 125,000$. At the same time there were on the stocks at the different lake ports forty vessels of 2,000 tons and over, several ranging between 2,500 and 2,800 tons.
One of the latter, having a carrying capacity of 80,000 bushels of grain, was lately launched at Cleveland. Its dimensions are given as follows: Keel, 255 feet; beam, 38 feet; hold, 20 feet. It is a propeller, employing two compound engines, the cylinders measuring $43 \times 48$ and $22 \times 48$ respectively. The two boilers are each 10 feet in diameter and 17 feet long.

Another vessel soon to be launched at Toledo measures as follows: Length of keel, 265 feet; length over all, 278 feet breadth of beam, 38 feet 9 inches; hold, in shallowest place
masted and will carry 5,500 yards of canvas. Her cost is estimated at $\$ 95,000$, and her carrying capacity will be, full draught, 140,000 bushels; 14 feet 6 inches draught, from $90,0,00$ to 95,000 bushels of corn. There is a decided recent movement in the direction of iron vessels for the lake service.

## water supply of cincinnati.

We are indebted to Charles F. Klayer, Esq., member of the Board of Health of Cincingati, Ohio, for a copy of a recent report of the Sanitary Committee, made to the Board of Health, on the public water supply of the above city. Most of the city water is taken from the Ohio River, but other sources are made use of, namely, springs, wells, and cistern water. A growing suspicion on the part of the public that the sewage of the city, owing to the ripid increase of popu lation in the vicinity of the pumping works, was injuring the purity of the water, led to the appointment of a com mittee of examination. The analyses of the water established the unwelcome fact that the sewage of the city se riously contaminates the river water supply. One re ervoir however, at Markley Farm, twelve miles from Main strect, was found to furnish water of good quality-as good as the was found to furnish water of good quality-as good as the
Croton water, New York. The report shows that waters Croton water, New Yorik. The report shows that waters
exposed to atmospheric air contain naturally about one exposed to atmospheric air contain naturally about one
pound to one and one-balf of sewage to the million gallons.
On this basis the general conditions of comparison are as follows:

For better water supply for Cincinnati it is suggested in the report that wells might be sunk in the sand beach alongside the river bank at Dayton, Ky., where, by means of 116 tube wells, 20 inches in diameter and 20 feet deep, and a water main 3,000 feet long, a new supply of superior water filtered through the sand to an extent of fifty million gallons daily, cau be obtained.
An interesting supplementary report by C. R. Stuntz, M.D. on the analyses and value of cistern water for domestic pur poses, the impurities it contains, how it becomes contami nated, etc., is presented. Those who think that cistern water is the only proper liquid for domestic use, may have occasion to change their notions after reading this report which we give in full in Scientific American Supplement, No. 275. It is accompanied with rules for the proper location and care of rain-water cisterns, which shoul
be read and practiced by all who depend on this sy stem.

## The Cost of Coal Gas.

Mention has been made in this paper of the evidence given by Mr. Kennedy, in the Philadelphia Gas Trust inquiry touching the manufacture of coal gas. More recently he has been on the stand again, and, in answer to the question, What should be the cost of gas in the holder? has given the following statement of cost of 1,000 cubic feet of gas of 16 candle power, the price of coal being $\$ 4.30$ per 2,000 pounds:

| Coal. | \$0.44.9 |
| :---: | :---: |
| Labor. | . 15.8 |
| Lime | .01.2 |
| Renewal of retort settings | .02.2 |
| Disposition of debris. | .00.6 |
| Water supply | .00.3 |
| Consumption of gas in works | . 003 |
| Supplies .. | .00.7 |
| Repairs | .01.5 |
| Contingencies, expenses, and improvements. | 06.2 |
|  | \$0.73.7 |
| Sale of coke at $\$ 2.50$ for 36 bushels, to be deducted.. | .11.7 |
| Net cost. | \$0.62.0 |

Mr. Keunedy explained that he calculated to make 5 feet o g as to the pound of coal, by adding 10 per cent of cannel coal at $\$ 10$ per ton, and he credited the coal with 30 cents a ton for the residual products, 20 cents for tar, and 10 cents for ammoniacal liquor.

## Dangerous Toy Torpedoes

A serious explosion in a toy torpedo factory lately took place in Brooklyn, N. Y., caused by the accidental upsetting of a dish containing a quantity of explosive pellets. The building was a two story brick. The walls were blown out and seven persons badly injured. These torpedoes were composed of red phosphorus, chloride of potash, sulphur, and sulphate of lime. A pill of this mixture, the size of a pea, is placed, with a thimbleful of sand, in a bit of colored tissue paper and twisted up. This constitutes a torpedo which, when thrown on the ground, explodes with a sharp crack. The manufacture is very dangerous, and the making or selling within city limits should be prohibited by law. There are plenty of instruments with which boys may satisfy their instincts for making noises without resort to deadly ex plosives.

## French Exhibition of Electricity.

Mr. George Walker, our Consul-General in Paris, was, up to the time of his appointment, connected with the Western Union Telegraph office of this city, and is therefore likely to be more interested in electrical matters than most consuls. Mr. Walker has communicated to our government the decree which the French Government bave passed convoking an
the 15 th of September, 1881, and closes his report as fol ows:
"While the subject of these decrees will come officially and formally before the Government of the United States through its Minister at Paris or the Minister of the French Republic at Washington, I venture to think that the matters to which they relate fall strictly within the range of those commercial and industrial facts which it is made the duty of consular officers to communicate to the government. In this sense I may be permitted to express the hope that the coun ry which gave birth to Franklin, to Morse, and to Henry nd which is now the home of Gray, of Edison, and of Bell, will not neglect to participate in the proposed congress of electricians, and to impress upon it those scientific ideas in relation to one of the greatest forces which modern discovery
has furnished to the world, whiclr have received such a remarkable and rapid development in our own country.'

## the reese circular saw

The Reese circular saw, it will be remembered, consists o a circular smooth-edged iron plate, which will cut in two without touching it, a bar of steel placed in front of it and revolving in an opposite direction. The statements which have been made in the American and English papers in re gard to this apparatus having been questioned by Frocech writers, Mr. Reese has recently written a letter to one of the latter, Mr. L. Baele, giving his theory in regard to the ope ation of his saw. This letter, translated into French, was communicated to our contemporary, La Nature, from whi
we again translate it into English. It reads as follows:

## L. Baele, Esq.

The interest that scientists are manifesting in my circular saw by reason of its faculty of cutting steel bars without touching them, leads me to call your attention to a much more wonderful phenomenon yet that $I$ bave always observed in studying the operation of this apparatus. And allow me to say to you that for this saw, of which I hold the patent,
there is paid to me a royalty of $\$ 1,000$ on each one used. there is paid to me a royalty of $\$ 1,000$ on each one used. You see, then, that it is really a practical and useful appa ratus.
When the bar to be cut is brought near the disk in motion the metal immediately melts, and there escapes a current of sparks of a dazzling whiteness. Yet one's hand may be placed in this stream of molten metal with out its being in any way burnt; and the temperature is even but little different rom that of the surrounding at mosphere. A sheet of white paper placed therein would not take fire, and would not even be discolored; and it would be the same with a piece of cot ton wicking soaked in oil if it were placed in the current not far from the bar to be cut. Besides the drops of molten metal which fall thus to the ground a certain number are projected sideways in all directions. The sparks which thus pass in the atmosphere over a space of more than five feet become rapidly heated and burn like a hot poker. In America it is from France and Germany that we expect the solution of questions of abstract science. What scientist versed in the study of molecular physics, can give us the ex planation of so wonderful a phenomenon? The compara tively cold sparks burn like a hot poker, while the glistening incandescent molten mass will not burn at all, and will not discolor white paper.
The fusion saw is a circular iron disk, 42 inches in diame ter and twatenths inch thick. It is mounted on an arbor like an ordinary circular saw, and put in motion by the aid of pulleys and belts. It is given a velocity of 2,300 revolutions per minute, represonting at the circumference a tangential velocity of 25,250 feet. Then the cold steel bar which is to be cut is placed in front of the disk and made likewise to revolve, with a speed of 200 revolutions per minute.
Under these conditions as soon as the bar arrives in prox mity to the disk there is produced on its surface a little drop of molten metal, and a few seconds afterward a notch, and this without the disk ever having touched the bar. The rotary motion of the bar facilitates the flow of the molten metal, and the separation of the metal never takes place by contact, but only by melting. All bodies melt, as well known, at a suitable temperature; but is not this temperature
a perceptible measure of the velocity of the molecules in their movements in the interior of bodies? So long as this velocity is kept within certain bounds the body remains in a solid state; but if it exceeds these, the molecules then flow off in a liquid state-fusion takes place. Then if, going yet further, we increase the velocity of the molecules we arrive at the gaseous state. Fusion is thus produced, then, without any contact, and the only condition necessary is to bring the molecules up to the requisite velocity. The pressure of the atmosphere perceptibly increases, as you have pointed out In the description of the apparatus, on each surface of the disk, and may even attain during the experiment 1.02 atmospheres. The molecules of air are thrown, in fact, in directions divergent to the velocity of 25,250 feet per minute, and there takes place a certain increase of intermolecular distances at the same time with an absorption of latent heat. The gaseous particles thus projected strike against the bar with the velocity of fusion, and under the influence of these multiplied shocks and of the compression which results therefrom, the latent heat, which has become free, is transmitted into the bar of steel, brings the metallic molecules to the velocity of fusion, and in this region the metal flows of in a liquid state.

Some years ago I heard Mr. Tyndall say in one of his lec ures, "Temperature is the measure of moleeular velocity, as gravity is the measure of matter," and I thought then tha it would be possible to make a practical demonstration of this theoretical idea. I was then led to construct the fusion saw, and to my great satisfaction I beheld the little drops of liquefied metal flow off at the velocity of fusion.
In conclusion, I think that this imponderable agent which escapes our senses, and which we call heat, is the same which, in being transmitted through gases, communicates to mole cules the velocity which renders them luminous, just as it can bring those of solid bodies to the velocity of incandescence; and when it is obliged to exert its action upon contracted space it is also that which produces the phenome non that we attribute to electricity. Yours truly,

Jacob Reese

## American Butter in Ceylon.

The American Consul at Ceylon, Mr. Morey, deprecates the packing of butter in tin for shipment to warm climates. He states that butter arriving at Ceylon from the United States thus packed has become deteriorated from the cor rosion of the tin, or the use of impure salt used in the pack ing, and that there is not only a loss to the importer, but he mplies that it naturally brings a discredit upon the producer and our nation. He says: "The French are sending to the East large quantites of Normandy butter, in one and two pound botiles, with mouthsabout two inches diameter, glas toppered, and secured with hard, white cement, so as to be perfectly air-tight. The butter is fresh; but after being packed, about one tablespoonful of white pearly salt, almos mpalpably fine and exquisitely pure, is put into the neck of the bottle, and the stopper applied. This butter retails almost unlimitedly at 65 cents gold per one pound bottle, and 55 cents per pound in two pound bottles. As our coun try has now become famous for its excellent glass, and there can be no question about the conservation of butter in vessels formed of that material, I see no reason why our export ers should not only imitate the French in using it for pack ing butter, but for cheese also, thereby securing preservation and a never-failing market for those commodities in this oriental hemisphere."

## A New Entozoon in the Ostrich.

A serious plague among young ostriches has been spread ing over South Africa during recent years. A post mortem examiuation made by Mr. Arthur Douglass discovered the trouble to arise from the presence of myriads of small thin worms adhering to the coats of the ostrich's stomach Specimens were sent to Dr. Spencer Cobold, of London, who pronounced.them unknown to science, and named them Strongylus douglassii. The importance of the discovery may be estimated from the fact that ostriches are worth from $\$ 750$ to $\$ 900$ a pair, while the ostrich industry is a source of great revenue to South Africa. The cause of the plague being known some means of destroying the parasite may be looked for.

## The Denver Mining Exhibition.

Substantial progress appears to be making toward tne es. tablishment of a permanent exhibition of mining appliances, ores and other minerals, at Denver, Colorado, next September. An exposition company has been organized, and forty acres of land bave been secured whereon it is proposed to erect a building to cost 250,000 . A considerable part of the needed money has already been subscribed.
Mr. Clarence King bas promised to loan one set of specimens from the triplicate geological collection which is now being made under his direction. It is intended that this exhibition shall display every natural fact and every artificial process known to mining engineers. It will be dis tinctly national in its character, but collections, machinery, illustrations, and treatises from abroad will be welcomed.

## Lacquers for Brass.

1. Seed lac, dragon's blood, annatto, and gamboge, each 4 ounces; saffron, 1 ounce; wine spirit, 10 pints
2. Turmeric, 1 pound; annatto, 2 ounces; shellac and gum juniper, each 12 ounces; wine spirit, 12 ounces.
3. Seed lac, 6 ounces; dragon's blood, 40 grains; amber and copal triturated in a mortar, 2 ounces; extract of red sanders, $1 / 2$ drachm; Oriental saffron, 36 grains; coarsely powdered glass, 4 .ounces; absolute alcohol, 40 ounces. (Very fine.)
4. Seed lac, 3 ounces; amber and gamboge, each 2 ounces; extract of red sanders, $1 / 2$ drachm; dragon's 1 llood, 1 drachm; saffron, $1 / 2$ drachm; wine spirit, 2 pints 4 ounces.
5. Turmeric, 6 drachms; saffron, 15 grains; hot alcohol, 1 pint; draw the tincture and add: gamboge, 6 drachms gum sandarac and gum elimi, each 2 ounces; dragon's blood and seed lac, each 1 ounce.
6. Alcohol, 1 pint; turmeric, 1 ounce; annatto and saffron, drachms each. Agitate frequently for a week, filter into a clean bottle, and add seed lac, 3 ounces. Letstand, with occasional agitation, for about two weeks.
7. Gamboge, $1 / 2$ ounce; aloes, $11 / 2$ ounce; shellac (fine), 8 ounces; wine spirit, 1 gallon.
From half an acre of land at Bristol, R. I., Mr. Arthur Codman gathered last year 6,300 pounds ( 126 bushels) of grapes, some clusters weighing a pound and a balf each, and all perfectly ripe. The vineyard contains 550 Concord vines, twelve years old, and kept low and closely pruned. The grapes yielded 580 gallons of wine.

COMPARATIVE EXPERIMENTS MADE WITH NAKED AND

## METALLIZED CARBONS

by e. reynier.
These experiments were made at the works of Lautter \& covered with nickel; with the negative carbon the shape was

Fig. 1.
Fig. 2.
Fig. 3.


| Dimensions | State of the surface | Consumption per hour in millimeters. |  |  | Length of the consumed part in millimeters. |  | Light in Carce burners |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | + | - | Total. | + | - |  |
| $\begin{aligned} & \text { Diam., } 7 \\ & \text { millimet'r } \end{aligned}$ | Naked, Fig. ${ }^{\text {c }}$ \% $\ldots$ | 166 146 1 | 68 40 | 234 186 | ${ }_{24}^{53}$ | 23 10 | $\stackrel{917}{9}$ |
|  | Coppered, Fig. ${ }^{\text {Nickeled, }}$ Fig. 3. | 106 | ${ }_{38}$ | 184 | 12 | 7 | 947 |
| $\underset{\text { Diam., } 9}{\substack{\text { Dillimet'r }}}\{$ | Naked <br> Coppered | $\begin{gathered} 104 \\ 99 \\ 98 \end{gathered}$ | 50 34 3 | 154 132 13 | 45 <br> 27 | $\stackrel{22}{7}$ | 523 553 5 |
|  | Nickeled .. ..... |  | 36 | 104 | 21 | $7 \frac{1}{2}$ | 516 |

burning Carré carbons. The positive carbons covered with mgested by Prof. Bell's photophonic experiment in which opper cave a very cood shape, and an excellent one when beam sounds are obtained by the action of an intermittent
little courage and ingenuity may provide cheap substitutes which will amply answer the student's purpose. The rude apparatus, herewith figured, illustrates this fact.
sliggested by Prof. Bell's photophonic experiment in which beam of light upon solid bodies. Referring to this, Prof. yndall says:
" From the first I entertained the opinion that these singular sounds were caused by rapid changes of temperature produciug corresponding changes of shape and volume in the bodies impinged upon by the beam. But if this be the case, and if gases and vapors really absorb radiant heat they ought to produce sounds more intense than those ob tained from solids. I pictured every stroke of the beam responded to by a sudden expansion of the absorbent gas and concluded that when the pulses thus excited followe each other with sufficient rapidity, a musical note must be the result. It seemed plain, moreover, that by this new method many of my previous results might be brought to an independent test. Highly diathermanous bodies, I reasoned, would produce faint sounds, while highly ather manous bodies would produce loud sounds-the strength of the sound being, in a sense, a measure of the absorption The first experiment, made with a view of testing this idea, was executed in the presence of Mr. Grabam Bell, and the result was in exact accordance with what I had foreseen."
I have successfully repeated Prof. Tyndall's experiment with the simple apparatus shown in the illustration, and have verified the results obtained by him. Utilizing apparatus already at hand, I mounted a small sized bulbous glass flask, $13 / 4$ inches in diameter, in a test-tube holder, and placed it be hind a rotating pasteboard disk, 12 inches in diameter, hav ing twelve apertures $11 / 2$ inches wide and $11 / 4$ inches long I provided several flasks of the same capacity, and filled them with the different gases and vapors, and stoppered them, to be used at convenience. Near the disk I placed a common gas flame, and into the mouth of the flask was inserted on end of a long rubber tube, the other end being provided with a tapering ear tube, placed in the ear of the listener, whose position was sufficiently remote from the apparatus to avoid any possible disturbance from the revolving disk or the operator. The disk being rotated so as to rapidly intercept the thermal and luminous rays of the gas flame and render the rays rapidly intermittent, the effect on the gases and vapors contained by the different bulbs was noted. Dry air produced no sound; moistened it yielded a distinctly audible tone, corresponding in pitch with the rapidity of the inter ruptions of the thermal rays.*
Among gases tried, nitrous oxide and illuminating gas yielded the loudest sounds. Among vapors, water and sulphuric ether were most susceptible to the intermittent rays. A candle flame produced dis inctly audible sounds in the more sensitive gases, and a hot poker replacing the gas flame yielded the same results.
By using an ordinary concave spun metal mirror the heat of the flame was satisfactorily projected from a considerable
distance. Considering the crudeness of my apparatus and Considering the crudeness of my apparatus and
direction, as they are fully given in Scientific American Supplement, No. 272, of last week, and are, therefore, accessible to the reader.

## Lamp of 100,000 Candle Power.

A Brush electric lamp of 100,000 candle power was successfully tested in Cleveland, Ohio, March 6. Tbis is fifty times the illuminating power of the ordinary street electric lamp. It is the largest and most powerful lamp ever made, and is to be used in the British Navy. The carbons are two inches and a half in diameter. The light requires 40 horse power to maintain it.

ELECTRICAL FIRE INDICATOR OF M. G. DUPRE.
A large number of electrical fire indicators have been de-


## ELECTRICAL FIRE INDICATOR.

ised and constructed, but the one represented in the engrav ing is one of the simplest and most practical of any that we It consists of a small mahogany board upon which are arranged two small copper rods, one, A B, fixed, connected with the binding post, R ; the other, CD, movable, connected with the binding post, Q, and supporting a weight, E. A | battery and bell are inserted between the binding posts, $R$ and $Q$, and a small lump of tallow is placed between the horizontal bends of the rods, the movable rod, C D, resting upon it
When the temperature of the locality where the appara tus is placed rises above the melting point of tallow it melts, and the movable rod descends under the action of the weight, E. An electrical contact is then established between the two branches, B and C , and the bell is set in m()$-$ tion.
By replacing the tallow with any other fusible non. conducting material the apparatus may be employed to indicate the precise instant when a given temperature is reached.

A metallic substance may be placed between the points, A and D , the fusible metal of Darcet, for example, on condition that the rod, A B, be cut at some point in its length, in such a manner as to interrupt all metallic communication between the two parts of the rod.
The apparatusis simple, in expensive, compact, and may erest (or affords a better test of the possible sufficiency of cheap appliances) than his recent experiments for testing acoustically the capacity of apors and gases to absorb radiant energy
It often happens that students who would like to test experimentally the results arrived at by distinguished investigators, are kept from such instructive pleasures by the notion that for delicate experimenting nice and expensive apparatus is required. Such apparatus is undoubtedly good to have and pleasant to work with; but where it is not to be had
little too short when nickeled. Independently of the im positive carbon the nickel oreased the duration of carbons nine millimeter diameter fifty per cent and those of seven millimeter sixty-two per cent. The coppered carbons thus occupy a position mid way between the naked arbons and the nickeled nes.
For equal section the meallization does not modify the illumination.
Among the refractory metals nickel is to be preferred, especially for the positive pole (iron being very difficult o apply in thin coats).
The figures represent the hapes of the naked and metallized carbons: Fig. 1, the naked carbons; Fig. 2, copper covered; Fig. 3, those covered with nickel.-Translated from La Lumière Electrique, by Clarence Sterling

## TYNDALL'S EXPERIMENT

 ON RADIANT HEAT.by geo: m. hopkins.
In the entire range of Prof. Tyndall's investigations noth-

apparatus exhibiting the action of radiant heat on gaseous matter.

## AMERICAN INDUSTRIES.-No. 69

the brush electric light.
The most difficult problems in electric lighting have been: (1). To provide an efficient and economical means of converting mechanical power into electric energy, that is, a good dynamo-electric machine. (2). To devise a generator able to evolve an electric current capable of subdivision, to supply a series of lamps in one circuit. (3). To invent a self-regulating lamp adapted to such an electric circuit, and so constructed that any accidental disturbance of it, or so constructed that any accidental disturbance of it, or
its extinction, would have no effect upon the other lamps in the same circuit. The lamp to the same circuit. The lamp to
be at the same time easy to be at the same time easy to
keep in order, durable, and economical in power. (4). To discover an automatic method of regulating the supply of electricity so that the current would be always exactly equal to the varying requirements of the circuit. Up to 1876 , when Mr. Brush produced his when Mr. Brush produced his
firstdynamo-electric machine, first dynamo-electric machine,
a large number of scientific a large number of scientific
investigators and mechanical inventors had been at work upon these problems. Individually and together they had accomplished much, but there was yet no machine that could be considered a com mercial success, and no lamp -certainly no system of electric lighting-that had passed beyond an experimentally promising stage. There was no machine that could furnish a current for a number of lamps, much less sustain them in one circuit with steadiness and uniformity. Very soon after Mr. Brush entered the field, he presented to the public an apparatus which was free from the defects of all other systems, and the public, waiting for justsuch an apparatus, welcomed the new machine, and the result is that to-day the Brush Electric Light is practically the sole occupant of the field; at least forty-nine out of every fifty lights that have been sold in this country being Brush lights. Up to the present time over 6,000 Brush lights have been sold for regular industrial use, and the business has only just opened. An idea of the great superiority of the Brush system of lighting may be obtained from the fact that with the largest sized Brush machine forty powerful electric lights are burned in one circuit, with an absorption in the machine of thirty-six horse power. We believe that no other system of lighting can mantain one fifth of this number of lights on one circuit; and most are confined to a single light to one machine
Although the Brush electric light has been introduced on an extended scale in other cities, it is only recently that it has been brought to the city of New York; but notwithstanding the tardiness of its apperance here, it is being largely introduced and used by both private individuals and the public.
Our large illustration represents the lighting station of the Brush Electric Illuminating Company of New York, at 133 and 135 West 25th street, and also shows a portion of Broadway between 14th and 34th streets, as it appears at night illuminated by twenty-one Brush electric lights.
In the same illustration we give a view of the im mense factory of the Brush Electric Company at Cleveland, Ohio; also views of some of the lamps. The parent company at Cleveland controls the manufacture and sale of all of Mr. Brush's patented inventions relating to electric light or electro-plating apparatus and supplies.
The genius. of the in ventor of this system, and theenergy and good business management of the Brush Light Electric Company of Cleveland. have done more since 1876 to place the business of illumination by the electric light upon a practical and substantial basis than has been done in this direction by all other inventors since the discovery by Faraday, at least so far as voltaic arc lights are concerned.
In every sense the Brush electric light is a practical, commercial success, and is no longer an experiment. No better
proof of this could be required than the well known fact that no one can buy a Brush machine or lamp at less than regular prices. Makers of other machines may offer inducements of every kind, in the way of large discounts from regular prices, the privilege of a trial with no obligation to purchase, long deferred payments, etc., etc.; but the Brush Company takes the same ground held by George H . Corliss in regard to engines, and claims that the apparatus they furnish is no longer experimental, that it is well worth the price asked for it, and should not be compared with merely experimental systems whose principal recommendations ar


## BRUSH ELECTRIC LAMPS.

that they can be bought at the purchaser's own price, and may be returned if not satisfactory.
Not only has the Brush light practically monopolized the Not only has he but if we may judge from is also rapidly doing the same abroad. It has made wonderful advances in England, where it is controlled by the Anglo-American Brush Electric Light Corporation, Limited, having a capital of $\$ 4,000,000$. One yea ago this company bought the English patents of Mr. Brush at a very large price, and we understand they have recently purchased all his other foreign ration-those for France. Belgium, Austria, Russia, Italy, Spain, Norway, Sweden, Denmark, etc., paying for them still larger prices than they paid for the English patents, and they now propose to commence the introduction of the Brush light into all these countries in the same business-like and thorough manner which has characterized its management from the first. The
sums paid for these foreign patents are, it is claimed, greater

250 lights in parks, docks, and summer resorts; 275 lights in railroad depots and shops; 150 lights in mines, smelting works, etc.; 380 lights in factories and establishments of various kinds; 1,500 lights in lighting stations, for city lighting, etc.; 1,200 lights in England and other foreign countries. A total of over 6,000 lights which are actually sold, none of them being on trial
This system, we believe, is the only one by which a large number of powerful electric lights can be burned in series, upon a single circuit of wire, with steadiness and uniformity. The machine known as No. 8 maintains forty lights of 2, 00 candle power each, upon a circuit ten miles in length of copper wire No. 6 English gauge. By using still lish gauge. By using still
larger wire the distance or length of circuit may be proportionately increased, it being possible to extend the circuit to twenty-five miles by using No. 1 wire. The smaller sizes of Brush machines are fully as efficient. A No. 7 machine is used in Montreal to light the harbor on a circuit of about three miles, using sixteen lights. Another peculiarity and advantage possessed by the system is that any number of lights desired, from one up to the number capable of being maintained by the machine, can be burned in circuit from the machine without changing its speed or adjusting the lamps.
Each lamp of the Brush type is provided with an automatic cut-out, which is oue of the valuable features of the system. If from any cause a lamp in circuit becomes deranged so that its carbons do not feed together properly, or if the carbons need renewing, the cut-out mechanism is called into action and this particular lamp is switched out of circuit without disturbing any other lamp in use. When this lamp has been supplied with carbons again and put in order it will burn as before. This simple cut-out mechanism effectually guards against all the dangers of general extinction of lights, a thing liable to occur in all other systems. We believe that no other system uses a cut-out.
When it becomes desirable to operate lamps more than seven or eight hours continuously, the double lamp shown in our large illustration is used, and two sets of carbons are employed. Both carbon rods are actuated by a single magnet, the same as that employed in a single lamp, and they are so arranged that wheu one set of carbons is completely consumed, the other set is automatically switched into circuit.

In practice the transfer of
the voltaic arc from one set of carbons to the other is instantaneous and scarcely noticeable. By means of these double lamps a system of lights may be maintained in continuous operation from fourteen to sixteen hours without requiring any attention, whereas other systems are limited to six or eight hours' continuous burning
The great simplicity and durability of the machines are points of importance in considering the wear and tear from constant use. The experience of the four years shows that ne per cent allowance for wear and tear is ample to cover, and that with even a less amount annually spent upon the machines they will last indefinitely.
The business of the Brush light on Manhattan Island is in the hands of the Brush Electric Illuminating Company of New York, a corporation organized under the laws of ganized under the laws of
the State, with a capital of $\$ 1.000,000$. The officers
D. Juilliard, Vice President;

BRUSH DYNAMO-ELECTRIC MACHINE.

than have ever been paid for any other foreign patents obtained by an American. As rapidly as arrangements can be made the Brush light is being introduced into every civilized country on the globe, and it seems to have found a field in every branch of industry, and in almost every imaginable situation, as the following partial list of users indicates:
There are 800 lights in rolling mills, steel works, shops, etc.; 1,240 lights in woolen, cotton, linen, silk, and other factories; 425 lights in large stores, hotels, churches, etc.;
 re: W. L. Strong, President; A. D. Juilliard,Vice President; A. A. Hayes, Jr., Secretary; S. B. Sturges, Treasurer; C. M. Rowley, General Manager; R. J. Sheehy, Superintendent. The first lighting station of the company is at Nos. 133 and $i 35 \mathrm{West} 25$ th street. It contains at present five dyna-mo-electric machines, the largest of which is 89 inches long, 28 inches wide, and 36 inches in height, and weighs 4,800 pounds, and runs at a speed of about 700 revolutions per minute. It is believed to be the largest machine in the
world. Forty lights are fed by it, and it requires 36 horse power. Several circuits are connected with this station, one exclusively for lighting parks and streets. Broadway, from 14th to 34th street, is lighted from there. Among buildings in this district are the Sixth Avenue Elevated Railroad, the Sturtevant House, the Gilsey House, the Standard Theater, Daly's Theater, the Bijou Theater, the Aquarium, Aberle's Theater, Koster \& Bial's, the Herald office, and many others. The company runs wires from this station to any point within a radius of two miles, putting up the light in any desired place, and renting in the same manner as is done with gas.
The street lighting is done by means of double lamps on iron posts twenty feet in height, and in plain glass globes. It is proposed to extend this materially and to use the larger lights, elevated on poles, for open spaces, as is now done in the West. This company has had much success in lighting large buildings for balls, such as the Academy of Music, Madison Square Garden, etc., using opal and lemon colored globes, giving a hue to the light which is approved by the globes, g
fair sex.
The establishment of lighting stations in cities and towns for the illumination of streets, parks, open spaces, depots, docks, stores, hotels, factories, etc, is enlisting very large amounts of capital, and promises to be a busiviess as profitable and as eagerly souglt after by capitalists as gas companies bave been heretofore. Companies have already been formed, or are about to be formed, for the establishment of such lighting stations in the following cities and towns: New York, Philadelphia, Boston, Baltimore, Washington, Providence, Albany, Hartford, New Haven, Meriden, Rochester, Buffalo, Cleveland, Cincinnati, Dayton, Indianapolis, Columbus, Middletown, Detroit, Grand Rapids, Chicago, St. Louis, Denver, Salt Lake City, Ogden, Butte, San Francisco, etc.
It is only a question of a few months before similar companies will bs formed, and similar lighting stations established in every city and town of any pretensions in the country. In all of the above places the Brush light is to be ex clusively used.
The general plan of operations in all these lighting stations will be similar to the one in New York, which, briefly described, is as follows: A location is first selected as central as possible with reference to the territory to be lighted; sufficient space must be provided for engiues, boilers, heater, pumps, shafting, belting, pulleys, etc.; space is also to be provided for the dynamo-electric machines with the necessary wires and connections. As the steadiness and quality
of the light are dependent entirely upon the steadiness of the power, care is taken to provide for this by the use of engines of approved make, with automatic cut-offs and other modern appliances for producing steady motion. The central station baving been thus equipped, copper conducting wires are run from it on poles, on house tops, or underground, to the various points or places where light is needed.
The light is furnished and charged for in proportion to the amount used, and this is readily ascertained by noting the consumption of carbons in the lamps, which is sufficiently uniform for this purpose. When the engines in the lighting station are started the electric light machines are put in motion, and the electricity passes over the wires, and produces a light in each lamp in circuit. An automatic governor or regulator is provided for each electric machine, and this is so constructed and so connected to the machine that, without changing the speed of the machine, any num ber of lights from one up to the number capable of being produced by the machine may be burned without any disturbance or interference, either in the machine or in the lamps. By means of this simple and admirable contrivance any of the lamps in circuit may be turned off or turned on without increasing or diminishing the light in any of the other lamps in the circuit. From this description it will be evident that a lighting station of this character affords prac tically all the facilities provided in the use of gas, for the electric lamp may be turned on and off at the lamp itself as readily as if it were a gas burner. The lighting of interior spaces is in this way fully provided for in a practical manner
In the matter of lighting streets and open spaces electric light possesses many advantages not possessed by any other illuminating agent. The electric lamps can be placed on top of lamp posts of moderate height, as in the lighting of Broadway, New York, each electric light providing for the illumination of a space two hundred to three hundred feet in diameter; or the lamps may be placed upon towers at a considerable elevation above the ground and above adjoin ing buildings, as is done in Wabash, Indiana, and Akron, Ohio; each light, or group of lights, providing for a general illumination over an area a mile or more in diameter. Either of these plans is perfectly practical and successful, and both have been thoroughly tested. For the lighting of cities and towns of moderate size the latter plan is the most economical, and will, no doubt, be very largely adopted. The town of Wabash, Indiana, was the first in the world to light its streets wholly in this way, and they find that four Brush streets wholly in this way, and they find that four Brush
lights, of 3,000 candle power each, placed.on an iron flag. lights, of 3,000 candle power each, placed.on an iron flag-
staff on the dome of their court house, at a height of about staff on the dome of their court house, at a height of about
130 feet above the ground, are sufficient for the general il130 feet above the ground, are sufficient for the general il-
lumination of an area from one half to three quarters of a mile in every direction. Some of the streets are, of course, much better lit than others, although they are not nearer to the lights, because the light is not intercepted by intervening buildings. It is stated, however, that even in the streets
est, there is yet enough diffused light to permit of getting around without the use of other light. It is also stated that
even at a distance of two miles from the lights there is a sort of general illumination produced which is of considerable value.
By placing a sufficient number of powerful electric lights upon towers high enough it is no doubt possible to produce an amount of light that would be practically as efficient as daylight for the lighting of all spaces within a reasonable distance of such towers. A sufficient amount of light couid be thus provided to light the interior of buildings and dwellings sufficiently for ordinary purposes. This is the plan that has been proposed for the lighting of the Capitol and its surroundings at Washington.
It is proposed to place upon the dome of the Capitol, and upon six towers surrounding it, at a distance of 1,000 feet from it, no less than 450 electric lights, each of 6,000 candle power, or a total light of $2,700,000$ candle power, equal to 200,000 four foot gas burners. The effect of such an enormous nassing of light at such a distance above the ground and surrounding buildings would produce a surprising effect, and within a considerable area would, no doubt, be practically equal to daylight. If this plan is carried out the Brush light will be used. This subject will be brought to the attention of the next session of Congress.
The Brush Company have not yet taken up that branch of electric illumination known as incandescent lighting, because the voltaic arc system has so far proved vastly more economical than any possible incandescent system for the lighting of streets and large parks, buildings, manufactories, or halls. A single example will illustrate this fact. None of the advocates of incandescent lighting claim that their usual size of lights are any more powerful than an ordinary four or five foot gas burner; and wherever incandes cent lights have been used at all practically, as at the Equitable Building in New York, each incandescent light bas not certainly more than replaced one gas burner. The usual claim made by those who are interested in this system of lighting is that from five to seven lights of this size can be produced by the expenditure of one horse power. Others claim that four lights per horse power is as much as can be realized in practice. Assuming, however, that five can be produced from one horse power, it would appear that no less than 29 horse power would be required to supply 144 incandescent lights in the place of the 144 gas burners formerly used in the dining room of the Continental Hotel in Philadelphia. It is a fact, however, that this dining -room has for a long time been lit, much better than with gas, with two
Brush arc lights, which, by actual dynamometer measureBrush arc lights, which, by actual dynamometer measure ment, require two horse pover-one for each light, or 15.48 horse power for the 16 hights used in the hotel. The Grand Pacific Hotel, in Chicago, replaces 571 gas burners with 16 Brush arc lights, requiring 16 horse power. If lit by the incandescent light no better than by gas, 114 horse power would be required, or, according to the figures of one prominent inventor in this line-7lights per horse power-it would require about 82 horse power. This enormous difference in favor of the arc lights, where much light is required, will necessarily confine the small incandescent lights to small
uses, where but few cas burners or lamps are now used We are assured that when in the opiniou of the Brush Company incandescent lights can be profitably and economically used they will take up that branch and be prepared to supply the market.
The officers of the Brush Electric Company (the home com pany) of Cleveland, Ohio, are as follows: General Mortime D. Leggett, President (formerly Commissioner of Patents); George W. Stockly, Vice President, Treasurer, and Busines Manager; F. K. Collins, Secretary; Nathan S. Possons, Superintendent; W. J. Possons, Assistant Superintendent. Agencies for the sale of apparatus and supplies have been established in all sections of the country. The most important of these are: the Brush Electric Light Company of New England, who control all territory east of $77^{\circ}$ longitude, ex cept Manhattan Island, of which company Mr. Lyman $\mathbf{P}$ French, of Boston, is President, and Mr. Charles M. Rowley of New York, Treasurer and General Manager. Mr. Rowley has been of the greatest assistance to the home company in the management of their Eastern business, of which he has certainly made a very great success. The Brush Electric Illuminating Company of New York controls the territory of Manhattan Island, and is pushing the introduction of the Brush light in this city vigorously. Their office is at 860 Broadway, which is also the main office of the N. E. Co. above mentioned. The N. E. Co. has branches at 5 Pember ton square, Boston; 430 Walnut street, Philadelphia; and in Baltimore and Washington. At Pittsburg the business for that vicinity is managed by Ridall \& Ingold, 224 Liberty street. Chas. E. Stockly, at Rochester, is the agent for Western New York and Northwestern Pennsylvania. Other agencies are the Brush Electric Light Company, of Cincin84 to 90 Market street, Chicago (for the Northwest); the Brush Electric Association, 421 Olive street, St. Louis (for the Southwest); Colorado Electric Company, of Denver Colorado; Salt Lake Power Light and Heating Company, of Salt Lake City; California Electric Light Company, of San Francisco, and others.
We publish in SUPPlement 274, April 2, a monograph by Mr. Brush, giving a full scientific description of his apparatus and its mode of operation, illustrated with cuts and diagrams; also profusely illustrated articles from foreign journals on the same subject.

## AGRICULTURAL INVENTIONS

Certain improvements in that class of sulky plows having the plow beam supported by adjustable hangers arranged on a suitable frame extending back of the seat, and provided with vertical adjustment for raising and lowering the plow, have been patented by Messrs. Samuel M. Robertson and Augustus A. Hamilton, of Lynnville, Iowa.
Mr. Owen Davis, of Sullivan, Ind., has patented a separator for grain, etc., so constructed as to drive off the chaff and straw, separate the larger and smaller kernels of wheat, separate the split kernels of wheat, and the cockle and cheat from the grain, separate red clover seed, timothy seed, and red top seed from the grain and from each other, and to separate the larger kernels of oats from the smaller kernels. Mr. Fred Aldred, of Glencoe, Ontario, Canada, has patented a swinging churn, having supporting sprincs, made in S shape, and attached to the ends of the churn above the central line; by this means the churn body is supported and allowed to vibrate.
An improved method of raising tobacco plants has been patented by Mr. James M. Dunkum, of New Canton, Va. The object of this invention is to protect the plants from the ravages of the tobacco fly or bug. The invention consists in protecting tobacco plants from the tobacco fly by surrounding the bed with logs, covering the bed with brush, and ap plying to the logs a mixture of whisky or alcohol, gum camphor, oil of peppermint, and linseed oil.
Mr. Lorenzo P. Teed, of Erie, Pa., has patented an improved ladder, designed especially for use in picking fruit from trees, but which may be used to advantage for any of he purposes for which ladders are required.
Mr. Philip H. Long, of Newark, N. J., has patented a separable button so constructed that the head and foot can be readily connected and disconnected, that the buttons will not turn in the button holes, and in which the fastening mechanism is connected with the foot, so that any kind of heads can be used.

## Treatment of Carbuncle by Carbolic Acid.

In the Toledo Medical and Surgical Journal, December, 1880, Dr. J. T. Woods writes:
It is now about two and a half years since a patient pre. sented with two carbuncles, one on the back of the head, the other below it, on the neck. They were of moderate size only, the upper one open in three places, while in the lowest he skin was unbroken.
Having considered the various known properties of the carbolic acid, I determined to use it vigorously instead of inserting it in meager quantity. I loaded my hypodermic syringe, and passing the point through the openings and into the sloughing mass in every direction, I completely saturated it with the pure acid and awaited results. In a minute the smarting disappeared and with it all pain and all sense of eness.
By this result emboldened, I a gain charged my instrument, nd thrusting it through the skiu over the other carbuncle, in a variety of places, I soaked the whole carbunculous mass beneath the skin, enough of necessity escaping to fully bathe the borders, modify inflammation, and destroy any septic elements then developed. I waited, not without concern, and was delighted to learu in a few moments that all the pain and soreness was gone in this also. The skin over the mass became quickly white, hard, and dead, and in a few days detached, in the form of a slough, the interior mass also becoming rapidy loosened, only requiring the cutting of a few shreds to remove it, when the cavity was found to present a satisfactory appearance and rapidly filled up, leaving an exceedingly small cicatrice. The remarkable feature in this case was that after the complete saturation of the carbunculous mass no pain occurred, my patient going about his ordinary labor without discomfort. It is now one year since I treated a very painful case, the same method bringing about similar results, the party suffering no pain or even sore
tion. ion.
In making this suggestion, which, so far as I know, is new, I am conscious of the insufficiency of my cases, but $I$ am so sure of its efficacy that $I$ shall at once resort to it when case and occasion offer, and advise others to do so, at least until the value of the measure is determined.
In conclusion, I would advise the use of the pure acid only, and to complete saturation. Dilution would increase. if not create, danger of absorption of the acid, converting a very simple procedure into a condition of great danger, and insufficient quantity defeat the purpose for which it is used.

## The Tides of Electricity.

Mr. Alex. Adams, one of the officers of the British Post Office Telegraph Department, has discovered the existence of electric tides in telegraph circuits. By long continued and careful observations he has determined distinct variations of strength in those earth currents, which are invariably present on all telegraphic wires, following the different diurna' ositions of the moon with respect to the earth.

## The Geological Survey.

Mr. Clarence King has resigned the directorship of the Geological Survey. The reasons given for the step are twoThe administration of the office left bim no time to pursue
his investigations, and he believed that he could be of his investigations, and he believed that he could be of
greater service to geology if unencumbered by executive duties and responsibilities. Major J. W. Powell is named as the probable successor of Mr. King.

## Collodion Films.

According to M. E. Gripon, if a layer of collodion, such as is used by photographers and surgeons, be poured upon a plate of very clean glass, it will be found, after the layer has dried, that an extremely thin and transparent film is formed, which, with a certain amount of care, can be separated from the glass, and may then be stretched upon a frame. This film, so placed, is seen to have some curious physical properties, which the author just named describes as follows: In the first place he finds that this delicate thin membrane reflects light exactly as glass does, and polarizes it both by reflection and by transmission of the rays of light through its substance.
M. Gripon has also found that films obtained in this manner may. be procured as thin as 0.01 of a millimeter, and that when no thicker than this they transmit a very large proportion of radiant heat. Polarizing piles, he tells us, may be formed of these layers of collodion film, which are much more transparent than the piles of mica usually employed by physicists for this purpose, and necessary in studying the properties of heal; and although they are, of course, much more fragile, and require more careful handling than mica pites, they are also more easily replaced than the latter when destroyed.

## NEW HANDLE FOR SOLDERITG IRONS.

In ordinary soldering irons and like tools it is well known that the wood which surrounds the shank is liable to become loose on account of the shrinkage and expansion of the contiguous wood and metal, and to keep the handle tight in its place it has frequently to be driven on to the shank. This results in splitting the wood and the speedy destruction of the handle. Mr. A. A. Park, of Gill, Mass., bas patented a handle which obviates this difficulty and renders the handle as durable as other parts of the tool. This handle is shown in longitudinal section in the annexed engraving. The shank of the iron is made of small gas pipe threaded at its


Park's handle for soldering irons.
free end and fitted to a perforated tube supported in the middle of the handle, which is hollow. This construction admits of a free circulation of air, which keeps the handle cool.
This handle may be fitted to an iron having an ordinary solid shank.

## Comparative Health Statistics.

The cities of the United States which made weekly sanitary reports to the National Board of Hea,th last year numbered sixty-eight. The Bulletin of the Board for February 19, contains in tabular form the aggregate results of reports so received, from which table it appears that Vallejo, California, was the healthiest place reported in 1880, and Norfolk, Va., the unhealthiest. The average life in Vallejo was 83.5 years, and only one person in 1,000 of population died of consumption, while in Norfolk the average life was only 27.9 years, and one person in 241 of population died of consumption. The aggregate population of the sixty eight cities is $7,359,937$, the average duration of life in them was $44 \cdot 5$ years, and there was one death from consumption for every 326 of population, and one death from acute disease of the lungs for every 429 of population. In otber words, of every 100 deaths $24 \cdot 4$ were from lung diseases, and of these 14 were from consumption and 10.4 from acute diseases of the lungs. Fọur of the best cities for health were Yonkeis, N. Y., average life, 70 years; Omaha, Neb., average 68 years; Utica, N. Y., $67 \cdot 5$ years; Kenkuk, Iowa, $67 \cdot 1$ years; and four of the worst cities were Jackson ville, Fla., 35 years; Vicksburg, Miss., $34 \cdot 8$ years; Charleston, S. C., $31 \cdot 3$ years; ano Savannah, Ga., $30 \cdot 6$ years. In Boston the average life was 42.5 years, deaths by consumption one in 246, by acute lung disease one in 336 of population; in New York average life 37 years, death by consumption one in 254 , and in acute lung disease one in 260 ; in Philadelphia, life 47.8 years, consumption one in 314, acute disease one in 844 ; in Cincinnati, life $47 \cdot 8$, consumption 346, acute disease 494; Louisville, life 476 , consumption 300 , acute disease 410 ; Indianapolis, life $47 \cdot 8$, consumption 447 , acute disease 381 ; Chicago, life 48 , consumption 593, acute disease 453; St. Paul, life 58.5, consumption 561, acute disease 715; San Francisco, life $51 \cdot 8$, consumption 295, acute disease 459; New Orleans, life $41 \cdot 3$, consumption 256, acute disease 584; St. Louis, life 52, consumption 447, acute disease 580. The difference between New York and Pbiladelphia in the general death rate and in that from consumption is great; in that from acute lung disease it is striking. Next to lung diseases diarrheal disorders cause the greater number of deaths. In every 100 deaths from all causes in the sixty-eight cities, 10 are from diarrheal disturbances, and there is one death from this source in every 436 inhabitants.

## RECENT DECISIONS RELATING TO PATENTS <br> United States Circuit Court.-District of Massachusetts.

mifi et al. vs. merriam et al.-Patent presser foot for shoe sewing machines.
Lowell, J.:
ing shown and described in the original patent and in the reissue is the same, but in the original has been claimed with all its features in combination, the patentee can in the reissue modify or divide his claim so as to embrace severally the distinct features of the thing invented. 2. The case of The Giant Powder Company vs. The California Vigorit Powoder Company et al. (18 O. G., 1,339) considered and commented upon.
3. The most natural construction of the law relating to reissues (Rev. Stats., sec. 4,916) would perhaps be that, if a patent should be inoperative by reason of a defective specification or invalid for claiming too much, the defect might be supplied or the excessive claim be reduced by reissue.
4. But the courts have given a very different interpretaion, much wider in most respects and narrower in only one. They do not permit a defective specification to be supplied excepting from the drawings or model; but they do permit the claim to be varied, provided the same invention is described in both patents.
5. The law is extremely liberal, perhaps too much so, and has been much abused; but if we change it suddenly we shall make a destruction of titles which it is impossible to contemplate without dismay.
6. As to the mere question of the necessity for a reissue, supposing the new patent itself to be unobjectionable, the decision of the Commissioner has always been held to be final, and this for an unanswerable reason that no patentee, however honest or careful, can be safe in obtaining a reissue if he is to be informed when he gets intocourt that the judge is unable to see why he should have surrendered his first patent. The slighter and more obviously unobjectionable the change the stronger will be the argument that there was no occasion to make it, so that honest and careful patentees will be the most likely to suffer.
7. A mistake by the Commissioner as to the necessity of issuing a new patent is not an excess of jurisdiction, but a mistake in a matter clearly within his jurisdiction, and the real question is whether it is one which the courts will cor rect by destroying a new patent after the old one bas been surrendered.
8. Urgent reasons of justice require that, upon the mere question whether the paper called a reissue shall be given, the finding of the Commissioner should be, as it has hitherto always been held to be, conclusive
9. If it be found that the claims the original patent were valid, and that the reissue for the same invention states the claim or claims in a different way, the law is well settled that the change does not of itself vitiate the new patent, but that, on the contrary, the original claims are conclusively presumed to have been made as they were through inadvertence, accident, or mistake.
10. It has been brought out a little more decidedly by the later cases that the invention must be the same; but it has never been held in the Supreme Court or any circuit court that the Commissioner's decision is not final as to the propriety of a reissue as distinguished from its validity upon what may be called its merits, or that the claims may not be varied to express the real invention.
11. The claim is part of the specification, and if defective may be amended.
12. The Reissue No. 7,558, to Daniel A. Sutherland, March 13, 1877, for "improvement in presser-feet for sewing machines," was granted in order to enable the patentee to claim the actual operations of his tool in detail, which is a perfectly legitimate reason for a reissue until the law is changed by Congress or the Supreme Court.
Patent sustained.

## MECHANICAL INVENTIONS.

Messrs. Francis W. Ashton, of Hyde, county of Chester, and William Mather, of Salford, county of Lancaster, Engand, have patented machinery for washing fabrics, which consists in certain combinations of machinery, whereby the fabrics in a distended state are continuously lifted out of and immersed in the water, soap liquor, or other liquid, while passing through the machine, so as to obtain a dashing action, which will effectually cleanse the piece while extended to its full width and witbout undue tension, thus obviating the necessity of washing pieces that are printed with color in the form of a rope, as at present.
An improved glove-sewing machine has been patented by Mr. Claude M. Boland, of New York city. This invention relates to that class of machines for sewing gloves and furs in which are employed two parallel feed disks, a reciprocating needle, and an oscillating looper; and it consists in an arrangement of parts which cannot be clearly described without engravings.
Experimental Researches on Magnetic Coercitive Force.-(D. Kulp.)-The author magnetizes iron and steel rods in spirals, which he opens before taking out the rods. On percussion, the permanent magnetism of the rods is partly increased, partly diminished, and partly inverted. As a series of induced currents arise in the rods on opening the spiral they have been exposed to magnetizing forces in alternating directions, whereby their behavior is explained.

IMPROVEMENT IN TELEPHONE AND TELEGRAPH LINES. We give an engraving of an elevated support for telephone and telegraph wires invented by Mr. T. G. Ellsworth, manager of the John St. office of the Metropolitan Telephone and Telegraph Company, New York city. Many useful and improved appliances are combined in this invention, making the whole structure an ornament rather than a blemish to the streets. In the larger cities telegraph wires are becoming objectionable to the public on account of the space they occupy, on account of the unsightliness of the poles and fixtures; and the great expense and trouble of constructing and maintaining the lines on house tops and in streets, is becoming a burden on the different companies.
The number of wires in many localities has become very large since the telephone has been so universally adopted. In many instances the breaking of a single wire has interrupted communication on twenty or thirty other wires, suggesting the necessity of some letter means to carry the wires from point to point. The great value of telegraphic and telephonic communication lies in uninterrupted service, and any means that will insure this will undoubtedly prove valuable. The particular tube shown in the engraving bas been selected from many desirable forms to illustrate this invention. Inside the tube, are arranged a number of shelves for supporting the cables, which are marked at suitable distances along the route in the covering. At each


ELLSWORTH'S TELEPHONE AND TELEGRAPH LINE
SUPPORT.
street crossing is located an electric light, its support being a part of the structure. At proper distances are located letter boxes arranged for the attachment of a pneumatic tube for collecting the letters, or they may be collected in the usual way by carriers. Electric clocks are located at desired points. Police time detecters form a part of this system, each policeman to signal to station while on his beat. By this arrangement it may be known where the men are at stated times. Fire-alarm boxes are placed at suitable distances, and ambilance boxes are provided for calling ambulances. Drin'sing fountains are distributed at different points. Tbese attachments constitute some of the uses which can be made of the structure. The columns being hollow admit of cables passing unseen underground to offices wherever desired, or special tubes can be arranged for conveyance above ground.

## Birch for Cabinet Work.

The small value of birch wood for fuel, and its lack of toughness and strength, except in the smaller twigs, have led to its general neglect in the arts. Our more enterprising builders of railway cars, however, have discovered that its light weight, close grain, and rich finish make it admirably suited for certain applications where fine finish and bright effects are desired. The contrasts presented when white birch and light colored ash are relieved by the red of the cherry birch, are said to be peculiar but very pleasing.

## Simple Mode of Toughening Glass.

A Leipsic journal gives a method which it asserts will prevent lamp chimneys from cracking. The treatment will not only render lamp chimneys, tumblers, and like articles more durable, but may be applied with advantage to crockery, stoneware, porcelain, etc. The chimneys, tumblers, eto., are put into a pot filled with cold water, to which some common table salt has been added. The water is well boiled over a fire, and then allowed to cool slowly. When the articles are taken out and washed, they will be found to resist afterward any sudden changes of temperature.
The Disappearance of a River.-The labors of a number of miners have been successful in filling up the large chasm caused by the river Bradford breaking through the roof of a disused mine at Alport, in Derbyshire. The stream, however, still flows through the mass of rock and timber thrown into the opening, and finds its way to the Derwent underground. It is impossible to divert the stream by reason of the conformation of the ground. $\boldsymbol{\Lambda}$ large number of persons have visited the spot.

## NEW SAFETY WHIFFLETREE.

The engraving shows a simple and effective device for instantly detaching horses from a vehicle. This invention was recently patented by Mr. B. J. Quattlebaum, and is controlled by Messrs. Brooker \& Home, of Ridge Springs, S. C. who are general agents for the inventor in the United States. The invention will be comprehended by a glance at the engravings, in which Fig. 1 shows one end of a whiffletree with the trace attached, and Fig. 2 shows the device as it appears when letting the trace go.
The whiffletree is of ordinary construction and attached to the pole or shafts in the usual way. The end of the whif. fletree is provided with a clip in which is pivoted the lever,


## QUATTLEBAUM'S SAFETY WHIFFLETREE

A, with its shorter arm projecting beyond the end of the whiffletree to receive the end of the trace, while the longer arm rests against the rear side of the whiffletree and is retained by a locking lever, B, pivoted to the whiffletree, and having its longer arm projecting in a direction parallel with the lever, A. To this arm is attached one end of a forked strap, the other end of which is connected with a similar lever on the opposite end of the whiffletree. This strap is within easy reach of the driver, and when pulled moves both levers, $B$, simultaneously allowing the levers, $A$, to escape, and permitting the traces to slip off, as indicated in Fig. 2. This operation is so simple and easy that a child can readily work the device even when the horses are pull ing to their full extent. A spring guard, C, attached to the end of the whiffletree, serves to prevent the accidental unfastening of the traces. When the trace is to be put on or removed from the rounded end of the lever, A, the guard, C, is sprung out of the way. This device is simple and in expensive, and there appears no reason why it may not out last the whiffletrees. It is a useful and much-needed invention and should find a ready application wherever horses are used

## IMPROVED HYDRAULIC RAM.

The hydraulic ram is one of the simplest and most desirable devices for raising water where a fall of a foot or more is available, providing its construction be such as to insure continuous and uniform action under equable conditions A ram which seems to embody every essential feature with out being unduly complicated is represented by the an uexed engraving, in which Fig. 1 is a per pective view showing the exterior, and Fig. is a vertical sectio showing the interior construction.
The base of the ram bas a horizontal pass age, $A$, with a dis harge valve, $B$, at the harge valve, B , at the op, and an overflow alve, C, at the end Covering the discharge valve there is an ai chamber, held in place by keys or wedges, and furnished with a dis charge pipe at the top which projects a short distance downward and serves the double pur oose of a discharge for water and an escape for the surplus of air n the chamber. On f the greatest troubles with all rams, aside lrom this one, is the radual increase of water in the air cham ber until the cham er is filled and ram stops. The ram
shown in the engraving airs itself, and drives off with the water any surplus air when the quantity is more than suffi cient to till the space above the lower end of the tube, D The discharge valve, B, is attached to a flap formed on a disk of leather which also forms the packing of the lowe end of the air chamber. The valve is concaved to receive the bead of the rivet or bolt which secures it to the leather and the leather touches the valve seat a short distance from the edge of the valve opening. By means of this construc tion the valve is always kept free from ridges, and whether
or not it always strikes exactly in the same place it is always tight.
The overflow valve, C, is hung upon a casting attached to the lower end of the spring, E , and its stroke is regulated by the screw, F , which bears against the body of the ram. Tlis screw, F, carries a toothed head which may be secured in any desired position by a stop or pawl. This construction admits of regulating the overflow valve to the $\frac{1}{448}$ part of an inch, and effectually prevents it from jarring out of ad ustment. The valve can be regulated to make from 30 to 300 strokes per minute, and the ram may be adjusted so delicately as to raise water 10 feet on a 9 inch fall, or it may raise water 200 feet with less than 4 feet fall. For irrigat ing lands, supplying dairies, farms, barnyards, dwellings, factories, engines, railroad stations, villages, etc., this ram is invaluable, as its extreme simplicity enables it to be set up or repaired by any one likely to use it.
This improved form of hydraulic ram is the invention of Mr. H. F. Morrow, of Chester, Pa., who has a patent for it and an application pending.

## Mode of Purifying oils.

Oils in their natural state are always more or less impure and some of them so viscous as to be quite inapplicable to the lubrication of machinery, or to illuminating purposes, without previous purification. The impurities consist, for the most part, of albuminous, mucous, gelatinous, and coloring matters. A great part of the mucilaginous matters, and all bodies merely in a state of suspension, are deposited by repose for a short time; but, in order completely to clarify the oil, it is necessary to employ other means. The method most generally adopted is that suggested by Thenard. Sulphuric acid, for example, in the proportion of 1 to 2 per cent of the oil, acts as a purifying agent, precipitating the mucilage and parenchymatous matters: first, by its power ful dehydrating action, it removes the water by which the substances were held in solution in the oil, and afterward chars the mucous matters themsel ves, thus rendering them nsoluble, or otherwise effecting their destruction. The oil tself is, to a small extent, used upon. It becomes green or dark brown, and after some time yields a deposit of the same color, becoming itself bright and clear
Thenard's purifying process, as improved by Cogan, is conducted as follows: The oil is heated to $212^{\circ}$ Fah. by steam in a copper pan. When sufficiently hot, from 1 to 2 per cent of sulphuric acid is gradually poured in, with con stant and violent agitation. As the action of the acid de pends more or less upon the amount of contact between the wo liquids as well as upon the degree of heat, Cogan's im provement consists in blowing steam through the mixture In five or ten minutes the action will be complete, and after wenty-four hours' repose, the oil will be almost entirely freed from acid, and the black feculent dregs will subside leaving the supernatant oil quite clear and greatly improved in color. For one hundred gallons, ten pounds of sulphuric acid are required, diluted with an equal bulk of water. After standing for twelve hours, the black watery acid quor is withdrawn, by opening a stop cock at the bottom of the pan. The clear and limpid oil is then drawn off by
opening a tap in the side, and what remains below this tap i turbid, and this, being let wit into a reservoir, is cithe clarified by subsidence, or mixed with the next portion of raw oil.

## NOVEL FIRE RINDLER

The engraving shows a recently patented fire kindler which dispenses with matches, and is always ready and re iable. The kindler is moulded from inflammable materia in the form of hollow pyramids, a number of which are produced in a sheet, as indicated in the illustration. The apices of the pyramids are tipped with a striking surface of material something like that applied to the ends of safety matches, which can be ignited only by striking it against a prepared surface. This admits of packing and shipping the indlers with perfect safety. The peculiar form of the sheet admits of forming a very close package, and it facil tates breaking off one or more of the pyramids as may be equired. The material of the kindler is easily ignited, and burns for a long time, giving off no unpleasant odors. It is


## IMPROVED FIRE RINDLER

cheaply made, and answers perfectly the purpose for whic is intended.
Further information may be obtained by addressing Mr Wm. Rausch, 1828 Wood street, Philadelphia, Pa.

## Proposed Crematory in Brooklyn:

The advocates of cremation, as an economical and sani ary mode of disposing of the dead, appear to be increasing in number and confidence. It is now proposed to establish crematory in Brooklyn, a gentleman having tendered a plat of land there for the purpose. Steps have been taken to organize a society for the construction and operation of the crematory, with an associated society for collecting, collating, and publishing information in relation to cremation and its advartages. It is expected that the expense of cremation may ultimately be reduced as low as five dollars.

## Compressed Air Locomotive

A preliminary trial to test the practicability of employ ing compressed air instead of steam as the motive power or an underground railway lately took place on the Metro politan line, London. The engine employed was one of Beaumont's compressed air locomotives, and was originally made for a tramway. It was not large enough to draw complete train, the wheels being only thirty inches in diame er. The inventor, Colonel Beaumont, R.E., was present ogether with Mr. Tomlinson, chiet engineer of the line Colonel Frank Bolton; Major Ardagh, of the War Office and several other gentlemen. A start was made from the Chapel street works of the railway company ear the Edgware roa tation. The engine ran o Baker street, wher it was shunted on to he St. John's Wood ine to pick up a car riage, which most of he party entered in order to continue the journey. The engine then ran from Bake street to Moorgate street. On the return journey, after a halt a King's Cross, the en gine ran without a stop to Edgware road, the distance between the two stations-which is for the greater part an ascent of 1 in 100 being performed in ight minutes, or les han the avera or lime taken by the ordinary trains The total distance run, including the shunting, was about eleven miles, and the weight moved, including the engine itself, was about 20 tgns.

The engine commenced with an initial pressure of $1000 \mathrm{lb} . \mid 243$ such batteries, and yet Faraday has proved that the on the square inch, and when the run was finished the gauge showed a remaining pressure of 300 lb . in the cylinders. 'The engine was perfectly under control throughout the trial, and was started and stopped with the greatest ease. Further experimental trials will be made on the Metropolitan line, but for the present the result is considered highly satisfactory

Hudson's Bay as a Possible Outlet for the Northwest
During the past summer the engineers of the Nelson River Railway Company have surveyed a railway route between Norway House at the outlet of Lake Winnipeg and Fort Churchill on the Hudson's Bay. The distance between these places is about three hundred and fifty miles. The surveyed route first follows the course of the Nelson River for a distance of nearly one hundred miles over a level country. The next part of the road is over a broken rocky country, where he Nelson River has a descent of nearly seven hundred feet to the lower plateau, where the country again becomes level, and continues so to Hudson's Bay. Upon entering this rocky range the surveyed route leaves the Nelson River, taking a more northerly course toward the valley of the Churchill River, which is reached at its entrance on the lower plateau, and continues to foilow the course of the river to its outlet in Hudson's Bay. The estimated cost for building the roadbed is ten thousand dollars a mile on the plateau and seventeen thousand dollars a mile through the rocky portion of he route, or an average of twelve thousand dollars per mile long the whole route
It is claimed that by this route it will be possible to transport grain from the Saskatchewan Valley to Liverpool for less than it will cost to carry it to Montreal by the proposed railway north of Lake Superior.
Professor Bell, of the Canadian Geological Survey, who sailed from Fort York, Hudson's Bay, and passed through Hudson's Straits in the latter part of last September, says that sailing vessels have sometimes considerable difficulty and delay in getting through, but steamships can make the voyage at any time between the first of May and November as the straits are nearly one hundred miles wide in the narrowest part, and the channel is not obstructed by ice.

A Gigantic Electrical Battery.
An immense galvanic battery has been constructed for use in the lectures at the Royal Institution, London. It consists of 14,400 cells of chloride of silver and zinc elements. Each cell is composed of a glass tube about the size of a large test tube, stoppered with a paraffin wax stopper, hrough which the zinc rod and chloride of silver are in serted, a small hole being left to pour in the solution, which consists of a weak solution of chloride of ammonium (sal ammoniac), the hole being fitted with a small paraffin stopper to make it air-tight. The tubes are mounted in trays each containing 120 cells; eighteen trays are fitted in each cabinet. The battery, which is in the basement of the building, was begun in June, 1879, and finished in August, 1880 The charging of the battery occupied three persons a fortnight. A lightning flash a mile long could be produced by
of lightning would resuit from the decomposition of a single grain of water.

## RUSSIAN BEER FLAGON.

The annexed engraving represents an example of Russian artistic metal-work. It is a massive silver flagon wrought in high relief, in a spirited design embodying an episode in


SILVER RUSSIAN BEER FLAGON.
the life of Peter the Great. With the exception of the waist of the vessel and knob of the cover the flagon is quite plain but the relief portions are done in a style characteristic of Russian art.

## SCALY-FINNED FISHES

Our engraving represents members of a large family of fishes called by Dr. Günther Squamipinnes or scaly-finned fishes, because "the vertical fins are more or less densely covered with small scales;" but the spinous portions are not always scaly. These fishes are mostly carnivorous, and are inhabitants of the tropical seas and rivers. They are re markalle for their peculiar shape and their strange color their length, and their mouths are usually small.

The first group of this family have small mouths furnished with several rows of tiny, slender, and bristle-like teeth, which give them their scientific name Chatodontina, a term composed of two Greek words, the former signifying hair, and the latter a tooth. The colors of this group are brilliant and generally arranged in stripes or spots. Black and yellow are the prevailing colors, but blue and green are found in some species.
Fig. 1 in our engraving represents a fish which is found in the Indian Ocean and the western part of the Pacific Ocean, and is called by the Arabian fishermen of the Red Sea the flag fish (Chetodon setifer), on account of the considerable lengthening of the fourteenth ray of the dorsal fin. Dark bands run in different directions upon the whitish ground of the body. A black band edged with white extends from the neck through the eye to the throat; it is widened on the under side. Five or six blackish bands run obliquely from the front upward toward the dorsal fin, and from these lines eight or ten bands issue nearly at right angles, take a slight sweep downward, and then converge toward the tail. The region over the eye is also ornamented with four orangeyellow diagonal lines. The back part of the dorsal fin is lemon color, and has a black spot surrounded with an edge of white; above this the fin is a fiery red edged with black. The caudal fin is lemon yellow, ornamented on the back side with a crescent-shaped pale yellow and white-edged girdle, then with a cylindrical dark brown, black-edged girdle. The anal fin is orange color edged with black and seamed with white. The pectoral and abdominal fins are reddishwhite. The dorsal fin has thirteen spinous and twenty-five soft rays, the anal fin three spinous and twenty soft rays; the pectoral fin has sixteen, the abdominal fin six, and the caudal fin seventeen rays. The length of the fish is about eight inches.
The coral fish (Chetodon fasciatus), Fig. 2, is about six and a half inches long. The main color of the head is white, with a broad black band extending from the crown of the head to the "præ-operculum," or front gill cover. The body is a bright yellow, ornamented with from nine to twelve brownisb-black bands running obliquely from the front upward and back, reaching to the yellow fins. The lips are rosy red. The soft dorsal and anal fins have a black border. The caudal fin has near the end a lentiform black diagonal marking and a whitish edge. The dorsal fin has twelve hard and twenty-five soft rays, and the anal fin three hard and nineteen soft rays. This fish inhabits the waters extending from the Red Sea to China.
A third species of this group is the cliff fish (Chotodon villatus), Fig. 3. It is about four and a quarter inches long. The ground color of the body is lemon yellow, and has about thirteen longitudinal stripes. The head is ornamented with a broad black curved eye band, with a narrower band behind it running in the same direction. The brow has three or four diagonal lines, which, with the bands and the surroundings of the mouth, are black. The soft part of the yellow dorsal fin has a black edged band and an orange colored border. The anal fin has a bright yellow stripe extending the whole length with an orange colored border, and the black caudal fin has a broad rosy-red border. The dor-


1. FLAG FISH.-2. CORAL FISH.-3. CLIFF FISH.-4. CHARIOTEER.-5. DUKE FISH.-6. EMPEROR FISH.
sal fin has thirteen hard and twenty-one soft rays, and the anal fin has three hard and nineteen soft rays. This beautiful fish is found in the waters between Eastern Africa and the Society Islands.
Fig. 4 represents a reroarkable fish which, on account of the peculiarly elongated dorsal spine, has received the name of long-spined chætodon or charioteer. It also exhibits well the scale covered fins. Both of the scientific names Heniochus monoceros are of Greek origin, the former signifying a charioteer-the long slender spine representing the whip; and the latter signifies "single horned," in allusion to the same peculiarity. The fourth dorsal spine is enormously elongated and whip-like, its use not being as yet ascertained. The prevailing color is grayish-yellow, which passes upon the breast and throat into a silvery white; the head is partially or wholly black, the side of the snout light. Two very broad black bands are drawn across the body touching the fins. The first extends from the back to the abdomen; the second is almost parallel with the first, and runs from the fifth to the eighth spine of the dorsal fin downward to the extreme end of the anal fin. The fins are lemon color where they are not touched with the bands. This fish inhabits the whole of the Indian Ocean.
Nearly forty species of the genus to which the duke fish (Holocanthus diacanthus), Fig. 5, belongs are now known. They all possess some remarkable peculiarity of coloring, and the front gill cover is armed with a strong sharp-pointed thorny spine. The ground color of the body is lemon yellow. There are eight or nine pale blue bands broadly edged with black extending diagonially across the body. The back of the head is black, and beautifully marked with blue longitudinal and diagonal lines. A blue stripe surrounds the eye, another runs down to the edge of the front gill cover. The pectoral, abdominal, and caudal fins are yellow. The oft part of the dark brown dorsal fin is striped with black and blue at the edge; the remainder is spotted with dark blue. The brown anal fin is ornamented with six or seven curved bright brown bands. Fourteen hard and nineteen soft rays support the dorsal fin; three hard and nineteen soft rays, the anal fin.
The emperor fish (Holocanthus imperator), Fig. 6, is still more beautiful. The smutty sulphur-yellow head is adorned with a brownish black brow and eye band, which is edged with bright blue. The region over the pectoral fins has a large black spot bordered with yellow which stands out distinctly from the violet blue color of the body. The body is ornamented with a large number of curved yellow stripes extending throughout its entire length. The abdomen and breast are a greenish brown, the fins bluish, their rays brighter or darker orange color merging into black. The brown anal fin is decorated with blue curved longitudinal ines. This fish has also the thorny spine on the front gill cover. It is an inhabitant of the Indian Ocean.-Brehm's Animal Life.

## MISCELLANEOUS INVENTIONS.

An improved buckle has been patented by Mr. N. L. Anderson, of Sioux Falls, Dakota Ter. The invention con sists of a curved, looped, and barred frame, through which the trace is designed to pass, having a vertical stud projecting from the upper edge of the rear bar and designed to enter the trace, and, in combination therewith, of a tongueless barred and curved frame designed to be secured in the hame tug, locking with the tongue frame in such a manner that a strain upon either trace or tug will apply a corre ponding pressure to compress the trace between the tongue bar of the one frame and the cross bar of the other frame.
Messrs. Cristobal Benavides and Joshua P. Arthur, of Laredo, Texas, have patented an improved sheep shears, so onstructed that the blades are separable from the handle.
Mr. Minard M. Smith, of New York city, has patented a series of coated alkali balls attached together and traversed by a common wire passing through the entire series.
An improved shoulder pad has been patented by Mr. Isaac N. Stern, of New York city. This invention consists in a hollow segment-shaped pad, made of some air-tight material, such as rubber or oiled silk, which pad is inflated and placed between the cloth of the coat and its lining at the joint of the sleeve and shoulder.
An improved stop for oil can spouts, which allows for in let of air when oil is poured from the can, has been patented by Messrs. Winfield S. Ricker and Robert H. M. Barker, of Cambridgeport, Mass. The invention consists in a spring finger lever provided with disks covering the neck and spout of the can, and fitted so that they may be simultaneously opened by pressing the lever, to permit of the oil be ing poured out and to admit air into the can, the lever bein also adapted to be moved aside to open the neck for filling.
Mr. John D. Brooks, of Jersey City, N. J, has patented a surface condenser, more particularly for marine engines, which provides large condensing surface in a small space It is constructed with a series of narrow steam condensing spaces of annular corrugated form in cross section with in tervening cold water spaces of similar form
Mr. George B. Stetson, of New Bedford, Mass., has patented a twist drill grinding machine. The invention concists of a sliding head adjustable on a suitable standard, so as to be moved toward or from the grinding wheel, and supporting a horizontally swinging bed, on which is mounted a chuck or jaws for holding the drills to be ground, and supporting also a sliding plate or fulcrum, a system of levers
connecting the same with the chuck or jaws, whereby the
latter may be vertically adjusted. And it consists, further, of a stop and a drill guide attached to the chuck, and of the machine.
Mr. Samuel H. Bakewell, of Lansing, Iowa, has patented pump which reduces the comparative pressure of the water on the piston, and the power required to work the pump, and which throws water both during the ascent and scent of the piston.
Mr. William D. Peebles, of Breckenridge, Texas, has pa ented a balanced piston engine, which may be operated by water, steam, air, or other gas, and may be run at high peed.
Mr. Edward A. Eustice, of Greenvale, Ill., bas patented a sulky plow so constructed that it can turn a square corner and can be readily adjusted to deep or shallow furrows. As the team starts forward in a new direction the plow is turned at right angles or at the angle which the new direction makes with the former direction, and at once begins to cut a fur row, no ground being left unplowed and no wide space being required for turning the machine. The machine is turned by the draught applied to the draw-rod (each horse drawing his own share) instead of by side pressure upon the tongue.
Mr. Edward A. Fisher, of Worcester, Mass., has patented castanet which consists of two pieces or strips of wood, the longer of which has an aperture made through it from side to side near its lower end, and an insulated plate secured over the aperture, while the shorter piece has a ball, prefer ably of wood, attached by a rigid shank to its lower end the castanets being operated by holding them between th fingers of one hand and striking the ball against the meta plate. The tone produced is musical, and by using a num er of the instruments on each hand a tune can be played. Mr. Rector R. Wilson, of Stewart, Ohio, has patented a locomotive whicb provides a substitute for springs supporting a locomotive engine on driving wheels and trucks. The engine is free to swing laterally as well as longitudinally, and ride more easily and with less wear upon the rails. The supporting frame is itself supported upon standards resting upon the boxes of the driving wheels
Mr. Henry S. Rogers, of Auburn, N. Y., has patented boot and shoe shave and head cutter. It is a combination tool for trimming edges of boot and shoe soles, cutting beads, and cutting strips on the bottom of the soles. A handle carries an adjustable slide having an adjustable stripe-cutting knife attached and also carrying a combined shave and bead cutting knife.

Oil, Tallow, and Tow.
Considering that the materials referred to in the heading f this article are in such general use in coal and other mines few remarks upon them will probably be read with interest, especially if we point out some simple ways in which their qualities may be tested.
Olive oil used for engine lubricating should not be contaminated by earthy or other impurities, nor should it contain any acids, which act detrimentally on machine journals, prings, and the sliding surfaces of the steam distributing organs. The presence of acid in oils may be detected by mmersing litmus paper into the oil. The paper will be reddened in color if acid be present in the liquid. It may be safely asserted that every impurity or oil adulteration is detrimental to lubricating purposes. By them the oil becomes thickened and soils the lubricating wicks. Care should also be taken to retain the oils as pure as possible, which can be done by keeping the lubricating vessels well closed. Egg like substances, which cause the oil to turn bad and to become sticky, rendering it quite unfit for lubricating pur poses, may be more or less distinctly detected by their turbid ppearance.
Lubricating oils should not be too thick, in order that they may be easily absorbed and able to run between the bearing brasses; nor should oil, on the contrary, be too thin, so that it may remain for some time between the bearing surfaces of rotating shafts, etc., without losing its lubricating property. If the oil runs too easily, a waste must ensue by a too rapid consumption.
Perbaps the simplest way to test the consistency of variou oils would be by the employment of a flat iron bar, 4 or 6 eet long, and channeled with equal grooves. This should be inclined, and an equal number of drops of the various oils allowed to fall on the top of the bar, care being taken to observe which quality travels the greatest distance in certain imes. This will at once indicate which of the oils is the thinuest or the most liquid. The narrower the streak whic the oil leaves behind it in traveling down the bar the greater is its consistency. For lubricating purposes, that quality is the best which has traveled furthest after the lapse of seve ral days, provided, of course, that the oils have been poured in precisely equal quantities on to the bar. Oil which ha dropped, or which has been taken out of the lubricators, should not be again used for oiling journals and brasses; it is far better to collect it in separate vessels, and after letting it stand, to use it up for the guide bars.
The most common and the most pernicious adulterationwhich may be detected both by smell and taste-is the oil obtained from the cotton seed. This substitute is much thicker, and deteriorates the quality of olive oil. It speedily urns the latter bad, and so renders it worse than useless.
Engine parts which come in contact with the live steam are best lubricated by tallow, because the high temperature
of the steam easily evaporates oil. It is not economical to
pour melted tallow into the cylinders or valve boxes; the steam mostly carries this away into the condenser or into the open air. Consequently, tallow is best to be used in the lubricators adapted to receive it, as then the whole of the rubbing surfaces are covered with a thin film of tallow, because of its falling drop by drop into the main steam pipe, whence the live steam takes it into the valve box and passes it on to the cylinder, where it then falls on to the rubbing surfaces.
The stuffing glands of both cylinder and valve chest should be amply lubricated with tallow. It is unquestionable that much annual expense might be saved to steam users were they to take more active interest in watching and check ing the wasteful modes in which their engines are lubricated, and in enforcing upon their engine drivers greater economy in this respect. Thus, the use of large oil cans with small lubricators, the pouring of oil on to gliding surfaces, which usually gives more oil to unexposed surfaces than to the bearings, and the overfilling of lubricators, are some of the most prevalent of wasteful habits practiced in engine houses.
As with oil, so tallow also should be as pure as possible, and be free from all foreign matters, which are to be detected in a turbid appearance. If the use of impure tallow is at imes rendered compulsory, it should be melted down before use. After scumming the surface, the pure tallow may be poured off, but the bottom sediment should be rejected. As the bottom of tallow casks are generally dirty, it isalso advisable to go through the same melting-down operations when the bottoms are nearly reached. Tallow contains more or less of fatty cells, which, though not injuring the appearance, deteriorate the quality of the tallow very much for lubricating purposes. To test tallow in this respect, all that is required is to take a sample and to boil it well with water. The fat collects together on the water surface, when it is allowed to go cold. If the tallow is free from these fatty cells, then its under surface will be comparatively even; but f otherwise these cells will show themselves there not unlike roots. According to the greater or less abundance of these roots, the purity or impurity of the tallow may be judged. As a proof against the tallow being rancid, the water in which it is boiled should not act as an acid on litmus paper. Tow which is intended for engine purposes should be clean free of roots, sand, etc. Its fiber should be solid and strong, or it is otherwise rotten and not wall adapted to this purpose. Tow which is rough to the touch and which contains much unbroken fiber, is of secondary quality. Prime qualities are advantageously chosen, and in this state tow presents long, delicate, and soft fibers of white color. It is true the cost of purchase is in this case enhanced, but the ensuing smaller consumption more than amply covers the extra expense of prime cost. Cotton-waste may be equally advantageously used.
To utilize cotton-waste or tow over again, i.e., to clean it, water-glass may be diluted with three parts of water, and the ow or waste immersed and worked round with a stick. After half an hour's soaking the liquid may be let off, and hot water poured on to the waste, which should be then well rinsed. If the original soft touch is required to be regained, the waste or tow may be rinsed a second time in lukewarm water, when it will be found, after drying, to be equal to new. Particular care should be taken when using the waterglass not to allow it to touch the skin, hence the stirring of the liquid should not be done by the bare hand.
Tow which has been once wet is not so efficacious, because it does not absorb the oil so well. If it has by mistake been steamed, it should be aired, to prevent it from moulding, etc. If the tow is not clean it should be carefully beaten in small parcels to cause the impurities to fall out. Oily tow which is merely kept for lighting up fires should not be allowed to be thrown anywhere. It should be kept carefully in a place by itself, and caution observed to prevent spontaneous com-bustion.-Colliery Guardian.

Gold and Silver Statistics.
The Director of the Mint has submitted to the Secretary of the Treasury a report upon the production of precious metals in the United States for the fiscal year ending June 30 1880, which shows the following amounts by States and Territories:


Gold.
$\$ 6,00$
40,000
$17,50,0,000$
$3,20,000$
$3,60,000$
1,02000
$1,980,000$
$2,40,000$
$4,80,000$
10,000
950,000
$1,090,000$
21,000
210,000
10,000
410,000
20,000
14,000 Silver.
$\$ 2,00,0,00$
$1,1,00,000$
$17,00,000$
70,000
450.000
$2,500,000$
$10,90,000$
425,000
15,000
$4,740,000$
$=$
$=$


## Daniel Atley Webster.

Daniel Atley Webster, for forty years connected with the Croton Aqueduct Department, died recently in this city. I is said that there are not more than a thousand dwellings in this city in which Mr. Webster did not personally superin tend the introduction of Croton water. The method of taping street mains for the introduction of house pipes, in rented and patented by him, is in use wherever there is public water system. Mr. Webster's name is associated with many other important inventions.

## sik Growing in Americe.

The rapid growth of the silk manufacturing interest in his country was recently made evident in these columns by a review of the census statistics gathered by Mr. Wycoff. Commenting upon the same facts, and the superior quality of American manufactured silk, the Philadelphia Public Ledger gives a large amount of interesting information touching the production of raw silk and its possibilities in the United States. The Ledger says:
' It is as easy to raise cocoons as sheep-easier. The intermediate stages between the cocoon and the factory have yet to be undertaken, but cocoons and eggs are both raised in this State, in North Carolina, and in Missouri, for sale and export. The shearing of the cocoons, or the filature, is the step that has to be taken on an extended scale. The great cocoon market for the world is Marseilles. The silk filatures are grouped in the departments around Lyons, and the French raised cocoons are consumed in the immediate neighborhood in which they are raised; but the foreign cocoons, coming from all countries, are distributed from Marseilles, and there they are purchased to the best advantage. Consul Peixotto points out, in a private letter to the American Minister at Paris, in answer to some inquiries made through Mr. Noyes by the Philadelphia silk school, that American-grown cocoons can be sold at Marseilles as readily as any others, as soon as the quality, and especially the uniformity, of the cocoons become known in the markets. By the efforts of this school American-grown cocoons will doubtless soon be placed on sale in this important depot to direct the attention of American silk raisers to this point. There have been already given in the Ledger such details of silk growing under the management of this school as will satisfy any one that all that is needed is such a point to which the numerous little harvests all over the country can be gathered and forwarded. Here is one experience from Gwynedd, Pa., representing six weeks' care of one crop. There were raised in one farmhouse, just as an experiment and to see how it would work, thirty pounds of cocoons and fifteen ounces of eggs. The cocoons are worth at a market two dollars a pound; the eggs, from three to four dollars an ounce. From a North Carolina farmer comes a letter on a larger scale. He has put up one hundred and fifty racks this year, four feet long by three wide, and each rack is to accommodate two thousand worms. He expects to raise this summer one thousand barrels of cocoons (North Carolina cocoons, pure white, took a premium at the Centennial); but this grower raises also from the French eggs the large flesh-colored cocoons, of which about one hundred and ninety weigh a pound, and from the Japanese eggs also a ninety weigh
fine cocoon.
"But why, asks the protective and otherwise thoughtful reader, need the cocoons be sent abroad to be sold, and this golden fleece sheared by French hands? Why can they not be kept at home, seeing that the silk manufacturer can, or at least could, take all that can be raised for years to come? That is the point which is now occupying the minds of sericulturists-seriously occupying them. Cocoons and eggs and all that, they know. They know that the mulberry will grow wherever the apple tree does, and that the osage orange does about as well as the mulberry. They know that the season begins on the eleventh of May and lasts six weeks, and that it is possible, by skillfully retarding some of the eggs, to make two seasons in the year. What they have not yet reached is the perfection of reeling, although they are experimenting upon it. The hand reeling of Italy and France is an old story. Silk has been reeled by hand here, and is still, and if the farmer's daughter puts her reeling at the same price as her knitting or crochet, to fill up the unemployed time, and not for an occupation to live by, hand reeling would pay to that extent. For an extended business the great filatures are needed, where American cocoons can be reeled at home by machinery, the only thing that can come into competition with the cheap day labor of the Italians, French, and Japanese hand reelers. A young American engineer is at this time in France, experimenting on the reeling of silk by electricity, which is the motive power destined to lighten labor as well as streets. This is the one missing link that is needed to complete the chain between Horstmann's fringes and ribbons and the New Jersey silk dress goods and handkerchiefs, the Connecticut sewing silks, etc., and the cocoon racks in American farmhouses. The Philadelphia school, that has done so much in gathering up these threads of detail, and in sending out its cocoons and instruction over the country, is a real credit to the city and the State."

## American Goods.

The American Register boasts, and not without reason, adds Land and Water, of the slow but sure manner in which American goods are forcing their way into and successfully competing in all foreign markets with European manufactures. "Our cotton goods, both heavy and fine, and our spool thread, are rapidly taking the place of English. Our printing and wrapping paper is finding a ready sale in the East and West Indies, while even bank note and bond paper is in demand in Italy, Austria, and Spain. American cutlery is sold in Birmingham, our locks are supplanting those of English make in English houses. American jewelry is sold in Paris, and if we are not stnding coals to Newcastle, anthracite from Pennsylvania." English manufacturers must stir up and put their shoulders to the wheel, or they will be nowhere in the race for wealth.

Why some Confectioners do not Make Money.
The following, by C. F. Gunther, in the Confectioners' Journal, is apropos to many people in other trades:
They are lazy.
They neglect details.
They overlook the small things.
They have no eye to business.
They hope for fortune to drop in their lap.
They are not careful in weighing.
They let their clerks eat and give them away.
They let their help waste and destroy.
They let their fires burn at will.
They are slovenly in their shops.
They let their shops get filthy and dirty.
They fail to clean their jars and cases.
They make no changes in goods.
They make no changes in goods.
They fail to furnish good tools.
They fail to furnish good tools.
They try how cheap they can do everything
They make no window changes.
They fail to advertise.
They try not to excel or improve.
They think cheapness recommends articles.
They have too much outside business.
They talk politics too much.
They philosophize on everything but their b iness.
They fail to invent or have new ideas.
They employ too cheap help.
They fail to show what they have.
They try to sell stale goods.
They are penny wise and pound foolish.
They think inferior will take the place of good.
They imitate their neighbors.
They fail to clean their windows.
They sit and read newspapers too much.
They are not polite or accommodating.
They think most things take too much trouble.
They fail to use plenty of light.
They do not furnish good materials.
They are not neat or cleanly in person.
They fail to push business.
They are not awake to the seasons.
They know not imitations are but shadows of the real.
They do not study light or shade.
They ought to make goods in a strong light,
They ought to sell them in shaded light.
They know that there is an idea in flavors.
They know not the weakness of humanity's stomach.
They should throw ether flavors to the dogs.
They know not the best is the cheapest.
They put goods up in poor style
They use poor judgment in colors.
They fail to shine up and clean store up daily.
They fear to buy stock. No stock, no trade.
They know not the power of method.
They fail to pile stock up and let the people see it
They fail to keep signs and fronts bright.
They fail to give loafers the cold shoulder.
They have hangers on who eat them up.
They are too social where it don't pay.
They fail to shake sponges and dead-beats. They go out too often to see a man.
They don't treat travelers or drummers politely.
They can get many ideas from them that pay.
They are illiberal to home enterprises.
They do not use cheap fruits to advantage.
They attend to everything but their own business. They have their head muddled with beer.
They have their tongues thickened with drinks.
They let their breaths reek with alcohol.
They fail to keep system and good order.
They smoke or chew tobacco in business.
They make no changes in spring or autumn.
They fail to meet the wants of the season.
They always stay at home, and travel not.
They become rusty and lose ambition.
They do not progress with their cities.
They try not to better their stores.
They fail to paint and rejuvenate the interior.
They think money thus spent is thrown away.
They know not the power of printer's ink.
They fail to remember their art is a science.
They know not it is allied with the fine arts. They know not it has been so considered for ages. They fail to consider their weak points.
They must wake up to the idea of improvement.
They will then find business and prosperity.

## Tele-Photography.

Mr. Shelford Bidwell describes in Nature the result of some experiments in sending pictures by the telegraph. This he accomplished by using an apparatus resembling Bakewell's well known copying telegraph. In the trans mitter the image was focused upon a revolving cylinder, to which a selenium cell is attached. At the other end of the wire a platinum point presses against the surface of sensitive paper prepared by passing it through a strong solution of equal parts of iodide of potassium and water. The arrangement is such that the selenium cell, by intercepting the current, causes a white spot to appear on the receiver corresponding in shape and size to the picture focused on the transmitting cylinder. The experiments are as yet crude, but full of promise. The experiments are as yet

How Manchester, England, is Lighted.-Cheap Gas and Public Profit
The Examiner, of Manchester, England, gives an interesting account of the management of the public gas works of that city. The gas works in Manchester have always been the property of the inhabitants. Originally they were directed by a body of thirty directors selected from the commission of police. Up to 1835 they lad a debt of $£ 80,000$. It has been the custom from the first to apply the gas protits to town improvements. In 1831 the sum paid for this purpose was $£ 6,900$; in 1835 it had risen to $£ 10,133$. The price of gas has steadily been reduced. In 1838 it was $12 s$ s. per 1,000 cubic feet; in $1844,6 s$; up to $1870,5 s$.; then, by a series of gradual reductions, it has come down to last year's figure of 38 .; and a further reduction was promised in December last to $2 s .10 d$. per 1,000 cubic feet for gas having an illuminating power of $21 \cdot 32$ candles. The profits turned over to the public in 1879 were equivalent to $91 / 2 d$. per 1,000 feet. There is no committee of the council that does more feet. There is no committee of the councir that does more
work than this. They are great manufacturers and traders, and, as in any business, every point in connection with buying and selling has to be watched, so as to obtain a satisfactory result. In the mere purchasing of coal cannel, the penny per ton is equal to a thousand pounds a year, as will be seen when we say that 240,000 tons were carbonized last year. On the other side, a reduction in the price of gas of $1 d$. per 1,000 cubic feet means over $£ 8,000$ per annum. The committee have been very busy of late years watching the many valuable improvements in gas making, and notably in all labor-saving appliances. They have lately engaged an engineer of ability, whose business it is to watch over the details of production and all the multifarious appliances at the immense works. The heaviest day's consumption has been over thirteen million cubic feet, and the storage capacity of all the holders is over eleven millions. A most important part is the sale of the by-products, ammoniacal liquor, tar, and coke, which in 1879 produced $£ 80,000$. New contracts have been entered into for the sale of these residuals, and the committee hoped to realize a still larger amount under this head, and to be in a position this year to consider a further reduction in the price of gas. The committee are alive to all the uses their materials may be put to, and they make exceptionally good bargains for them on behalf of the citizens. The monetary operations of the committee are necessarily on a scale of great magnitude, the total income being nearly $£ 400,000$ per annum. They employ about 600 men in summer and 1,300 in winter. For interest on their debt they need $£ 25,000$ a year; for sinking fund, $£ 30,000$; they light the streets at a cost of $£ 24,000$, pay rates, rents, and taxes amounting to $£ 13,000$, and charge themselves with depreciation, $£ 27,000$. These items come annually to the enormous sum of $£ 119,000$, and yet the committee can hand over a profit of $£ 52,000$ to the Improvement Committee, and save the rates to that amount. The total sum paid for this latter purpose in relief for rates is about $£ 1,250,000$.

## The Color Organ.

This consists of a musical instrument, such as an organ, on which a series of colored glasses are placed, having shut ters behind them. The shutters are connected with the key board in such a manner that when a given key is touched a shutter drops and the light shines through the corresponding colored glass, and thus, by touching different keys, different colors are shown, or combinations of colors.
In the thirteen whole notes and semitones embraced in a single octave the colors flashed upon the plates appear and correspond with the notes as follows: C, red; C flat, orange red; D, orange; D flat, orange yellow; E, yellow; F, yel. low, green; F flat, green; G, bluish green; G flat, blue; A, violet blue; A flat, violet; B, violet, red, or crimson.
These colors are produced mechanically. In each pipe at the rear of the organ is a small shutter facing the light. This color shutter is connected with its appropriate key by a wire. So when C is sounded the C shutter is opened. The light falling on the red glass belonging to C , the ray is reflected on the ground glass plate facing the spectator; D flected on the ground glass plate facing the spectator; $D_{\text {, }}$
opens the shutter admitting the light through the orange opens the shutter admitting the light
colored plate, and so on with the rest.
The play of color during the performance of a quick air fascinates the eye, and as the tints rapidly appear, disappear, and blend into each other, the beholder is charmed by the gratification of two senses at once, and feels more than understands the harmony established betwixt melody and color. Mr. Bishop, of this State, is the author of this novel instrument.

Postal Money Orders.
Though but sixteen years old the postal money order sys em has become a gigantic business. The present head of the Money Order Department, Mr. C. F. McDonald, was its originator. The money handled last year amounted to over $\$ 100,000,000$, and the work of the department is rapidly in creasing. About one eighth of the business is done in this city. In 1879 the transactions numbered $1,161,378$, amount ing in money to $\$ 43,652,273.37$. This was an increase ove 1878 of 100,119 transactions and $\$ 5,000,000$. The next yea showed $1,251,095$ transactions, amounting to $\$ 51,231,749.04$ This was a gain over the previous year of 189,720 trans actions and $\$ 7,579,47567$. The money orders issued during the last fiscal year numbered $7,240,537$ for the whole United States. This in money reached the enormous sum of $\$ 100,352,818.83$. The fees paid to the Post Office Deprirt ment amounted to $\$ 916,452.80$.

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ormation. C. H. Brown \& Co., Fitchburg, Mass. Saunders' Pipe Cutting Threading Mach. See p. 173. Nickel P.ating.--ole manufacturers cast nickel an des, pure nickel salts, importers Vienna lime, crocus,
etc. Condit. Hanson \& Van Winkle, Newark, N. J., and 2 and 94 Liberty St., New York
Saw Mill Machinery. Stearns Mfg. Co. See p. 141. For Mill Macb'y \& Mill Furnishugg, see illus. adv. p. 172 Mineral Lands Prospected, Artesian Wells Bored, by
Pa. Diamond Drill Co. Box 423 , Pottsville, Pa. See p. 189 For Pat. Safety Elevators, Hoisting Engines, Frictio The I B. Dutch Cut-or Coupling, see Frisbie's ad. p. 188. Apply to J. H. Blaisdell for all kinds of Wood an ron Working Machinery. 10
Peck's Patent Drop Press Se av page 20 For the best Diamond Drill Machines, address M. C Clark \& Heald Mach
Fire Brick. Tile, and Clay Retorts, all shapes. OH Turbine Wheels; Mill Mach'y. O.J.Bollinger,York,Pa. rass \& Copper in sheets, wire \& blanks. See ad. p. 20 The Chester Steel Castings Co., office 407 Library St hiladelphia, Pa., can prove by 15,000 Crank Shafts, and astings over all others. CIrcular and price list free.
Diamond Tools. J. Dickinson, 64 Nassau St., N. Y. The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York. Eagle Anvils, 10 cents per pound. Geiser's Patent Grain Thas Machinists' Tools and Special Mach'y. See adv..p 295 Steam Engines; Eclipse Safety Sectional Boiler. Lamertville Iron Works, Lambertville, N. J. See ad. p. 189. ew Economizer Portable Engine. See illus. adv. p. 205
Catechism of the Locomotive, 625 pages, 20 engre ings. The most accurate, complete. and easily under-
stood book on the Locomotive. Price $\$ 2.50$. Send for
a catalogue of railroad books, The Rairoad Gazette, a catalogue of railroad
Broadway, New York.
c. B. Rogers \& Co., Norwich, Conn., Wood Working Moulding Machin. see adv., page 203 Moulding Machines for Foundry Use. 33 per cent
saved in labor. See adv. of Reynolds \& Co., page 205. For Shafts, Pulleys, or Hangers, call and see stock Wm. Sellers \& Co., Pliila., have. introduced skinner \& Wood, Erie, Pa.. Portable and Station Engines, are full of orders. and withdraw their illustrated advertisement. Send for their new circulars. The Sweetland Chuck. See illus. adv., p. 204.
Toope's Pat. Felt and Asbestos Non-conducting Re movable Covering for Hot or Cold Surfaces ; 'Toope's Pat.
Grate Bar. C.Toope \& Co., M'f'g Agt., 353 E . 78th St., N. Y. Use Vacuum Oil Co.'s Cylinder Oil, Rochester, N. Y Don't buy a Steam Pump until you have written ValMa
For Superior Steam Heat. Appar., see adv., page 204. Vick's Seeds best in world. Floral Guide tells how grow them. See adv., p. 204.
Burgess' Portable Mechan. Blowpipe. See adv., p. 204. Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Also manufacturers of Solo-
man's Parallel Vise, Taylor. Stiles \& Co.,Riegelsville.N.J. man's Parallei Vise, Taylor. stiles \&Co.. Riegelsvile.N.J. The New System of Bee Keeping, Every one who has a farm or garden can now keep bees with pleasure
and proft. For particulars address Mrs. Lizzie E. Cot on, West Gorham, Maine.
Pat. Steam Hoisting Mach'y. See illus. adv., p. 140.

Hatus Manaistion will be CORRESPONDENTS, No attention will be paid to communications unless
accompanied with the full name and address of the writer. Names and addre
given to inquirers.
We renew our request that correspondents, in referrin name the date of the paper and the page, or the number of the question.
Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then pub-
lished, they may conclude that, for good reasons, the lished, they may conc
Editor declines them.

## Editor declines then. Persons desiring

Persons desiring special information which is purely of a personal characier, and not of general interest,
siould remit from $\$ 1$ to $\$ 5$, according to the subject, as we cannol be expecteil to spend time and labor to obtain such information without remuneration.
Any numbers of the Scientific American Supple MENT referred to in these columns may be had at this
office. Price 10 cents each.
(1) C. M. C. writes: I have occasion to finish nickel plated work in different colors, for bands
and lires, and have tried using aniline colors mixed with and lires, and have tried using aniline colors mixed with
a lacquer, but it rubs off easily, and I wish to get a re ceipt for a lacquer or japan (light color preferable) that will mix with colors making a smooth finish that wil not scratch off easily; also I would like to learn how brass and oreide are treated to give that finish such as is on lamp trimmings, etc. If it needs to be baked please give the degree of heat and time it should be exposed.
A. Color alcoholic spirit copal varnish with any of the A. Color alcoholic spirit copal varnish with any of the
soluble coal tar dyes previously dissolved in a little absolute alcohol. Warm the work, apply the colored var-
nish quickly, and harden at about $300^{\circ}$ Fah. (higher if the varnish will bear it), in an oven. Thetrimmings are
largely stamped from rolled sheet metal or turned over mandrel, thinly lacquered with pale shellac and hardened ir an oven as above.
(2) E. McA. B. asks: What per cent of carbon does ordinary cast iron, Bessemer iron, and
wrought iron contain respectively 4.7 per cent; when manganese is present, sometimes as high as $5 \cdot 9$ per cent. Bessemer iron contains about. $0 \cdot 45$
per cent of carbon. Wrought iron seldom or never per cent of carbon. Wrought iron sela.
(3) T. T. T. asks: What composition is best to put upon iron to prevent rusting underground ?
A. The following preparation, used for ocean cables nd underground iron work, will give satisfaction: Cot on seed or linseed oils, 1 lb. ; coal tar, 1 ; sulphur, Heat separately, mix thoroughly, and heat to $300^{\circ}$ Fah.
for about 1 hour, at the end of which it becomes pasty and is ready for use. Heat the metal to which it isty be applied. Under ordinary circumstan
main unchanged for an indefinite period.
(4) E. W. ©. writes: I see in a late number of your valuable paper that you recommend glyfollowing reasons: The alcohol evaporates, leaving the glycerine alone on the tools. Glycerine has a strong attraction for water, and will draw it from the air, caus
ing the tools to become coated with rust. I would sug ing the tools to become coated with rust. I would sug-
gest pure lard oil as the best thing for oil stone. It will gest pure lard oil as the best thing for oil ston
not gum, and it preserves the tools from rust.
(5) V. H. writes: In your paper dated January 22 , you explain how writing with a saturate solution of alum witer may be copied indefinitely by
laying it upon a gelatin pad previously rubbed with a wet sponge and the pad afterwards rolled with
and printer's roller, when the writing engraved on the pad
acts like a lithograph, taking ink and yielding acts like a lithograph, taking ink and yielding an impression for each fresh inking. (an this suggestion
be applied to type writing. I have tried by soaking a be applied to type writing. I have tried by soaking a
strip of muslin in glycerine and copying ink in equal strip of muslin in glycerine and copying ink in equal
proportions, in which powdered alum had been dissolved n sufficient quantity to operate as you suggest when ap ribbon on the type writer at all. It would be a very
raluable assistant to type writing if it could be copied in the cheap and expeditious way you suggest with re spect to writing with a pen. A. Try saturated so-
lution of alum in glycerine (made by aid of heat) withlution of alum in glycerine (made by aid of heat) with-
out the ink. Or add to a saturated aqueous solution of out the ink. Or add to a saturated aqueous solution of
alum just enough glycerine to make a clean not necessarily visible copy with the type. Let the copy remain
the gelatine some time.
(6) J. M. H. asks:
(6) J. M. H. asks: 1. Is paper pulp manu thetured from pine wood? Yes. See "Technology of
the Paper Trade," ScPpLements Nos. 109, 110, 116, 117 the Paper Trade," SLPPLEMENTS Nos. 109, 110, 116, 117 ,
118, and 123. 2. Give receipt for making glue used by manufacturers of pocket books and bookbinders. A
Mix together over a water bath equal parts of flou paste and good glue size.
(7) G. B. \& Co. ask for the best and most recent method of dissolving bones for fertilizing pur-
poses. A. Grind the dry bones and gradually mix them with about one-fourth their weight of oil of vitrio previously diluted with an equal volume of water and conled. Boiling in a 5 per cent solution (aqueous) of
muriatic acid completely dissolves the earthy phosphates from bones, the remaining portions being usêful to the glue manufacturer.
(8) J. H. B. asks how to make papier mache for stereotyping. A. Lay a piece of tissue paper upon a perfectly flat surface and paste a soft piece of
printing paper, which must be pressed evenly on to the tissue. Lay the paper on the form,previously oiled,and cover with a damp cloth; beat with a stiff brush the paper in evenly; then paste a piece of blotting paper
and repeat the beating in; after which three or more pieces of soft tenacious paper are pasted and used in a similar way; back up with a piece of cartridge paper.
The whole must then be dried at a moderate heat under a slight pressure. When thoroughly dry brush well a slight pressure. When thoroughly dry brush well
over with plumbago or French chalk. When this is
dit done it is ready for the matrix. 2. Can I taike a cast
with papier mache from a plaster cast? A. No, not very well.
(9) H. L. C. writes: I see reply to M. M.
H., as to how to temper iron springs. I submit the fol lowing, as it is cheaper and better for large and small
springs. Heat to an even red heat, rather low, to pre vent cracking; quench in lukewarm water; place in ladle withttallow to cover; heat until tallow burns with a
large flame spreading beynnd ladle, then set the ladle large flame spreading beyond ladle, then set the ladle
aside and allow it to cool. Will stand frost, or work under water.
(10) J. T. D. asks (1) for the best way to remove the marks of a friction match from a valuable
piece of ground glass. A. Try a little aqua regia nitric acid, 1 ; muriatic acid, warm, $3 ;$ mix); rinse with water, and scour with a little so
dinary nail brush, if necessary.
(11) C. D. V. writes: In Supplement, 2077, page 4249, you give recipe for chrome ink. Does the
addition of sodium carbonate prevent gelatinization. and if not, what can be added that will prevent it ? Yes, to a certain extent. Use the finest French extract
(12) T. A. H. asks: How is the ink-such as is used for making copies from electric pen stencilsmade? A. 1. By thinning printer'sink with castor oil; erine and molasse
(13) J. A. B. asks: 1. What is the best and its pliability? A. Pass the paper quickly through strong oll of vitriol and wash thoroughly in running water; or use a hot sirupy solution (aqueous) of zinc chloride, and rinse quickly and thorcughly in water con-
taining a trace of soda
2. Where can I obtain the taining a trace of soda 2 . Where can I obtain the
fullest treatise on the chemical (or other) manufacture of paper pulp from wood, etc.? A. See " Technology of the Paper Trade." Nos. 109.110. 116, 117, 118, and 123, Scientific American Supplement.
(14) C. A. B. asks for a cheap and simpl method of frosting windows and glass doors without with ordinary hydrofluoric acid. As soon as the frost
wist and with ordinary hydrofluoric acid. As soon as the fr (15) P. A. asks for a good receipt for mak ing an oil paste shoe blacking. A. Ivory black, in in
 mix the first 3 ingredien s , then add the acid with enough water to reduce to proper consistence. Triturate to gether until a perfectly homogeneous paste is obtained
(16) A. H. asks: What are the ingredintsused by taxidermists to embalm small birds? A will crystallize to representa snow storm? A. You fall o state the conditions. 3. Where can I obtain supplie for bird stuffing ? A. See Hints to Correspondents and business and Personal column.
(17) E. D. V. says, in answer to J. R. K. and others, who have asked abont copying pads: "I posed, and find that pure gelatin and pure glycerine without any addition, such as sugar whiting, sulphate o baryta, etc., make the best pad. The consistence and
color the latter gives is an evil and not whiting latter gives is an evil and not a benefit. With whiting or the sulphate added fewer impressions an French pink gelatin and 8 oz. (by weight) of glycerine Soak the gelatin in cold water one hour; it will be flaccid. Have the glycerine hot in a pail in a water bath, or remove the lid from the tea vettle and set the pail in its place. Wring the water from the gelatin in towel; then put it into the hot glycerine and stir till
well broken up. Heat it several hours. It will give crimson transparent pad; good glue will give a brown crimson transparent pad; good glue will give a brown
transparent pad; cheap glue a miserable pad. 1 oz. violet a aniline 6 B . in one pint hot water, with $1 / 2 \mathrm{oz}$.
or gum arabic and tartaric acid, gives a good ink." W. H. pad a good deal, and find that 2 oze good gelatin in 1 lb (avoirdupois) of glycerine (about 1 to 8 ) prepared as directed in your article (page 100, vol. xlii.), gives the bes
result. Whiting and sulphate of baryta ficial.
18) A. M. asks how to make a cement that will unite leather shavings or leather that has been ground to a pulp, so that when it is rolled out and
pressed it will not crack or break when doubled, and be of use in places where strength is not requisite an Thin coal tar, cotton seed oil, and sulphur equal parts fuse together at a moderate heat. Mix the dry pulp thoroughly with this and expose the mixture for about an hour to a temperature of about $300^{\circ} \mathrm{Fah}$. The ho sulphur produces a kind of vulcanization in the mas
(19) F. H. B. writes: I have some Florida orange blossoms preserved in alcohol, which smell very Essential oil of orange flowers (ol. neroli) is usually obtained by distilling the flowers in a retort along with an equal quantity of water-the oil volatilizes, passes from the distilled wa for a second distillation. About 600 lb . of the flower produce only one ounce of the. essential oil. A weak
alcoholic essence may be obtained by macerating the
(20) S. G. M. asks: 1. Is the induction coil sed with carbon telephones because the induced cur rent is able to overcome the resistance easier? A. Yes.
2. If so, why cannot I use a carbon telephone on a very short line, without induction-wire is No. 12? A. You can; but the effect is greatly increased by the induction coil. 3. Is the Lyon's telephone transmy described in Sup
Yes.
(21) J. B. writes: I am engaged in dyeing arge quantities of small bone articles. I want to dy them quick and cheap. I use logwood. It only gives me
a surface dye. I want it at least one-sixteenth inch deep. Can yon give me a good cheap receipt? A. D'p
the articles for a few moments into a strong, hot, aqueas solution of caustic potash; rinse in plenty of ho water; boil in a strong aqueous solution of equal parts tannic acid and logwood extract, or logwood and cutch,
then in acetate of iron. (22) B. \& H
(22) B. \& H. ask (1) whether the enamel that is used on tin ware to make it look like marble can
be used on cast iron. A. Yes. 2. If so,what is it made of, or where can it be had? A. Fine liaolin, 3 parts; silica, $1 / 2$ part; calcined borax, 1 part. Mix and fuse in a crucible. Remove from the fire and stir in 1 part fine amber. Cool quickly, grind to a fine powder, mix with
uater to a paste, and apply to the clean metal. Dry water to a paste, and apply to the clean metal. Dry
slowly in a warm place; then heat gradually in a muffle (23) G. S. asks how to prevent fire clay from cracking wi:ie it is drying. A. Mix the clay very
thoroughly and with as litte water as possible, and dry voroughly and with as little water as po
(24) J. H. asks: Is there any known method of depositing a film of gold on glass? A method similar to that used in depositing silver would be most - suitable for my purpose. A. Try the following: 1 . Gold
chloride, 1 drachm; distilled water, 2 oz.; dissolve. 2. Oxalic acid (pure) 1 oz.; water, 6 oz .; dissolve. Clean the glass thoroughly, warm the plate, and pour over it a misture of equal volumes of the above solutions to a depth of a quarter of an inch, the edges being
rimmed with gutta percha putty as in silvering. Let it stand about six hour
(25) P. S. M. asks: 1. What is horse power of upright tubular, water leg boiler, 4 feet 6 inches
high (including leg), 2 feet 4 inches diameter, 78112 -inch tubes 2 feet 6 inches long? After passing out of top of tubes the products of combustion dive outside of shell to flue about two-thirds of distance to lower end of
tubes. A. About 5 horse power. 2. What size hori tubes. A. Abont 5 horse power. 2. What size hori-
zontal tubular boiler of usual style would be equal to
above in steaming power? A. A boiler having about
 square feet of radiating surface should
ply to advantage ? A. About 600 feet.
(26) B. \& A. Co. write: We have two shafts running $11 / 4$ inch to the foot out of line, with run by an upright belt, and the belt in running runs off both pulleys on the same side $11 / 2$ to 2 inches; both pul leys are turned the usual way crowning, and running at a speed of two hundred revolutions a minute. What we wish to know is, if we have one or both pulleys made a
little crowning off tha center, will it lead the belt on litte crowning off the center, will it lead the belt on
straight, and would we get full power of belt; and if we straight, and would we get full power of belt; and if we
should make them doubiy as crowning would it make any difference? A. Crowning will do no good. You號 pulleys or oilers, that the belt shall run
(27) C. S. writes: I bought Supplement, 42, in view of constructing me a telephone for a privat
line. But there are several points I would inquir further about. 1. Should the ends of the coil wir wound around the spool touch the connection wire fast-
ened in the binding post ? A. Yes. 2. How can I tell the like poles on magnets? A. Present the poles to compass needle. Poles that produce the same effect
are alike. 3. Would common tin do for the diaphragm,
 thick. Tse ferrotype plates. 4. Should I use No. 3 common copper wire for connecting the instrume.
another? A. Use No. 12 iron wire for your line.
(28) A. S. R. asks (1) for information on melting and pouring casutchouc. A. Caoutchouc can not be melted and poured as you suggest. When heated to the fusing point it suffers partial decomposition. 2.
Is there a work published on the manufacture of Indian arrow heads? A. We know of no book on this sub ject.
Minerals, etc.-Specimens have been re ceived from the following correspondents, and examined, with the results stated:
T. H. B.-1. Marmolite. 2. Hornblende in quartz
3. Dolerite. 4. Feldspar and hornblende. 5. Chiefl 3. Dolerite. 4. Feldspar and hornblende. 5. Chiefly quartz. 6. Hornblende. 7. Sandstone and lime car-
bonate--S. W.-1. Heavyspar-barium sulphate. 2. Limonite on quartz. 3. Gypsum. 4. Ferruginous lime sulphate (deposit). 5. Pyroxene. 6. Chrysocolla. ${ }^{7}$
Graphite in sandstone. 8. Chiefly quartz and limonite 9. Limonite on quartz.-N. O. G.-It is tourmaline hardness 7.5 -corundum is 9 , diamond 10 ).-E. G.The powder contains traces of gold-hardly rich enough to pay.-J. M. S.-The small pebble (one) is quartz-not
diamond.-T. C. Y.-Your ink, where not used in excess is easily removed.-T. F. W.-Iron, copper, and molybdenum sulphides. It may carry gold, but it will rock contains much titaniferous iron ore. Some of it may carry gold. An assay would be advisable.

## COMMUNICATIONS RECEIVED

 On a Brilliant Meteor. By C. E. S. bonic Oxide. By H. M. D.|  | ans, closing metal, J. Br |
| :---: | :---: |
| KS | coupling, A |
|  | r cou |
| nal of Scientific Instruments) |  |
| Schwirkus | Car coup |
|  |  |
| This monthly publication, the first number of whic |  |
| is now before us, is devoted to scientificinstruments and the experiments therewith. Each number will contain |  |
|  |  |
| illustrations and descriptions of the modern scientific |  |
| instruments, the opinions of scientific men in regard tothe same, and all possible improvements and observa- |  |
|  |  |
| ns in manufacturing the instruments will be given,so |  |
|  |  |
| ence of others, whereby the accuracy of scientific instruments in general will be greatly improved. All patents for scientific instruments will also receive proper notice. The leading savants of Germany, such as |  |
|  | s, life guard |
|  |  |
| Messrs. C. Bruhns, of Leipsic; Bauernfeud, of Munich: v. Lang, of Vienna, and many others contribute to this work. The first number contains articles by Fuess, on |  |
|  | e shells, |
|  |  |
| Normal Barometer; Illuminating Micrometer Devices, by Foerster; Micrometer Screws, by Reichel; Vogel and |  |
|  | Ce |
| Lohse, on Spectral Apparatus; Kronecker, on Graphical Methods in Physiology, etc. This work is printed in clear English type. |  |
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|  |  |
| Proyecto de Organization de la Seccion |  |
| de Estudios del Ateneo del Uru- | Clipper, hait |
| D | Clock, elect |
| Mortevideo: 1880. |  |
| This volume of over 250 octavo pages is an elaborate | Clothes prop, G. O. Lack |
|  |  |
| plan for a total reorganization of the course of studies now pursued at the Atheneum of Uruguay. It seems | Co |
|  |  |
| that these studies have hitherto been quite elementaryjust enough to give the student sufficient education to | Corn husks, |
| qualify him for business, but not enough to fit him |  |
|  | Cotton and h |
| qualify him for the duties of a public life. The consequence is that the administration of the government |  |
|  | Cru |
| falls into the hands of a few privileged persons. This |  |
| state of things for a republic is justly considered radically wrong by the promoters of the project under con- |  |
|  |  |
| sideration. Hence the elaboration of a plan to give all the youths of the nation a liberal education which shall | Cylindrical bodies, device |
| the youths of the nation a liberal education which shall make them ornaments of society and good citizens, who shall be capable, when their country calls upon them, of filling any public office to which they shall be elected. |  |
|  | Dampe |
|  |  |
| The proposed conrse of instruction here laid down seems to be quite elaborate, and equal to that found in the curriculum of any prominent college or university. |  |
|  |  |
|  |  |
| Dr. Berra and his associates are to be wished all success in their noble and patriotic undertaking. | Dyers' and blea |
| The Magazine of Art. Cassell, Petter, Galpin \& Co. New York. | mb wai |
|  |  |
| The March number of this entertaining art publication has made its appearance, and, like the preceding numbers, it is full of illustrations, and complete in interest to all lovers of art in varied departments. |  |
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$\left\lvert\, \begin{aligned} & \text { Eyeglass supporter. F. A. Hardy } \\ & \text { Fan, sun shade, J. H. Dennis..... }\end{aligned}\right.$ Fan, sun shade, J. H.
Faucet, H. Mattullath
Faucet attachment, J. P. Gruber..... ....
Feed trough and hay rack, J. M. Holladay
Felt hardening machine, Yule \& Yocom.. Fence, W. Churchman.

## Fence barb. wire, M. C. Shinn

Fence, barbed wire, T. Shuman
Fence post, P. Coughlin ........................
Fencing, barbed metallic, G. w. Kirchhöffer Fertilizer, J. M. \& J. Lippincott.
Field roller, Blackford \& Reno.
Fifth wheel, ve hicle, Campbell \& Neider... Filter for water service mains, J. H. Barnes.
Fire escape ladder, T. Torrance.............
Flax brake, w. A. Wright............. Flax brake, W. A. Wright
Flue for furnace register
fifield urnace registers, supplemental, c.
Gas burner, J. F. Barker
Gas governor, W. Cowan....................
Gas lighter, electrical, C. D. P. Gibson
Gas lighting and extinguishing device, automatic
J. M. Foster................. .....................
Gas. manufacture of illuminating; A. w. Wilkin
son (r)
Gas regula

$\xrightarrow[\text { Glove, H. Urwick }]{\text { H. Linell }}$
Governor, warine engine, W. Würdemann
Grain binder, A. Goodyear
Grain binder, F. Ogden. .
Grain binder, J. D. Reed
Grain binder, automatic, , V. V. Essick
Grain binder tension, W. R. Coats ...
Grain binder tension, W. R. Coats
Grappling bucket. F. G. Johnson..
Grinding machine, W. H. Doan
Hame attachment, w. O. Mille
Harrow, c . Tolle..
Heating buildings
Hoop cutting machine, F. L. Wilso
Hop picking machine, II. G. Locke.
Hose coupling, D. B. Kendal
Hose sprinkler, J. W. Killam
Hose sprinkler. J. W. Killam
Hydrant, H. Robinson.....
Invoice or scrap book, T. Hartung.
Ring bolt, T. Graser........
Lacing hooks, machine for setting, M. Bray..

## Bray... ............

Lamp, W. H. Smith
Lamp exting uisher, W. H. Kittle.
Lamp, lime light, A. M. Khe
of, w. Sellers...............
Leather, artifcial, C. A. Evans
Leather, artificial, C. A. Evans............
Leather. manufacture of, C. Heinzerling.
Lifting jack, A. Garrison .
Lock strike, H. Fellows.:
Locomotive, C. B. Clark.
Locomor sorter, E. It. Davies. ...............
Lumber and magnetic telephone, S. Russell. Magneto-electric signaling apparatus, J. S. Brown
Malt in brewing, etc., treatment of starch and
starchy substances, and the production there-
from of a compound used as a substitute for
Sullivan \& Valentin.
Meat safe and smoker, F. M. Woods
Middlings purifler, A. H. Kirk..
Milk and preserve jar. F. Henry
Milk, preparation of sour, C. Pe
Millstone, J. Y. Trammell. .....
Millstone dress, B. C. Lambeth
Millstone spindles, apparatus for
rillstone splales, apparatus for driving. S. Pott
Mower, lawn, Mast \& Martin
Musical box, D. Aubert...
Musical instrument, mechanical, M. J. Matthews.
Nut lock, J. W. Bunker.
Ore drying furnace, c. Stetfeldt
Oxidation furnace. G. w. Baker
oyster car, E. H. Frazier....
Paint ing on velvet in oil col

Pants stretcler. C. C. Chase.
Paper and manufacturing the
Paper and manufacturing the same, M. Newto
Paper, making wood pulp for, H. H. Furbish Paper, making wood pulp for, H. H. Furbish......
Paper pulp, machine for making rames or casings for lamps from, Stevens \& Chisholm (r)........ Perfumes of natural flowers by absorption,
tiano action, M. J. Chase...
Piano coupling. J. M. Foster
Pine coupling, G. H. Reynold
Plaiting machine, C. Clark...
1'lanters, coupling stop and wire for check row
Pole tip, I. R. Gilbert.
Press, T. A. Watrous.......... .............
Pump and sprinkler, $\triangle$. J. Polans
Rump, wortable R. Pickett
Refrigerating apparatus, air, T. B. Lightfoo
Refrigerating cover, portable, A. C. Peco
Refrigerator, P. Balz...................
Roal
Road or tramway for vehicles, T.s. Mus.
Rolling iron, method of and apparatus for,
Rub rolls, hanging and driving device for, J
Sand paper roll, H. L. Hapgood
Sash cord fastener, W. H. Day
Sash fastener, w. Tyler............
Saw gummer, gin. J. B. Clopt
Scarf, neck, W. A. Laverty
Scoop, wooden, E. P. Phillip
Scoop, wooden, E. P. Phillip
Sewin, book, D. M. Smyth.
Sewing machine spinning attachm’t, J. C. Blacket
Shaft coupling J State
Shawlstrap, M. Rubin
Silo, L. H. Whitney.
Sna and gas consuming furnace, w. D. Smith.
Snap hook, A. N. Bragg.
Soap, A. C. Selby
Soldering apparatus, N. Jenkin
Soldering machine: automatic.
Spectacle frame, J. L. Borsch.
Spokes and fellies, ma
ing, M. P. Elison

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Telegraph, duplex, G. Smith.
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Telegraph mechanism, S. M. Plush.
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elephone systems, circuit oharger for distri
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Trimming. M. Lowenstein..
Truck, locomotive, J. Apsey.
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Vele seat fastener, G. Ward.
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Washing machine, s. Parks.. .....
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