a Weekly joutrnal of practical information, art, science, mechanics, chemistry, and manufactures.


THE DE KALB, ILL., ELECTRIC PUMPS.
complished. The smaller view at the top shows the combined, 25 kilowatt. The Edison three-wire sysformer steam pump, boiler, coal house, and stand pipe. tem is used, and the connection to the pump house is One of the dynamos in use at the electric plant fills over a 0000 copper conductor.
the lower smaller view, while the Gould triplex pumps The requirements were for a constant level of water
of 85 feet in the stand pipe, with an increased pressure in the mains in an emergency of fire, the increase of pressure being obtained by use of an avtomatic closing valve at the stand pipe, when a fire pressure was re quired. An ordinary pressure of 40 pounds is maintained in the mains for domestic service, and in case of fire the pressure is raised to 125 pounds.
The pump house shown is fully one-half mile from the electric plant, and the pumps are controlled entirely by means of a switch at the electric power house. The system has been found to meet all the requirements.

## corn Stalks and Cocoanut Husks.

In view of the great rapidity with which the modern rapid-fire guns can deliver shells, it has been felt for some time that, in addition to watertight subdivisions in war ships, other means of preventing any inflow of water should be used. The most favored method of accomplishing this result has been to fit a coffer dam, or double skin, for some distance above and below the water line, the space between being about three feet thick and filled with material which would expand and keep out water when a shot passed through. The material that was adopted in the United States navy for this purpose.in 1892, called cellulose, is obtained from the husks of cocoanuts, being a brown, powdery substance, very light, and admitting of a good deal of compression. It was first used in France, and has been more or less used by various other foreign nations.

A Philadelphia inventor has recently brought to the attention of the Navy Department a new cellulose, composed of the pith of cornstalk, which is granulated by machinery. Secretary Herbert has determined to thoroughly investigate the new substance, and a board of experts was appointed a few weeks ago to conduct experiments. This board had duplicate coffer dams constructed, measuring six feet square and three feet thick, one packed with cocoa fiber and the other with cornstalk cellulose. A six and an eight inch shell were fired into each. Water was then forced into the dams under pressure. The water failed to penetrate the Marsden or American cellulose dam, but oozed through the cocoa product in a short time.
The English battle ship Inflexible is protected by coffer dams filled with a mixture of cork and oakum, which aggregates in weight 143 tons. With the French cocoa cellulose this weight would be reduced to 43 tons, while the American corn product would not weigh over 25 tons and furnish, it is claimed, more reliable protection.

## Photography in Natural Colors.

A. and L. Lumiere point out that the indirect method of photographing in natural colors has not received a proper practical application, because of the difficulty experienced in selecting the colors and in preparing and superposing the monochromes. They recommend the use of orange, green and violet screens for preparing three series of negatives presenting a maximum of sensibility to the rays which the respective screens allow to pass. Specimens of photographs so prepared were exhibited before the Paris Academy of Sciences The printing and superposition of the monochromes have been successfully accomplished by employing bichromated gelatine to which are added substance insoluble under certain conditions. If, for example, 5 per cent of ammonium bichromate and 5 to 10 per cent of silver bromide in the form of emulsion be added to a 10 per cent solution of gelatine, and the prepara tion be spread in a thin layer upon a plate of glass, a surface is obtained which can be exposed under negative and will reproduce the picture by the action of light. After exposure the plate is washed wit cold water, and the portion of the film acted upon by light, being rendered insoluble, remains and serves to print the image from on the application of suitable colors. The sliver bromide, which, by the way, may be replaced by other insoluble precipitates, is easily removed by the action of sodium hyposulphite, and proofs can then be printed from the plate in any color showing all the graduations of tint present in the negative. Polychrome prints may be obtained by receiving on the same plate monochrome red, yellow and blue images successively, by means of three corre sponding negatives, and isolating each image from the preceding one by an impervious layer of collodion By employing dyes of greater or less concentration o by simple decoloration with water, variation in the relative intensity of the monochromes is readily obtain ed.-Comp. Rend.

THE proprietors of the New York Recorder recently offered a.prize for a relay bicycle race from Chicago to New York, distance by road about 1,000 miles. .The race was finished on the 8 th inst., time 64 hours 5 minutes and 30 seconds. A crowd of 10,000 persons gathered at the Metropolitan Bicycle Academy, corne 60th Street and Boulevard, New York, to witness the coming in of the two riders, the red and the blue. The finish took place at 1:57 A. M., when the red rider came in about an hour ahead of the blue.

## Srientifir बhmerican.

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## THE CELEBRATION IN GERMANY.

The ship canal recently opened across the northern peninsula of Germany was celebrated with rejoicings and festivities by the people of that great $\epsilon$ mpire. On the invitation of the Emperor the representatives of the leading foreign governments took part; England, France, Russia and Italy sent some of their greatest war ships. The naval pageant was very grand. It is gratifying to know that the United States was represented by four such noble vessels as the Columbia, the New York, the San Francisco and the Marblehead. Report says the American ships presented a more at tractive appearance and excited more interest than any of the assembled fleets, due, no doubt, to the white color of our ships, their clean and graceful lines. The new canal, while it is a work of high importance to Germany as a means of defense in time of war, and of special commercial advantage in time of peace to her, to England and other nations of Northern Europe is likely to be of little utility for ships of the United States. Seldom, probably, will American vessels have occasion to use the canal. Fet a stranger might have supposed, from the ringing cheers and enthusiastic demonstrations of the populace, as the Marblehead came into view and passed from town to town, bearing the star spangled banner through the windings of the canal, that Germany considered the Americans as holding the greatest interests, next to themselves, in the success and operations of the new waterway Doubtless it was the presence of the glorious old flag the symbol of free institutions, under which so many Germans, so many of their own kindred, live and pros per, under which so many of them have fought snd died, that roused their feelings and caused their accla mations. Next to the emblem of the Fatherland, no ensign is so dear to the German heart as the flag of the American Union.

## TEMPERATURES OF LAKES

Mr. Desmond Fitz Gerald, at the annual meeting of the American Society of Civil Engineers at Nantasket June 18 to 22 , read an interesting paper on the tem perature of lakes, based on experiments made by him during the past five years. The author deduced from his observations that in lakes and ponds less than 25 feet in depth the temperature at the bottom does not differ materially from that at the surface. In deeper bodies of water, however, the conditions are quite different. Experiments made on Lake Cochituate, the base of the Boston water supply, showed that when the surface is frozen during the winter the temperature at the bottom is usually $39 \cdot 2$ degrees. The strata o water lie in the order of their densities, and the tem perature decreases gradually until within a few feet o the surface, when it suddenly falls to a point jus above freezing. The disposition of the strata is no disturbed after the forming of the ice until the spring thaws. By April 1, the surface water has becom warmed to the same temperature as tbat at the bot tom, and, as the whole body is in more or less unstable equilibrium, the winds and currents are sufficient to produce circulation from top to bottom. This con tinues until the first of May, when the surface tem perature has risen about five degrees above that of the bottom. The consequent difference in density pre vents further circulation, and, while the warming of the surface continues, the temperature of the bottom remains stationary until the middle of November.
During this period the summer stagnation take place. The lower layers of the water gradually col lect all the organic matter from the upper layers, and decay continues until there is no more oxygen left to support it. At the same time the water grows darker and more impure until by October it is usually offensive to the smell and has a dull yellow color. About November 1 the temperature of the bottom begins to rise, until by the middle of the bottom begins to rise, until by the middle of the
month it has increased from $20^{\circ}$ to $30^{\circ}$, at which point it equals that of the surface.
The temperature of the whole mass then falls a early the same rate during a second period of cir culation until the surface freezes and stratification again takes place. During the November circulation and again in the spring to a less extent, all the impure water at the bottom is brought to the surface and the infusoria and diatoms spring into life in great numbers, owing to the union of the organic matte rom the bottom with the oxygen in the surface water.

## Block Island Ship Canal and Harbor.

The new canal connecting Great Salt Pond, on Block Island, with the ocean, has been practicaly completed by the Hartford Dredging Company. The canal makes an entrance with one of the finest land-locked harbors along the Atlantic coast. The width is 400 feet and the depth 14 feet. The distance excavated from water to water is 600 feet. Inside the lake the excavatiou extends 200 feet, and outside the ocean entrance has been deepened for 400 feet, making a total of 1,200 feet. The breakwater is 600 feet long. This year $\$ 50,000$ has been appropriated for the work, and last year $\$ 25,000$.

## apoleon Bonaparte in Egypt and the Differential

 Refractnology.

Now that so much is being said and published about Napoleon Bonaparte, it may interest our readers to know that in the physical cabinet of the Stevens Institute of Technology there is preserved a large piece of apparatus, the history of which, leading to its location as above, connects it with the grand though disastrous campaign in Eyypt.
When Napoleon made his movement into Egypt he was accompanied by a number of prominent savants, members of the French Academy, who proceeded soon after their arrival to establish the French Academy of Egypt.
The most remarkable monument of their labors is found in the great work on Egypt, published by the French government, consisting of ten "elephant folios" of plates representing architectural monuments and inscriptions, as well as drawings of the fauna and flora of the country, and also comprising nine large octavo volumes of text.
At the same time they made arrangements for the pursuit of the higher lines of physical research, and for this purpose, among other things, ordered from the then famous instrument maker of Paris, J. Soleil, a piece of apparatus just devised by M. Arago, and called a differential refractometer.
However, before this apparatus was finished, Lord Nelson and the battle of Trafalgar intervened, and the address of the "French Academy of Egypt" became too uncertain to encourage the constructor in any attempt to deliver the instrument to those who had ordered it.
Under these circumstances, he looked around for another customer, and was glad to ship this apparatus -the largest of its kind ever built-to Mr. Charles Banker, of Philadelphia, who for many years had made it his pleasure to collect all sorts of philosophical apparatus, especially such as was unique and of special interest and value.
Mr. Banker had made during a long life, previous to 1870, a remarkable collection, filling several floors of a large dwelling house, and to this collection the present writer, for some years prior to that time, had almost exclusive access.
Mr. Banker died in 1870, without making any provision for keeping together his collection, and his executors offered it for sale. As the Stevens Institute of Technology was at that time about to begin its career, the present writer secured from the Banker collection all the most desirable objects, and among others this differential refractometer, whose original destination was Egypt.
Aside from these incidents of its early history, this apparatus is a remarkable one. It consists in the first place of a large and delicately adjustable vertical slot, through which light frow the sun or other source may pass in a broad but thin vertical band or ribbon. This is received on a corrected lens which collimates or brings all rays into parallel lines, and then continues in two parallel portions, one traversiug a closed tube having flat glass ends while the other passes beside it through the free air, but being obliged likewise to pass through glass plates identical with those closing the ends of the tube.
This portion is about a yard in length. The two parallel portions of the light then pass each through a narrow vertical slit and then through adjustable plates of parallel glass and enter the object glass of a large telescope, through the eye piece of which they are viewed.
If the conditions to which each half of the divided ray is subjected are identical, a series of what are called diffraction bands will appear in certain well known positions; but if the conditions are varied, as, for example, by substituting some other gas for air in the closed tube, or by changing the density of the air in this tube, these bands will be seen to shift to the right or left and more or less according to the character and degree of the changes made.
These shiftings may be corrected by adjustment of the two plates of glass, the effect of whose refraction will vary with their inclinations to the rays, and the law of this action being known, the effect of the changes in nature or in density of the gas or air in the inclosed tube upon the velocity of light may be calculated.
So sensitive is this action that if a long rubber tube is connected with the opening into the brass tube and closed at its extremity, the minute change in density of the inclosed air produced by pinching the tube in one place will cause the bands of interference to move sideways the width of one band, and if the open end of the rubber tube is held opposite to and near the mouth while speaking, the bands will be seen to flutter by reason of the changes in density developed in the air by the act of speaking.

A USE for compressed air in the foundry in addition to cranes and hoists, which are being introduced everywhere, is in providing a sand blast for the cleaning of castings.

## decisions relating to patents.

EBY VS. KING ET AL
Mr. Justice Brown delivered the opinion of the art.
Appeal from the Circuit Court of the United States or the Northern District of Illinois.
This was a bill in equity to recover damages for the infringement of reissued letters patent No. 7,851, granted August 21, 1877, to the plaintiff Eby, for an improvement in cob carriers for corn shellers.
Reissued letters patent No. 7,851, granted August 21, 1877, to Henry H. Eby for an improvenent in cob carriers for corn shellers, Held to be void.
Where a reissue was obtained for the purpose of Where a reissue was obtained for the purpose of broadening the claims of the original patent to cover that which is presumed to have been once abandoned
to the public, Held that the reissue is void. (White vs. Dunbar, 37 O. G., 1002; 119 U. S., 47; Ives vs. Sargent, 38 O. G., 781; 119 U. S., 652; Dunham vs. Dennison Mfg. Co., 67 O. G., 1571; 154 U. S., 103.)
When a patent has been surrendered and a reissue obtained and such reissue is held to be void, the patentee cannot proceed upon his original patent. (Moffitt vs. Garr, 1 Black, 273; Reedy vs. Scott, 7 O. G., 463; 23 Wall., 352, 364; Peck vs. Collins, 19 O. G., 1137; 103 U. S., 660; McMurray vs. Mallory, $2^{7}$ O. G., 915; 111 J. S., 97 , referred to and reviewed.)

The Commissioner is authorized to reissue patents in certain specified cases, and if the petition makes no pretense of setting forth facts entitling the patentee to a reissue, it is exceedingly doubtful whether he obtains any jurisdiction under section 4,916 Revised Statutes, to act upon such petition.

## Supreme Court of the United States.

RICHARDS VS. CHASE ELEVATOR COMPANY.
Appeal from the Circuit Court of the United States or the Northern District of Illinois.
This was a bill in equity for the infringement of letters patent No. 308,095, issued November 18, 1884, to the plaintiff Richards for a grain transferring apparatus.
The claims of letters patent No. 308,095, issued November 18, 1884, to Edward S. Richards for a grain vember 18, 1884, to Edward S . Richards for a grain gation of old elements.
So long as each element performs some old and well known function the result is not a patentable combi nation, but an aggregation of elements. The multiplicity of elements may go on indefinitely without creating a patentable combination, unless by their collocation a new result be produced.
While patent cases are usually disposed of upon bill, answer, and proof, there is no objection, if the patent be manifestly invalid upon its face, to the point being raised on demurrer and the case being determined upon the issue so formed. The Supreme Court has repeatedly held that a patent may be declared invalid for want of novelty, though no such defense be set up in the answer. (Dunbar vs. Myers, 11 O. G., 35; 94 U . S., 187; Slawson vs. Grand Street RR. Co., 24 O. G., 99; 107 U. S., 649; Brown vs. Piper, 10 O. G., 417; 91 U. S., 37.)
U. S. Circuit Court-Northern District of Illinois. american fiber Chamois company vi. De lee \& Showalter, J.: DERNBERG.

Trade Mark Valid.-The combined words "Fiber Chamois," as applied to a fabric used as an interlining for women's dresses, Held to have a significance as an arbitrary mark and name, whereby the goods made by complainant are identified and distinguished in the trade as carried on.

## The Secret of Long Life。

M. Barthelemy Saint Hilaire, the famous French scholar and politician, who recently entered on his 90th sear full of physical and intellectual vigor, has been telling the inevitable interviewer how it is his days have been so long in the land. It is, we are told, the effect of strict adherence to the old precept "early to bed and early to rise," with steady work during waking hours. Every grand old man seems to have a
secret of his own. Mr. Gladstone secret of his own. Mr. Gladstone, we believe, attributes his longevity to his habit of taking a daily walk in all weathers, and to lais giving thirty-two bites to every morsel of food. Oliver Wendell Holmes pinned his Knox Holmes swore by the tricycle, which, in the end, was the cause of his death. Dr. P. H. Van der Weyde, an American octogenarian, not long ago offered himself "as an example of the benign influence of the study and practice of music." Some aged persons give the credit of their long lives to abstinence from tobacco, alcohol, meat, or what not; others to their indulgence in all these things. One old lady of whom we read not long ago as having reached the age of 120 or thereabout, maintained that single blessedness is the real elixir vitæ, and she ascribed the death of a brother at the tender age of 90 to the fact that he had committed matrimony in early life. M. Ferdinand de Lesseps be-
lieved in horse riding. Mr. James Payn complains that in his boyhood he "got a little bored with too much horse." The Grand Francais seemed to think that one can hardly have " too much horse." In a letter recently published, M. De Lesseps delivered bimself on the subject as follows: "I shall always feel deeply grateful to Larine, my riding master, who from my earliest years made me share his keen passion for horses, and I am still convinced that daily horse exercise has in a large measure been the means of enabling me to reach my 84th year in perfect health." Carlyle was also a great rider almost to the end of his long life, and he not only rode, but, we believe, groomed his horse himself. On the whole, it must be concluded that the real secret of longevity is a sound constitution prudently husbanded. The only general rules that can be laid down are those set forth by Adam in "A You Like It":

Though I look old, yet I am strong and lusty
For in my youth I never did apply
Nor did not with unbashful forehead woo
The means of weakness and debility ;
Therefore my age is as a lusty winter,
Therefore my age
Frosty but kindly
That is the whole secret of long life. Shakespeare nnew it as well as any one, yet he died at $52 .-\mathrm{Br}$. Med. Jour.

By a recent decision reported in the American Lawyer, a person who signs an instrument without reading it, when he can read, cannot, in the absence of fraud, deceit or misrepresentation, avoid the effect of his signature, because not informed of the contents of the instrument. The same rule would apply to one who cannot read, if he neglects to have it read, or to inquire as to its contents. This well settled rule is based upon the sufficient reason that in such cases ignorance of the contents of instruments is attribut able to the party's own negligence. But the rule is otherwise where the execution of an instrument is obtained by a misrepresentation of its contents; where the party signed a paper he did not know he was signing, and did not really intend to sign. It is immaterial, in the latter aspect of the case, that the party signing had an opportunity to read the paper, for he may have been prevented from doing so by the very fact that he trusted to the truth of the representation made by the other party with whom he was dealing.
This is the clear-cut manner in which the Supreme Court of Alabama, in the case of Beck \& Pauli Litho graphing Co. v. Houppert et al. (16 So. Rep. 522), reiterates the wholesome doctrine that a person can not take advantage of his own wrong or negligence.

## Uneconomical Lubrication.

It is said that elaborate tests and investigations made a short time ago upon one of the largest railroads in the country showed that more than one third of all the lubricating material supplied in a given time was wasted and lost by carelessness in handling, leakage, etc. A great deal of this waste oil is drawn from the journal boxes by the centrifugal force of the rapidly moving wheels and deposited upon the track. The ties and wooden bridges are injured and destroyed by being thus constantly soaked with oil, and are also rendered highly inflammable. These difficulties have led to the adoption of various kinds of solid or semisolid grease in place of oil. A lubricant of this kind is now in use which seems to be all that could be wished, if the claims made for it are true. It is said that red hot iron will not burn it, water will not wash it off, steam at 90 pounds pressure will not remove it. It is used with cotton waste in ordinary journal boxes, and is said to be so tenacious that no amount of jarrin? will shake it from the fibers and allow it to leak out upon the wheels. Its lubricating power is claimed to be such that one package has sufficed for a run of 50,000 miles, representing more than a year of service.

Vault of the New York Clearing House.
The vault for the New York Clearing House is the strongest in the world. It weighs 571,400 pounds, is 24 feet 4 inches wide, 16 feet $101 / 2$ inches deep and 11 feet $61 / 2$ inches in height. It is divided intothree equal compartments, access to which is given by six doors, three of them weighing 16,800 pounds each. The old method of construction in which a bank vault rests on a stone foundation to guard against tunneling has been abandoned. The new vault will rest entirely on piers and arches of masonry so that the watchman can, at all times, pass under it and inspect the bottom of it.
The walls of the vault are $61 / 4$ inches thick and are built up of alternate layers of iron and chrome stee welded together. Everything about the vault is made to guard against the possible use of explosives. Each of the three compartments contains seventy steel strong boxes which will hold the gold, currency and securities which it is necessary to deposit. The Clear ing House is now constructing a new building in which the vault will be erected-

## an Improved piano action frame

This is a frame of simple and durable construction arranged to firmly hold the actions in position and prevent loosening of the arms carrying the pivots for the hammers, dampers, and other parts of the action. It has been patented by Mr. Frederick W. Bothmer, of No. 803 Tenth Street, Long Island City, N. Y. A number of metal brackets are secured in the usual manner to the piano frame, at equal distances apart, and on the rear of the brackets are secured, by machine screws, the rails, A, B, as shown in Fig. 2, a sectional view through the entire action being represented in Fig. 1. The rails are connected with each other by short arms


## BOTHMER'S PIANO ACTION FRAME

whose upper ends engage a longitudinal groove in th under side of rail, $A$, their lower ends beingseated in a similar groove in the top of rail, B. In the top of rail, A , is also a ridge adapted to enter a groove in the under side of an arm which forms at its inner end the pivot for the hammer, and at its outer end the pivot for the damper, of the particular action for a single string. On the under side of rail, A, are also lugs en gaged by pivot arms of the damper bar, adapted to be actuated in the usual manner from the pedal and on the rear of rail, $B$, is a ridge engaging a recess in an arm which carries a lever actuated from the piaro key, the two rails, which are made of metal, thus form ing firm supports for the pivoted arms, so that a dis placement of the hammers and dampers and othe parts of the action is not likely to take place.

## A STREET CAR RAIL SWEEPER.

It is quite necessary for the wheels of electrically propelled cars to continuously make good contact with the track rails, and to insure this, as well as to facilitate the cleaning of street railway tracks generally, is the object of the improvement represented in the accompanying illustration. It has been patented by Mr. Thomas Waite, of Cramer Hill, N. J. A trans-
verse shait journaled in the outer end portions of the verse shait journaled in the outer end portions of the
car, and adapted to be rotated by a chain belt from the car axle, carries near each outer end a loosely mounted sleeve, and integral with each sleeve is a hanger in which a brush is journaled diagonally over the rails, as shown in the small view. On the inner end of each brush spindle is a beveled gear meshing
with similar gears on the ends of the transverse shaft, with similar gears on the ends of the transverse shaft, passes the chain belt, has a clutch face adapted to engage with a clutch connected with a shifting lever operated by means of a rod terminating in a handle a


## waite's railway rail sweeper.

one side of the car, whereby the driver or motor man may readily throw the clutch into or out of gear. The two hangers carrying the brushes are connected by a rod, and an elbow lever loosely mounted on the drive shaft has one of its members connected to this rod, while the other member is pivotally connected with a link from which a hand lever extends up through the car platform. By means of this lever the brushes may
be elevated to be carried along above the track or be elevated to be carried along above the track or
thrown down to engage the rails, the clutch on the drive shaft being correspondingly moved into or out of engagement with the pinion driven by a chain belt from the gear on the car axle.

The Use of Quebracho in Tanning.
According to a recent German trade report, the Ger man tanners are now adopting the use of quebrach and other tanning materials, such as divi-divi, myro balanus, japonica, mimosa, valonia, alogobilla, etc. in place of oak bark. The leather industry in Ger many has shown great progress in recent years, and the new tanning material of quebracho has produced a revolution in tanning upper and sole leather. Que bracho is now used all over Germany and in other countries on the Continent. Quebracho wood is im ported principally in logs and on sailing vessels. It came originally from the province of Santiago, in Chile, but this source of supply is gradually becoming exhausted. In recent years, in the Argentine Republic, extensive forests of quebracho have been opened Of quebracho, two varieties are known, the red and the white. Red quebracho is richer in tannin than the white, the average contents being from 18 to 20 per cent. Considering the intrinsic value of this tanning material, it is cheaper than oak bark, and nearly as cheap as hemlock. Owing to its very high percentage of tanning qualities, quebracho contains relatively a small proportion of so-called non-tanning substances, and in this respect it has much resemblance to gambier.

These non-tanning substances are an important fac tor in the manufacture of leather, as they fill and nourish the leather, and also impart the necessary acidity to liquors, although not assimilating in a direct manner with the fiber of the hide. Quebracho, it is stated, does not possess a sufficiencs of these non-tanning properties to yield well nourished leathers, and its use, therefore, is only to be recommended in combi nation with other agents stronger in non-tanning sub stances. The supply of quebracho may be considered inexhaustible. Nearing the thirty-first degree of longitude in the Argentine Republic, the Pampas, the largest grazing lands known to the world, gradually develop into immense forests known as chaco. The chaco is wonderful for its luxuriant and varied vege tation; within its limits are found all kinds of tropi cal trees-among these in abundance the red and white quebracho. The red quebracho, like all other tree found in these regions, with the exception of the palm, does not attain a great height, although the trunk is well developed. Of a reddish brown, this wood is heavy and hard, and has tanning qualities which of late years have become highly appreciated in Europe. Formerly quebracho wood was obtained only from the forests bordering on the Parana River, but now trans portation by rail is possible, and gigantic saw milling enterprises have been started which develop the untold wealth of the chaco and send their products to market.
It is stated that the tract of country can furnish a fabulous amount of quebracho wood, practically an nexhaustible amount, while the present yearly consumption is but one million tons. Ten years ago the exports of wood from the Argentine Republic aggre gated in value $£ 15,000$; during 1892 this value had in creased to $£ 300,000$. Very recently a saw mill has been rected at each of the ten railway stations between Rosario and Beurequiste. The government allows the privilege of cutting timber within its boundaries, but makes no grants for more than 13 leagues. One league of forest in the vicinity of the rail way is considered worth from $£ 1,500$ to about $£ 2,000$. On the value f the woods arriving at the sea a tax of 3 to 7 per cen levied. The unlimited supply and low cost of pro duction make quebracho wood one of the cheapest vegetable tanning materials known. About one hun dred blows with an ax and a few hours' labor spent in peeling the bark and sawing the logs suffice to secure a ton of wood, whereas it is estimated that about 150 working hours are required to supply a ton of oak bark. The grinding and cutting of quebracho wood is naturally a more difficult operation than getting out hemlock or oak bark, but considering the original cost this is relatively an unimportant item.
Transportation from the Argentine Republic to Europe can be effected so cheaply that many firms ship their rough lumber to Europe to be worked into extract there. The red quebracho contains in consid erable quantity a red coloring matter, which is hardly soluble in cold water, but will dissolve readily in warm water. For this reason quebracho extracts, if not pro perly treated, will impart a reddish tint to leather. Used alone quebracho extract will only yield a leather of poor color, but when combined with alum and salt it yields finer results even than gambier. Leather tanned with quebracho, alum, and salt has a pale straw yellow appearance, the flesh side being almost white. In first using quebracho extract it is impor tant to use much weaker liquors than those needed with other tanning agents. There are large extract works in Reuners and Benrath, near Hamburg; also in Oberlahnstein on the Rhine, and Frankfort-on-Main.
In these factories the wood is cut by machines specially built for that purpose. It is cut from the log in two different ways-side and head cut. The side cut is of fine, thin, small chips, up to about one inch long, and enead cut consists of smaller and coarser pieces. Quebracho extract is manufactured in crystal and soft
paste. The crystal is put up in cases of 150 kilo grammes ( 330 pounds avoirdupois) and costs about $£ 215 \mathrm{~s}$. It contains about 65 to 70 per cent of tannin The paste is put up in barrels of from 230 to 250 kilogrammes ( 506 to 550 pounds avoirdupois) and contains about 45 per cent of tannin.

## BRINER'S ASH SIFTER.

This is a sifter of very simple and inexpensive construction, which may be readily attached to or detached from an ordinary ash can or barrel, altogethe preventing the escape of dust or other fine particle while sifting the ashes. As shown in the illustration, applied to an ash can of moder ate size, the sifting may be done at the side of the stove or range from which the ashes are re moved, rendering the device of especial convenience in flats or apartment houses. The improvement has been patented by Mr: Emil Briner, of 54 Rutger Street, New York City. An open-nded bag of sail duck or other suitable canvas is attached by means of a draw string to the mouth of the can, a second dra string drawing the bag closely over and in from the edges of the can, to absolutely prevent the escape of any dust, and cause the ashes to readily fall into the can. The upper end of the bag is attached by means of another draw string to a circular head in
which is a sieve, and a cover is adapted to be set on the head during the sifting operation as shown in one of the views

## The Lead Wort.

The lead wort, or Amorpha canescens, with its tall, laven der spikes of flowers is found in the dry regions of the Rocky Mountains. It is said to prefer localities where lead exists, whence its name. The effect of the beautiful pur plish hue of the blossoms is enhanced by the golden spangles of the yellow anther among them. The anther cores become bleached after the pollen has been shed and still further add to the beauty of the plant. The anthers mature one after another, the first one out being a little larger than the rest, and not until the last stamen has been fully formed does the small vexillum finish its growth. This is thought to account for its amorphous character.
The lateral growth remains stationary until the axial growth is complete. It then commences, beginning at the apex and continuing downward. Thus the spiral growth uncoils backward, and axial development ceases when the vexillum has been reached.

## A SIMPLE HAIR CURLING DEVICE

This is an inexpensive implement affording a guard or the hair as it is wrapped on the hot iron and obviating liability to burn the fingers. It has been pat ented by Mr. Edward J. Brand, of No. 61 Fulton Street, Columbus, Ohio. It has two pivoted limbs one of which is adapted to close upon the other, and a diminished shank of one limb extends through a central recess in the handle piece, at the outer end of which it terminates in a crank handle. One of the limbs is furnished with curved guard wings, and a spring attached to one wing bears at its other end on


BRAND'S CURLING IRON.
ferrule of the handle, the spring normally holding the limbs closed. On the outer end of the wing to which the spring is attached is a button to protect the hand in manipulating the device when heated. As will be seen, the implement may be readily heated by being hung in the chimney of a lighted lamp, or such other manner as desired.

In an article in the June number of the Astrophysical Journal, by H. Ebert, he concludes that the temperature of the interior regions of the sun is in round numbers $40,000^{\circ} \mathrm{C}$. This is in good agreement with values previously determined by others.
an adtomatic brake slack adjuster.
The illustration represents an improvement designed to automatically take up all the slack in the brake mechanism caused by the wear of brake shoes, permit ting a uniform travel of the piston in the brake cylinder and insuring a full and effective pressure in the air brake cylinder at the time the brakes are applied. The

freese and nicholson's brake slack adjuster
improvement has been patented by Messrs. William De Freese and Thomas E. Nicholson, No. 1296 Topping Street, Hamline, St. Paul, Minn. The brake rod is connected at one end, as usual, with the piston in the brake cylinder, and at its other end with the brake lever, which is connected by a link with the dead brake lever. The latter is pivotally connected, as shown in Fig. 1, with a head in which is held adjustable a rod connected with a longitudinal toothed bar sliding in bearings in a casing, the teeth of the bar being engaged by gravity dogs, of which one hasits fulcrum in the casing, while the fulcrum of the other extends through slots into the casing, to engage the forked ends of a lever fulcrumed at its lower end on the casing, as shown in Figs. 2 and 3. Through the upper end of the lever the brake rod passes loosely, lugs being held on the rod at opposite sides of the lever. Near its lower end the lever is pivotally connected with a spring which holds the lever normally in the position shown in Figs. 1 and 3. When from wear of the brake shoes or other cause a slack exists, and the piston in the brake cylinder has to travel beyond its normal stroke, the brake rod is drawn or pulled a greater distance to properly apply the brakes, and one of the lugs on the rod then engages the free end of the lever, swinging it until its dog engages the next tooth on the toothed bar. When the brakes are released and the lever is returned to its normal position, the toothed bar is moved by the dog into engagement with the other dog, which has its fulcrum in the casing, the toothed bar thus taking up any slack in the brake mechanism. The device works automatically and the bar is sufficiently long to take up all slack until the brake shoes are completely worn out

## THE BUNDY STEAM TRAP.

This trap has no interior float. It is operated by the power developed by the weight of the water that collects in the bowl. When the bowl is filled, then the weight of the water, in addition to the weight of the bowl, overbalances the ball weight on the lever, and the bowl settles in the frame, thereby opening the live steam connection from the top of the boiler to the trap. Upon the admission of live steam from the boiler to the trap the check valve in the pipe leading to the trap is immediately closed and temporarily the trap becomes a part of the boiler, subject to the same steam pressure and water line, and hence the water in the trap at once enters the boiler, passing a check valve placed between it and the boiler, on both sides

tank trap.

THE BUNDY STEAM TRAP.
of which, the steam pressure not being equal, the water of its own weight opens the check and passes in.

After the bowl has emptied itself into the boiler it again becomes sufficiently light so that the ball weight on the lever overbalances it and the bowl is rolled in the frame and the live steam valve is closed, at the

return trap.
same time an air valve underneath the steam valve is opened to allow the escape of any air or vapor that may enter the bowl. A special feature of this trap is the fact that on the air valve pipe a horizontal check valve is used, so that while there is a vacuum in the trap bowl the check remains closed and the vacuum helps to fill it again with water.
The Bundy traps are made in four sizes, holding from five to fifteen gallons of water. They are made by the A. A. Griffing Iron Company, Jersey City, N. J. In the bowl of the return trap there is a bent pipe turned up that is screwed into a diaphragm at the smaller end of the bowl, while the other end terminates near the highest point of the bowl. The live steam upon entering the trap is directed through this bent pipe and so brings the pressure upon the top of the water in the trap. Our illustration shows this feature
In the Bundy tank trap it will be observed tha this bent pipe extends down ward from the diaphragn to the lowest part of the bowl, and so, when this trap is discharging, the water is forced up through this pipe and so on out through the discharge valve.
Before all the water is discharged from the tank trap it is so adjusted that the trap bowl will rise in the frame and the discharge valve be closed, so that at no time is the end of this pipe out of water. The wate covering the pipe at all times prevents the escape of any steam.
When one takes into consideration the adaptability of steam traps, it is not at all surprising that thou sands of these traps are sold, and that so many factor ies have from one to fifty in use. They may be used as a boiler feed in place of a pump.

## THE IMPROVED BELL ODOMETER.

The carriage odometer shown in the engraving accurately registers the distance traveled, and will cord and ring a tiny bell as each mile is passed.
It is actuated by a steel pin driven into the hub This pin engages the spur wheel, shown on the righ of engraving, at each revolution of the carriage wheel. The spur wheel is attached to a wormshaft extending through from righ to left. Engaging with this shaft is a cut brass gear, termed the unit wheel, mounted on a cen tral shaft extending from the dial plate to the rear. The va rying sizes of car riage wheels are compensated by the size of $t h i s$ uni wheel. Keyad to th central shaft is a pawl which sets in motion the inter nal gears, and these are connected by bushings to indexes on the dial. This pawl is so constructed a not to propel the gears when reversed, thus avoiding all danger of injury when the carriage is backed With this exception the entire movement is positive and quite accurate, regardless of speed on uneven ground. Attached to the central shaft, back of the case, is a small gong which is struck a smart blow with a spring hammer at each revolution, thus an nouncing that a mile has been passed.
The dial contains three indexes, each of a different color. The red index registers a mile at each revolu tion, and, as the dial is divided into forty spaces, each space represents the fortieth of a mile, or eight rods The yellow index revolves once in forty miles, and each space represents a mile. The blue index revolves once in 1,600 miles, so that each space represents forty miles in relation to this index. The figures inside the ring indicate miles, measured by the yellow index, while the figures outside the ring indicate miles, measured by the blue index. The dial thus constitutes a reliable record of the distance traveled. On starting out, the positions of the indexes may be quickly marked on a dial card-a number of which are furnished with each odometerand on returning from a drive the distance traveled may be seen at a glance. The dial is protected by a heavy watch crystal, secured by brass bezels screwed in the malleable case. The whole is protected by a neat nickel-plated hood.
It is now less than two years since this instrument $\&$ Company, 33 Sudbury Street, Boston, and the result has been very gratifying to its introducers, numbers of
them having been sent to nearly every State and Territory, to the Provinces and to Mexico.

## Meteorological Balloons.

A balloon equipped with self-registering instruments to measure the temperature and pressure of the atmo sphere at high altitudes was recently experimented with in Berlin and came down with the instruments in good condition in Bosnia. The instruments showed that the balloon had reached an elevation of 53,872 feet, over 10 miles; the thermometer had fallen to 52 degree below zero-the lowest it could record. Another bal oon sent up later is stated to have reached an elevation of 72,000 feet above the earth, or $131 / 2$ miles.

## a bicycler's distance recorder

This compact little measurer of distance traveled by a wheel
 man, shown herewith detached and ap plied to a wheel, weigh only $21 / 4 \mathrm{oz}$. and register up to 1,000 miles and re peats. It is made of alumi num, with a satin finished dial which pre dial which pre some appearance and will not break or crack. It is manufactured by the Trenton Watch Co., of Tren ton, N. J., who have admirable facilities for the pro duction of such work in a manner which shall insure absolute accuracy. This cyclometer is noiseless and positive in action, while being also dustproof and waterproof. It can be run backward and forward at the highest rates of speed without the possibility of in jury. All instruments before being sent out are tested in a lathe running at many times the speed they will ever be called upon to record on a wheel. One instrument was thus run over one hundred and thirty thousand miles, recording at the average rate of a mile in four seconds, without showing the slightest evidence fear, and the same instrument was run back war at equal speed. As will be seen from the illustration


THE "TRENTON" CYCLOMETER.
it is but a matter of a moment to apply the instrumen to a wheel, and its dial can be read at a glance from the saddle.

The New York Botanical Garden
Under the act of incorporation, the citizens form ing the society known as the " New York Botanical Garden" have subscribed $\$ 250,000$ as an endowmen fund, and the Department of Public Parks is author zed to set apart a portion of Bronx Park, not to exceed 350 acres, for the purposes of the botanical garden The city will also appropriate $\$ 500,000$ for the construc ion and equipment of buildings. Bronx Park is about two miles in length and half a mile in width and con ains 653 acres; it extends along both•sides of the Bronx River, in the northern part of the city. In the otanical museum will be collected specimens of the products of plants. This building will contain labora tories, lecture rooms and an herbarium, which, it is hoped, will ultimately contain specimens of all known plants. There wi be a large number of greenhouse of various sizes, wn.ch will contain a great variety of growing plants from tropical countries. In the out door department will be as large a variety of plants a will grow in this climate; also an arboretum, in which all the trees that can endure our climate will be grown.

The average speed made on the recent 1000 mile relay bicycle race, Chicago to New York, was $151 / 3$ miles pe our. Michael, a young Englishman, on May 19, a Paris, made 100 miles in 4 h . $2 \mathrm{~m} .45 \frac{4}{5} \mathrm{sec}$.

## THE BLAKE REPEATING RIFLE.

This rifle was, in its military model, one of those submitted to the United States Army Board on Magazine Arms which reported May 20, 1893. It also was brought before the Navy Board on Small Arms in May of the present year. The inventor and maker is Mr . John H. Blake, of No. 136 Liberty Street, New York. The arm was favorably spoken of by both the Army and Navy Boards, but the radical departure of the magazine system from any known system or any system before either board, made it almost too much of an innovation to be hastily recommended for adoption. Since these tests, sportsmen and rifle experts have encouraged the inventor to put it on the market slightly modified to conform to sporting requirements, the cut showing the sporting model. The system is that technically known as a "multiple loader revolving packet repeating rifle."
It is a "central" magazine rifle that by the use of a "cut-off" can be used as a rapid single loader, with magazine holding seven cartridges in reserve, available as a repeater whenever the cut-off is thrown in. Single loading fire can be resumed at any time, holding the remaining cartridges in packet in reserve. It is said that an expert is able to fire at the rate of 43 shots pe minute until his ammunition supply is exhausted.
The distinctive feature of the system is that of the cartridges being carried in the belt or pockets in a re volving cylindrical packet, holding generally seven cartridges. These packets are charged into the mag azine, which lies under the receiver and just forward of the trigger guard, in one movement and "en bloc," as if the packet were a single cartridge. The cartridges are fed into the chamber by a positive movement, and when the cartridge packet is empty, the magazine door is opened, the empty packet drops out and a full packet is recharged. An empty packet may empty packet may re refilled with cartridges many times, if desired ; the packet weighs less than be furnished can cents. The rifle holds eight cartridges, one in the chamber and seven in the magazine. Twomore packets may be carried in a vest, or shooting jacket, lower pocket, which would give a supply of twentytwo cartridges. If it is thought desirable to carry more cartridges, more packets may be carried in the pockets, or in loops on the cartridge belt as those now in use, the loops merely being larger. A full belt
would hold fifteen packwould hold fifteen packets. A belt may have a smaller number of loops, the rest of the belt being looped to carry single cartridges.
The action is that of the bolt system. In the sectional view showing the action open, the receiver has on its left hand side a broad and deep groove, a, for the passage of the left locking lug of the bolt, and on the right a shoulder for the extractor and right locking lug of the bolt. The entire bottom is cut away to per mit the upward and forward movement of cartridges from the magaziue. The forward breech casing contains the grooves for the locking iugs of the bolt, and on the right hand a cut for the hook of the extractor At the rear the breech casing for a short distance is closed at the top, completely encircling the bolt back of that a channel is left for passage of the han dle, while at the right a shoulder is formed, in front o which the base of the handle locks in the firing posi tion. The magazine casing consists of a cylindrical box placed below the receiver. A central section of it i shown in the small figures, the upper view represent ing the cartridge packet adjusted for magazine fir and the lower one with the magazine in reserve. Its bottom is hinged at the left side, $d$. and when closed is secured bs the catch, e f. The cartridge packet has at the front and rear ends trunnions, which rest in bed in the front and rear faces of the casing.
The action of this rifle is built strong enough to shoot the $7 \frac{1}{2}$ millimeter, or 0.30 cal., U. S. army smoke less rifle cartridge at a muzzle velocity of 2,000 feet per second, which gives a chamber pressure of twenty tons per square inch; and also the 6 millimeter, 0.236 cal. U. S. navy cartridge at a muzzle velocity of 2,500 feet per second, giving a chamber pressure of thirts tons per square inch.

The splendid lake steamer, the Northwest, recently made the trip from Milwaukee to Chicago, $861 / 2$ miles, in 4 hours 6 minutes, being at the rate of $21 \cdot 13$ miles per hour.

## How to Ride the Wheel

In the course of a paper on "Cycling as a Pursuit," F. W. Shorland, an English bicyclist, has set down a number of hints on riding that beginners will find very helpful. As the recent impetus the sport has received has brought out many new devotees of the wheel, we eproduce here a portion of Mr. Shorland's article
Cycling as a pleasurable pursuit ceases to be enjoy able when it becomes sheer hard work. In nothing is it so easy to make a toil of pleasure, and therefore my strongest advice to every one indulging in the pastim is to take it easy and not to overdo it. This is, o course, a personal matter entirely. One man's potter ing pace is another man's high pressure effort, and I have often noticed how inferior riders will utterly ruin their enjoyment of a run by dreading to acknowledge that they cannot keep up as high a rate of speed a other men with whom they may happen to fall in dur ing a spin upon a frequented road.
Be very careful of strange cyclists. You never know whether they are able to ride or not, and the wobbling of a novice are the most dangerous obstructions of the highway. Even one's own companions are sometime the cause of collision, especially if they are not used to riding in company. One man can squeeze through a tight place where two cannot, and it is customary fo men not used to riding at close quarters to cut in fron very dangerously.
In all road riding it is a good plan to avoid sudden hanges and violent alterations of pace and course For instance, in passing a cart it is much better and safer to take a long swing round it than to swerv sharply behind and to return to one's course immedi ately in front of it. A sudden and jerky style of ridin is the usual cause of slipping sideways on a wet and
sible a continuously even driving pressure, one foo taking up the strain before the other ceases to drive.
Although steering and pedaling are so closely related in this respect that it is impossible to steer well when one pedals badly, yet that is not the whole secret o good steersmanship. No one is a good steerer who cannot ride a "safety" with his hands off the handles I do not advise this style of riding, which is merely the showing off of a really very simple accomplishment, but what I mean is that the ability so to steer shows that one's steering has been mastered. It is only a matter of a few trials, provided one's machine has its frame true and its wheels in line. It means that the ride has escaped from the elementary and erroneous im pression that his handle bar is something to keep a ight grip on.
Aching wrists and blistered paluns are proofs of bad steering. Handles do not want to be grasped like a try-your-strength machine; they are, when steering is mastered, simply hand rests, and a light touch is al that is needed. Pulling at the handles and wrenching he front wheel about is all wrong. For very stiff hills it is useful as a change to pull at the handles, but when a hill is severe enough to need this style of riding it is wisest to walk.
The third point of importance in style is the position; that is, the relative positions of the handles, saddle, and pedals. The center of the crank axle, to which cranks and pedal are fastened, is a fixed point in the machine, and the handles and saddle are equally adjustable; so it is convenient to measure from this fixed point, and when one's own fit is found, to keep a memorandum of it. A very suitable medium position for all-round work is to have the peak of the saddle just so far back that a vertical line from it hang against the peda when at its rearmos position. In the old days of the ordinary a very vertical posi tion right over the work was assumed, and a reac tion set in on "safeties," exaggerated immensely on front drivers to a ridicu lously far back position of 14 inches or more, both o which extremes are wrong The further one sits for ward the higher can one' saddle be raised, and in a very far-back position a rider has always to be doubled up, and cannot sit in comfort.
The reach is best deter mined by noticing, when riding, whether at the bot tom of the stroke you can while keeping the foot in position on the pedal, dro the heel to the lowest pos sible extent and then find the leg straight. The leg
reasy road. Of course, there are certain conditions of should never be fully extended at any point of the road when the most expert riders cannot avoid slip ping, especially with plain-faced tires; but these state of greasiness are exceptional, and most side slipping is due to spasmodic instead of smooth pedaling, to bad steering, and a wrong position.
Bad pedaling is a very common defect in the average rider. No man can race successfully without pedaling well; but the average rider who only uses his machine or pleasure would be astonished at his increase of enjoyment, if onlv he took the trouble to learn to pedal smoothly. It is noticeable, in nine cases out of ten, that the chains of ordinary riders are not kept continuously ight on the driving or upper part. Smooth pedaling with continuous pressure, will change all that. Back ash should never be permitted, as it is evidence of a slovenly, wasteful style, besides being a very frequent ource of slipping.
A smooth, continuous style of pedaling gives one frm seat on the machine and helps the steering. Ever one knows that in slowing a bicycle by back pedaling the conditions of steering are different from those of pedaling forward; if, then, a rider by uneven pedal ng introduces a little back pedaling every revolution, he is continually varying the conditions affecting th teering, which consequently is erratic, if not danger ous. Smooth pedaling and a straight course go natu ally together, yet the majority of trails one sees ar wonderful loopy and zigzag; clear proofs of the preva ence of uneven driving and the consequent indifferen steering.
Alternate plugging on the pedals is hopelessly wrong and the first aim of any one who wants to ride wel hould be to get his feet round evenly, not to raise on by the down push of the other in jerks, but by drop ping the heel at the bottom of the stroke and, as it vere, gripping the pedal, to maintain as near as pos
revolution. That is why if at the lowest part of the troke you exaggerate the position of ankling, and then find the leg straight, you may be certain that for riding purposes you are, as you should be, just within your reach. In any case, it is a far less serious error to too short than too long.
Handles should be so adjusted that they can be easily reached when sitting in a comfortable posture; not so high that the arms are akimbo, and not so low that a humped-up attitude is enforced. Bicycle hump and a crouched-down stoop are only necessary at sprinting pace when windage is excessive. The majority of the toops and humps seen on cyclists are due to the rider having his handles too low and trying to sit up to an easier position. A bicycle rider should not copy eithe a piano player or a man pulling up weeds; he want his hands about level with his knees when his thigh are horizontal. If they are up too high, he does no get the best results or have as accurate a control of the steering; but even that is better than being folded in balf on the machine by an outrageously dropped han dle bar.

## Street Car Fenders.

A correspondent says: A properly constructed bale or cushion filled with flocculent or equivalent materia and of suitable size and shape and restrained from materially yielding otherwise than backward, and ar ranged to lie or be adjusted in proximity to the track, would, if carried by the car in front, be much more ef ficient, prevent injury to limb, and be more certain in its action than a metal fender in pushing a body before it on the track or out of the way of harm till the ca could be stopped. It is a simple expedient, but often simple means are the most reliable.

THERE are over seven miles of tunnels cut in the solid rock of Gibraltar.

## ©orrespondence.

OIl, Gas and Water from an Artesian well. To the Editor of the Scientific American
Under promotion of this club and with the purpose of developing a water supply for this city the first one of three artesian wells has about been completed. It presents conditions which are believed to be novel and of general interest.

The well is 2,487 feet deep and flows about 300,000 gallons of water each twenty-four hours, the initial pressure being 65 pounds and the temperature 120 degrees Fah. There is a double casing from the top to a depth of 2,200 feet, one being $41 / 2$ inches (and through it only the water flows) and the other 6 inches in diameter. The $4 \frac{1}{2}$ inch pipe then continues to the top of the water-bearing stratum, about 2.400 feet. The water as it appears is strongly mixed with natural gas which readily ignites, so that apparently water and flame flow from the same opening. Scientific analysis shows that the water is impregnated with mineral pro perties in the proportion as shown below per gallon:


The water has been turned directly into the mains of the public water supply system of the city, and readily furnishes a tine fire pressure, besides tilling the standpipe 100 feet high on a neighboring elevation. The gas in the water is a matter of some embarrassment and it is a problem with us as to how to dispose of it.
Another point of especial interest is that, at a depth of 1,050 feet, a flow of petroleum oil was struck, which has been of the greatest trouble in prosecuting the work, the entire boring plant having been twice con sumed by fire on account of it. The flow is remarkable in that it has appeared with a persistent and un controllable natural or artesian flow of about 70 gallons a day, and this has continued for nearly a year. A
rupture having occurred in the 6 inch pipe, the oil has found it, and now flows between the inner and outer casing of the well with a velocity very much accelerated by the high temperature of the inner pipe.
What to do with the oil and with the gas, and how readily to separate the latter from the water and to utilize the same, are problems which very much puzzle us amateurs, and if they are such as interest the scien tific, we would be glad of any suggestion from you or your readers. We think we have one of the most re markable deep artesian wells in the world.

Commercial Club.
Corsicana, Texas, June 12, 1895.

## Cost of Power at Niagara.

The company which has undertaken to develop electricity at Niagara, on a large scale, for manufacturing and other purposes, has acquired more real estate there than it needs for its own use, in order to furnish sites to such of its customers as wish to establish their business close to the source of their mechanical power supply. But the public has been led to expect that in addition to serving local interests, the company would also furnish electricity to places scores, if not bundreds, of miles away, and there has been much speculation as to the feasibility of carrying such plans into effect. Owing to her proximity to the Falls and her great size and industrial activity, Buffalo has been regarded as the first center of population, removed from Niagara, to be provided for. It is not yet quite clear whether that city feels that it is enjoying a privilege or conferring a favor in letting the power company in vade its precincts. Perhaps she has not determined that point herself. The matter is evidently still under consideration. In reply to some inquiries from representative Buffalonians, the Power Company recently ffered the following terms :
It would let the municipality or a private corpora tion come to Niagara, take water from the Power
Company's canals at the rate of $\$ 10$ a horse power, and manufacture its own electricity; or it would furnish power off the turbine shafts at $\$ 13$, or electricity at the power house at $\$ 18$. But if the Power Company undertook to do anything of this sort, it would not contract to deliver less than 10,000 horse power. Hence Buffalo must agree to take at least that much or none at all. The Niagara people would not accept a franchise to operate a line to and in Buffalo for a shorter time than that for which its own bonds have been issued. No price is given for electricity delivered at a central station in the suburbs of that city, fifteen miles from the Falls, so that the company's own estimate of the probable waste and cost of transmission is still withheld.
There would be four kinds of losses: (1) In transforming at the power house up to a high voltage, (2) on the line. (3) in transforming down at Buffalo, and (4) in distribution over street lines to consumers. These could not well amount to less than 20 or 30 per cent altogether, and they might, perhaps, reach 50 or 60 per
half, the $\$ 18$ rate at the generator shaft would mean $\$ 36$ to the consumer, without adding anything either for interest on the cost of the transmission plant or for operating expenses. This, however, is probably an extravagant estimate. The prices actually given, by the way, are for a twenty-four hour daily supply. Some establishments require power, however, for only ten or eleven hours. Whether it would pay to putin storage batteries to utilize the surplus is a question which their managers must naturally consider.
Richard Hammond writes to the Buffalo Courier to say that steam power, on a scale of 1,000 horse power for ten hours daily, can be generated in Buffalo, where coal is very cheap, for $\$ 21$ per horse power. The Power Company, however, denies this, and estimates the cost
at $\$ 32$, besides quoting various experts as estimating at $\$ 32$, besides quoting various experts as estimating
the cost on a twenty-four hour basis at between $\$ 45$ the cost on a twenty-four hour basis at between $\$ 45$ pensive, it is said to be from $\$ 60$ to $\$ 75$. If, after this dis cussion, Buffalo decided neither to buy on the terms offered nor to let the Power Company bringin itsown lines and supply the market, more distant cities may possibly be deterred by her example from patronizing the Niagara concern; but as the latter supplies its ocal customers with electricity at $\$ 20$ per horse power in large quantities, there may be a greater industrial development at the Falls than would otherwise result -New York Tribune.

Benjamin Franklin on 'Torpedo Fish.-An interest ing letter of Benjamin Franklin on the stroke of the so-called torpedo fish is preserved in the electrical department of the Armour Institute, Chicago. It wa written during Franklin's second mission to England, while he was engaged in devising means for protecting the powder magazine at Purfleet from lightning. He was very busy at this time and was, besides, involved in a bitter political quarrel with Lord Hillsborough the Secretary of State for the Colonies; but he, never theless, found time to study torpedo fishes and their effects.
The letter is indorsed: "Franklin's Instructions to Try if the Stroke of the Torpedo be Electrical," and is, in full, as follows :
It has long been supposed that the Stroke given by the 'Iorpedo was the Effect of sudden violent muscular Motion. It is now suspected to be an Effect of the Electric or some similar subtil Fluid which that Fish has he Power of acting upon and agitating at Pleasure.
To discover whether it be the Effect of a subtil Fluid or of Muscular Motion, let the Fish be touch'd with the usual Conductors of Electricity, viz.:-Iron, or other Metals; and with the known Non-Conductors, dry Wood, Glass, Wax, etc. If the Stroke be communicated thro' the First and not the Latter, there is so far a Similarity with the electric Fluids, and at the same Time a Proof that the Stroke is not an Effect of mere muscular Motion.
Let it be observed whether the Stroke is sometimes riven on the near Approach of a conducting Body without actual Contact; if so, that is another similar Circumstance. -Then observe whether in that case any Snap is heard; and in the Dark any Light or Spark is not, there the Fluids differ.
Let a Number of Persons stand on the Ground, join Hands, and let One touch the Fish, so as to receive the Stroke. If all feel it, then let him be laid with his Belly on the Plate of the Metal; let one of the Persons so joining Hands touch that Plate, while the farthest from the Plate with a Rod of Metal touch the Back of the Fish; and then observe whether the Force of the Stroke seems to be the same to all in Circuit as it was before, or stronger.
Repeat the last Experiment with this Variation. Let two of the Persons in the Circuit hold each an uncharged electric Phial, the Knobs at the Ends of their Wires touching. After the Stroke, let it be observed whether those Wires will attract or repel like Bodies, and whether a cork Ball suspended by a long silk String, so as to hang between the Wires at a small Distance from the Knobs of each will be attracted and repelled, alternating to and from each Knob; if so, the Back and Belly of the Fish are at the Time of the Stroke in different States of Electricity.
London, August 12, 1772.
B. Franklin.

The Slavianoff Electric Welding Process.-The Slavianoff system of electric welding. or the Slavianoff smelting system, as its inventor calls it, is coming into extended use in Europe, and has been for some time in uccesstul operation in the celebrated Perm Gun Works in Russia. It is said to be an improvement on the well known Thomson and Benardos systems. Its principle depends upon the employment of a bath and the development of hydrogen at the negative pole, surrounding the part to be welded. The gas thus forms a high resistance to the current at this point, producing a corresponding amount of heat, which is communicated to he negative pole. A supply of molten metal, of the same character as the object to be welded. is supplied
to the fractured part. This is accomplished by using to the fractured part. This is accomplished by using
the object operated upon as one electrode and a bar of
the same metal as the other. During the welding this bar is gradually melted down and constantly supplies metal to the fracture as it is needed. A spring and solenoid automatically regulate the feed.
The Slavianoff process is, it is said, applicable to all ordinary metals. Some remarkable work has already been done by it at the Perm works. Some of the fractures repaired without difficulty were such as would have offered almost insuperable obs a acles to any other known system. One of these was a bell about six feet in height and in its greatest diameter that was cracked from top to bottom. Another was an immense roll from a rolling mill broken in two near the center.
Measuring Specific Inductive Power.-A new method or measuring specific inductive power has been described by Mr. Nodon and Prof. Pellat. They employed two metallic spheres of small capacity, placed some distance apart and connected with an induction coil, and a third, movable, sphere grounded through a telephone. This third sphere is placed between the other two, its position being determined by the point at which no sound is heard through the telephone.
The dielectric to be tested is placed berween one of thestationary spheres and the movable one, and the later is moved toward the dielectric until the telephone again becomes silent. The distance between the first and second positions of the movable sphere will then be proportional to the specific inductive power of the dielectric. In using the apparatus a material whose inductive capacity is known is first used; the unknown substance is tested from this or a standard. The two specific inductive capacities will be directly proportional to the distances found in the two tests.
Electricity from Heat.-M. Desire Korda, a French electrician, has recently made a thermo-chemical galelectrician, has recently made a thermo-chemical gal-
vanic cell, using ordinary gas retort carbon and a few cubic centimeters of barium peroxide. The salt is simply placed upon a flat piece of the carbon and the latter is heated to redness in a gas flame. A violent effervescence takes place and carbonic acid is given off. A voltmeter, whose terminals are connected by means of platinum wires with the carbon and the salt respectively, shows a deflection indicating a difference of potential of about one volt.
If cupric oxide, resting upon a layer of potassium carbonate, be used instead of the barium peroxide, a voltage of $1 \cdot 1$ is indicated.
Dynamo and Steam Engine Efficiency.-Prof. Unwin complained, in a recent lecture, that electrical engineers were in the habit of comparing the efficiency of the dynamo with that of the steam engine, greatly to the discredit of the latter. It is a common saying, he adds, that the efficiency of a dynamo is from 90 to 95 per cent, while that of the steam engine is only about 10 per cent; but this comparison is an unfair one, and shows a lack of comprehension of one of the two fundamental laws of thermodynamics, namely, the law of the motivity of heat. Heat energy is undirected energy and only a fraction of it is convertible into mechanical energy. Working, as it must, with only this a vailable fraction, the steam engine is not an inefficient machine. The task of the dynamo is simpler. Electricity is directed energy in a wholly convertible form, and it is, therefore, only necessary to transform one kind of directed energy into another. In order to do this, only a small fraction need be wasted. Prof. Unwin says further that the electrical engineer is to blame for his ingratitude, as without the steam engine the dynamo would be but a useless mass of metal and wire.

## Silvering Glass.

A simplified process for silvering glass is thus described by MM. Auguste and Louis Lumiere, in the Journal de Physique. Take 100 parts by volume of a 10 per cent solution of nitrate of silver, and add, drop by drop, a quartity of ammonia, just sufficient to dissolve the precipitate formed, avoiding any excess of ammonia. Make up the volume of the solution to ten times the amount by adding distilled water. The reducing solution used is the formaldehyde of commerce. The 40 per cent solution is diluted to a 1 per cent solution. The glass to be silvered is polished with chamois leather, and the bath is made up immediately before use by mixing two parts by volume of the silver solution with one of formaldehyde. The solution must be poured over the surface without stopping. After the lapse of five or ten minutes. at a temperature between 15 degrees and 19 degrees C., all the silver in the solution will be found to have been deposited on the glass in a bright layer, which is then washed in running water. It is then varnished, if the glass side is to be used; or polished, if the free surface is required for reflection. This method does not require the scrupulous care necessary with other methods.

## The American Cotton Crop.

On June 1, the visible supply of cotton in this country for 1895 was $9,520,085$ bales. This is $2,212,820$ bales more than were indicated by the crop at this time last year. These figures indicate that the entire crop this season will be no less than $9,800,000$ bales, an amount
that has never, heretofore, been approached.

## THE PROJECTORS OF THE ATLANTIC CABLE

A special meeting of the New York Chamber of Commerce was recently held formally to receive the painting entitled "The Projectors of the Atlantic Cable," York. Morris K. Jesup, chairman of the special committee having the matter in charge, presented the painting to the Chamber in an appropriate speech. Dr. Chauncey M. Depew delivered the oration, paying a glowing tribute to the memory and achievements of Cyrus W. Field, Moses Taylor, Marshall O. Roberts, Wilson G. Hunt, Professor S. F. B. Morse, Chandler White, and David Dudley Field.
The painting represents a meeting of the projectors of the Atlantic cable at the residence of Cyrus W. Field, in Gramercy Park. The venerable Peter Cooper is presiding. To the right stands Mr. Field, who is calling attention to a chart of Trinity Bay, pointing to Heart's Content as a safe harbor for landing the cable. David Dudley Field stands behind the president with a law book. Chandler White is handing estimates of expenses to Marshall 0 . Roberts, next to whom at the table is Moses Taylor. At the end of the table stands Wilson G. Hunt. Professor Morse is standing behind Mr. Roberts and by his side Danjel Huntington, the artist, sketching. The original idea Huntington was suggested by Mr. Field to Mr.

## GREAT FALLS AND GEYSERS-YELLOWSTONE

 NATIONAL PARK.The accompanving illustrations are views in Yellow stone Park. Of all the remarkably stone Park. Of all the remarkably
beautiful localities of this country, beautiful localities of this country, that tract of land stands pre-emi-
nent in the grandeur of its glacial and volcanic scenery ; its lofty snow and ice capped mountains; its silvery lakes; and its turbulentrivers, cascades and falls. The park covers an area of about 200 square miles and comprises the greatest geyser region of the world, together with some of the most wildly beautiful scenery.

Foremost among the natural attractions of this place is the Grand Cañon of the Yellowstone and its Falls. At places this grand gorge is 2,000 feet deep, while the bottom of the cañon is hardly wide enough to permit the river to pass through, notwithstanding its wildly turbulent character. The falls are two in number, the upper and lower, and are about one-quarter of a mile apart, the first being 140 feet in height, and formed by a perpendicular cliff over which the water dashes in a smooth, silvery sheet. Below the falls the speed increases as the cañon narrows, and the river breaks into a grand roaring stream of foam and spray, only calming the instant it takes its second leap over a precipice 390 feet in height and forming the second fall. The first portion of the illustration is a view of the cañon and its upper fall.

If the Yellowstone, its cañon and its falls, can be surpassed in point of beally and interest, the geysers and other volcanic features of the park preseut perhaps still more striking objects, for here are found the most beautiful geysers of the world. Some hourly shoot vast streams of steam and water high into the air, and others make themselves known only at periods of months or years. The principal and most regular geyser of Yellowstone Park is Old Faithful, which may be seen in eruption hourly, while the larger geysers erupt at greater in-

Geysers are only found in volcanic regions, the prin-
cipal localities being Iceland, New Zealand and Yel-
tervals; the Giantess after days and Excelsior only in years. lowstone Park. They are generally thought to be


Wilson G. Hunt.

HE PROJECTORS OF THE ATLANTIC CABLE
is to this fact that is due the eruptions of the geysers. Assuming a geyser tube to be filled with water and to be at an elevation where water will boil at the mouth of the tube at $100^{\circ}$ Centigrade, under normal conditions the water at the mouth of the tube has not this heat, while the water some distance below has this or even a greater heat, but as we descend the boiling poin becomes higher, and this greater heat of the water is always below its correspond ing boiling point in the same manner as at the mouth o the tube. When, however, the increase of water and vapors at the base of the tube and in the subterranean cav erns with which they communicate results in a sudden lifting of the water in the tube, the highly heated water at the lower parts thereof is lifted to an elevation at which it will boil, whereupon the water in the tube is started to boiling, and the geyser is then in the height of its eruption. As soon as these abnormal conditions cease the geyser subsides into inaction, only to be again awakened when the above conditions recur.
Closely related, both in origin and nature, to the geysers, are the hot springs. These are most plentiful in Yellowstone Park alon Yellow River where along Gardner River, where they oubble con where their clear, limpid water soon cools and settle in terraced reservoirs along passages in the earth communicating with subterra- |he sides of the mountains, presenting a most beauti nean caverns or reservoirs of hot water, the periodical ful appearance in the blending of the many colors of discharges of steam and water being due to convul- the coral-like formations at the terraces, and in the exsions occasioned by the generation of steam in the quisite clearness of the water. Principal among the passages or tubes. It is known that water will boil at terraces is the Minerva Terrace, which is composed of different degrees of heat at different elevations, and it a series of successively elevated reservoirs, from one to views in Yellow- different degrees of heat at different elevations, and it a series of successively elevated reservoirs, from one to the other of which the water flow sheets. This terrace is shown in the illustration.

The Organ of the American Liner St. Louis.
The Scientific American, in it issue of June 15, presented an illustration of the saloon of the new American Line steamer St. Louis showing at the further end the or gan built for the vessel by Messrs. Jardine \& Son, of this city. The organ is the first ever put into a sea-going vessel, and some interest ing modifications in construction were necessary to adapt it to the peculiar conditions to which it subjected. Each pipe is supported separately by fastenings which admit of expansion and contraction All the metal fittings are of brass, instead of iron or steel, that the dampness may not affect them in juriously, and, for the same reason no glue is used in the woodwork but everything is screwed fast.
The entire action of keys and stops is Hectric, and the keyboard is forty feet away from the pipes. The contacts are frictional and therefore, self-cleaning. The mag nets controlling the pipe valves con sume only 0.05 of an ampere in current, and but 2 volts tension is re quired. The current is supplied by a 300 ampere-hour storage battery charged when necessary from one of the ship's lighting dynamos
Another organ, similar to that of the St. Louis, is now being buil for her sister ship, the St. Paul.

Electric cars have been pro hibited on the road from Berlin to Charlottenburg. They would have passed by the Imperial Technical Institute, and experi ments showed that the current fo the railroad strongly affected all the apparatus in the building, so as to make delicate scientific observatioms and experiments impossible.

## the opening of the harlem canal

The improved waterway through the northerly part of this city, joining the North and East Rivers, was thrown open for navigation on Monday, June 17, 1895, with elaborate ceremonies, including a land and marine parade by civic and federal dignitaries. The ceremonies concluded with a banquet and fireworks. The term "ship canal" is really a misnomer as applied to the Harlem Canal. The canal is designed only for canal boats and small inland water craft. The Harlem River, before the canal was begun, narrowed to little more than a creek at Kingsbridge and there connected with the waters of Spuyten Duyvil Creek and then with the waters and then with the water of the Hudson; this allow-
ed a of water.
The work has been carried on by the federa authorities under the di rection of Geo. L. Gilles pie, Lieut.-Col. of the Corps of Engineers, U. S. A., who was appointed chief engineer of the operations. It was provided that the sum of $\$ 2,700,000$ should be expended to make to make a navigable waterway. $\$ 900,000$ of this sum has already been spent. The channel is ultimately to be 350 feet wide and 18 feet deep. It is now only 150 feet wide. Several years will elapse before the work is completed. The present minimum depth of water


OPENING OF THE HARLEM CANAL-VIEW FROM THE HUDSON RIVER.

## French Inhumanity.

The value of the bicycle as an aid to health has been dwelt upon since the beginning of the sport, but there are other advantages to be derived from it of equal or reater importance
Cycling cultivates the habit of rapid thinking-indeed, one whose mind is not more than ordinarily alert, and whose muscles cannot be trained to be the instant servants of the will, is not liable to pass through the several stages of cycling without accidents. Keen per ception and good judgment are two qualities, above

The isolated spot where Captain Dreyfus has to serve his sentence comprises three small islands off the coast of French Guiana, a few degrees north of the equator, and except a narrow sea frontage, are covered with tropical forests. The climate is simply murderous, certain death being the result of standing bareheaded in the sun even for an instant. From November to June is the wet season, during which the average rain fall is 180 inches; yet the temperature is never less than 85 degrees, and rises to 115 degrees during the four dry months. Conict ships bound for these 'Islands of the Curst" generally sail either from the Ile de Re, in the Bay of Biscay, or the Ile d'Aix in the Mediterranean. A month is occupied by the royage, the horrors of which are a fit prelude to those yet to come. Dressed in their convict garb, the prisoners are confined in batches of ifty in great iron cages on the spar deck. Benches are placed round the sides of the cage and hammocks are slung at night. But day and night they are watched by guards standing beside loaded mitrailleuses, ready to fire at the first sign o mutiny. Sometimes, in deed, such outbreaks do occur, but they are invariably quelled with remorse less severity. The horrors of the passage are too re pulsive for description
At present the Harlem River is practically limited for all others, which the rider of the wheel should strive navigation to the point marked by High Bridge. to acquire, and they are cultivated in a high degree by When dredged out and completed to the Hudson River the "king of sports." Not only must the urban cyclist a clear waterway will be provided for all vessels able thread his way among many vehicles, electric cars, and to pass through the draw and under the High Bridge. numberless other impedimenta, but his rural brother In transit from the North River to the Sound this route will cut off a distance of 10 or 12 wiles.
We have heretofore illustrated this great engineering work, and full details thereof are reproduced in our Supplement, No. 1015.

## resting the Great Lens.

A test of the 40 inch lens for the great Yerkes tele scope took place a few days ago at the establishment of Alvan G. Clark, at Cambridge, Mass. The observatory of the Chicago University was represented by Prof. T. J. See. The test was made with Arcturus, Saturn, and double stars. The astronomers present were much pleased with the lens, which will soon be ready for delivery. According to the Boston Evenint Transcript, a most novel form of telescope, which was highly praised by the company gathered at Mr. Clark's shop, was the binocular telescope constructed for D. W. Edgecombe, of Newington, Conn. This may be popularly described as a huge opera glass. It consists of twin telescopes of $61 / 4$ inches aperture, which lie side by side precisely as do the tubes of the opera glass.

## A Milk and Cream Separator Bu Results.

At Pittsburg, Pa., on June 18, by the explosion of a milk and cream separator, revolving at the rate of 13,000 times a minute, an accident occurred at 2110 Carson Street, south side, resulting in the death of Philip Deihl, vice-president of the Milk Dealers'

Exchange, of Western Pennsylvania, and the serious but not fatal injury of James R. Miller, Otto Winter halter, and Albert Winterhalter, milk dealers. It required 8,500 revolutions per minute for the machine to separate the cream from the milk. A greater number of revolutions is dangerous. In some manner the separator did not perform its work, and the revolutions increased suddenly to 13,000 , when it exploded.

Of the English Bench of Bishops twelve are pledged abstainers.


## OPENING OF THE HARLEM CANAL-THE KINGSBRIDGE DRAW

the scenes resembling rather those observable a century or two back than what one would associate with the present times.
On the arrival of the prisoners at the Iles de Salut they are taken to the "Camp," a clearing occupied by strongly-built iron-barred huts, furnished with double rows of hammocks. But at night the fetid atmo sphere within, combined with the noisome vapors o the outer air and the ever-present swarms of stinging insects, render any but the sleep of exhaustion impossible. From the moment of his arrival the convict has no name. He is known only by the number of his hammock. The new arrivals are put to the most se vere tasks-draining marshes and clearing ground"to break their spirits." They are conducted to their work by armed guards, who are ordered to fire at the least attempt at flight. Hardly any try to escape, for they know that if they evade the bullets of the guards and their pursuit it will be necsary to traveguard sea and the vircin forest At every step will lie in weight for them death by hunger, by fatigue, by dis case, or by the poisoned arrows of the natives, who receive a reward for ever convict they bring back, dead or alive. Meanwhile with bodies broken by their awfultoil in a climat where a walk of a hun dred yards is a formidabl task, they labor in the blazing sun with spade and picks. About their heads hang clouds of sting ing insects. Greatred ants cover their bare legs, and sometimes poisonous ser pents twist about their ankles and inflict mortal wounds. They stand in wh in water and mire, and the exhalations rising from the earth consume them with fever, or set their teeth chattering as with cold while the sweat rolls from their foreheads. Occasion ally, in their despair, some
a delight and he grows to love Nature in he varied moods. He learns, too, much of the country around him-its people and their pursuits-not only in his immediate neigh borhood, but within a radius pro portioned to his leisure.
As a teacher of practical geographical knowledge the wheel is the most thorough in the world; nothing ap proaches it in the encouragement of the love of out door life and appreciation of the beauties of nature which are so apt to be lost sight of in a world alm canopied by commercial life.-Bicycling World.
of the convicts revolt, in the hope, which is seldon disappointed, of finding in the bullets of their custo dians a relief from this living torture. Others again go mad, or end their lives by deliberately exposing themselves to the sun, while very few ever succeed in escaping. Indeed, only once have any fugitives reached civilized countries again, and even then their period of freedom was comparatively brief.-Public Opinion.

WOMEN are not permitted to be photographed in China.

## The Faults of the Plow.

The primitive Egyptian and Assyrian plow consisted of a forked branch of a tree, one arm of which served as a share, loosening the soil, the other as a beam, drawn by human or by animal power. This was the original double mouldboard or lister plow, throwing the soil both ways. An improvement was made by so shaping the wooden mouldboard as to form a twisted wedge, which elevated, inverted, and carried the soil to one side only of the plow. A further improvement was made by making the point of the share of iron. Simple as it seems, it was not until April, 1831, that center draught was given to the plow by Meares, who in clined the beam inward. In 1797, Newbold patented a cast iron plow, and commenced its manufacture, but abandoned it, for the farmers said the iron plow poisoned the land. The steel and wrought iron plow was not invented until 1808. In 1788, Thomas Jefferso improved the plow by showing its proper principles of construction, and in 1836 and 1837 Daniel Webster ex perimented in plow manufacture, and said that none of his successes in public life had given him so much pleasure as seeing the improved plow of his own construction, drawn by six yoke of oxen of his own raising, cut broad and deep furrows through brush and sap lings. In 1845, Governor Holbrook invented a method of shaping plow mouldboards symmetrically, either onvex or concave.
All of the improvements which have been made in the plow, from the earliest agriculture until now, are simply modifications of the original idea: a wedge drawn through the soil, pulverizing and displacing it. No better method has been found.
The faults of the plow are serious ones. The bicycle may be credited with having brought ball bearings into general notice and showing the striking decrease of friction when sliding friction is converted into roll ing friction. All of the wearing surfaces of the plow are sliding frictional surfaces, and the loss of power oc casioned by friction of sticky earth upon the plows of this broad domain of ours is past computation. The plows of the day are rigid and inadjustaile in form. In sandy or in loose and light soils, and in lumpy or clayey soils, in shallow or in deep plowing, in plowing at slow or at fast speed, no adjustment or change of form can be made to suit the special conditions of the work, yet these different conditions are often found in one plantation, and the plow should be capable of be ing modified to suit these conditions.
If a perpendicular line is drawn from the point o attachment of the harness tug and hame to the ground and another line from the same point to the center of work in the mouldboard of the plow, and a horizontal
line connecting the center of work with the perpen dicular line, then the hypotenuse of the triangle thu formed represents the total tractive effort, the horizontal line, or base of the triangle, represents the use ful tractive effect, and the perpendicular line repre sents the part of the traction which is expended in pulling the horse down upon the ground. In some cases one-third of the tractive effort of the horse is ex pended in increasing the pressure of the horses' fer
upon the ground instead of in advancing the plow.
In a 14 inch plow the earth is elevated say 14 inches, carried sideways 14 inches and deposited, inverted, in the preceding furrow. It is easy to see that each inch of unnecessary elevation represents a great amount of unnecessary labor during the lifetime of a plow, and that the carrying of all the surface soil sideways to the preceding furrow represents a great aggregate trave of soil; that is, effort in plowing large fields.
The share of the plow, like the fluke of a ship's anchor, is shaped so as to draw down into the soil. The line of traction, from the center of the mouldboard to the center of the horse collar, tends to draw the plow out of the ground. The plow advances horizontally as a sort of compromise between these divergent lines, and there clearly results a loss of power occasioned by the line draught being in one plane while the line of traction is in another plane.
When the total weight of all the surface soil which is elevated, and also carried sideways, in plowing all the cultivated area of this country is calculated, it is clearly seen that the agriculturists of the country waste each year, in incidental but not in useful work, in excessive sliding friction, in indirect lines of traction, in unnecessary resistances caused by imperfect forms, and by inadjustability of form of the plow, a greater
amount of labor than was wasted by the builder of the amount of labor than was wasted by the builder of the great Pyramid in Egypt, or in the building of the
Chinese Wall. If all the soil thus removed were trans ported to the agyregate distance which it is transported and elevated to the aggregate height which it is elevated, in one heap, no one would dare to attempt the vated, in one heap, no one would dare to attempt the
removal of the heap with no better implement than the plow.
Although 10,122 patents have been granted on the plow, in this country alone, it still offers a promising
field forfuture inventors. The killing strain on the mus. cles of horses in starting street cars was not fully considered until the electric motor took the place of horses in street car work; then it was found that it required
it after it was started. The loss of power in vehicles by sliding friction was not understood until the bicycle, propelled by human muscle, showed the utility of converting sliding into rolling friction by ball bearings, and the labor wasted in dragging the plow will never perhaps, be rightly considered unless inventors them selves drag the plow, and inquire into the reasons and causes of the excessive effort required by this ancient and indispensable implement upon which all civiliza tion depends. The horse and the mule cannot com plain, and so the plow remains the plow, improved in material and in workmanship, but retaining many o the faults of the plow of our remote ancestors.
It would seem that agriculturists have to observe the working of the implements they use, to notice errors of construction, to study the conditions, and should have ability to suggest means of improvement. Singularly ability to suggest means of improvement. Singularly, vented or improved their implements. More singularly, ery few radical inventions or new departures have been made by men in their own lines of work. The machinist instinctively judges a suggested improve ment in mechanics by what he has seen. The lawye naturally tests innovations by past decisions. The physician unavoidably refers to his reading or praptice
for approval or condemnation of anything new in his line. The agriculturist can but seldom divest himself of preconceived notions. Morse, the inventor of the telegraph, was not an electrician; Watts, the inventor of the steam engine, was not a machinist. The list way be extended indefinitely. To make a new de parture, a radical invention, seems to require an in genious man, untrammeled, open to new ideas and
approaching a subject from a new side. Ask an agriculturist how a plow may be improved, and instinct ively his mind will picture a crooked thing of steel and wood, which is essentially what he has seen. There are few of us who are not mentally hide-bound, fewer still who do not travel in mental ruts. There are very ew who do not inherit religions, or absorb politic from newspapers, or form associates or their ideas from
those they admire, or their mechanical opinions from those they admire, or their mechanical op
what they have seen, or read, or heard of.
The inventor who will furnish a superior substitute for the plow will probably not be a plowman. He will almost surely be poor, for rich men cannot invent. When an inventor becomes rich, which happens but rarely, his attempts at further invention are passing queer. He will meet opposition. Others will develop his invention and reap the reward, and long after he is dead a statue will be raised to his memory, and his name will appear in the list of benefactors of the race, hough but few of the millions benefited by his work will know of him or his work, or will care to know.
If the statesmen of the present time, trained as they are in the acute political methods of the times, should imitate Jefferson and Webster, their illustrious prede in the list of those benefactors of the world-the "Inprovers of the Plow."-La. Planter.

To watch the loading of grain either from an ele vator or lighter into one of the mammoth vessels en-
gaged in its transportation, is to witness one of the chief operations in the movements of the world's commerce, says a writer in Donahoe's Magazine. It is carried in long pipes, with a funnel-shaped, movable appendage at the end, which is shifted by means of a rope from one part of the hold to another, according as the stream of grain fills up the spaces. It rushes ino the vessel with the velocity of a torrent, and sends dense volume of dust and chaff upward, obscuring the depths beneath, and making tbe men attending th towage below look like ghosts in the rising mist.
The "trimming" of the grain in the holds is an im portant part of its storage. After several thousand bushels have streamed into the hold, a dozen or more in between the vessel's beams, a job for which they are paid at the rate of one cent a minute. In vessels of the Cunard stripe, it takes between twelve thousand and fifteen thousand bushels to fill a hold, and these vessels average 50,000 bushels in the total cargo. Ships carrying grain alone can take as high as 125,000 bushels,
and when it is considered that from 4,000 to 7,000 and when it is considered that from 4,000 to 7,000
bushels can be stored in an hour, every forty bushels weighing a ton, an idea can be had of the force of the orrent directed into the vessel.
Large vessels have four or five holds, and a distinc tion is made in storing the cargo in them. Grain, from its compact and dead weight, is reserved mostly for the enter of the vessel, while cured provisions are packed as far forward and as far aft as possible, for their bet er preservation from the heat of the ship's fires. In some vessels, like the great Cunarders, which carry
passengers as well as freight, the heaviest weight is stored in the lowest hold; this is to steady the vessel. and is called in the technical parlance of the stevedore "stiffening" the ship. It takes about 1,500 tons to "stiffen" a great Cunarder, and when this is done the ower hold is fastened and battened down, and work is began on the next.

No side of natural history is more curious than the elation between insects and the flowering of plants In the primitive and simpler plants that live in the sea the male cells are discharged into the water and row themselves along by the screwing motion of min ute bristles until they reach and fertilize the egg cells of the female. In many land plants the male cells discharged as clouds of golden pollen, are blown about by the wind; myriads perish, but a few reach thei goal, and, fertilizing the young egg cells, cause them to ripen into seeds. In many cases, however, Nature has curbed so reckless a prodigality, and the colors and scents of flowers are fruits of her parsimony. It may be laid down as a universal truth, to which the exceptions are only apparent, that plants bearing brightly colored or perfumed flowers require the aid f insects to fertilize them. The colors serve to attract the attention of insects; the scents, especially in flow rs that blossom by night, serve the same purpose The insects come for the store of honey, or for the pol en of the plants, and their return gift to the plants is that, flitting from blossom to blossom, they unconciously carry the golden fertilizing grains from plant o plant.
For most flowering plants the visits of insects are a necessity. Let one but grow some common plant, like geranium or mignonette, under glass and muslin, so that no stray insect may reach them; the flowers will be formed, the perfume will be as sweet as usual, but the blossoms will fade without forming seeds. Many of our English flowers are capable of being fertilized only by one kind of insect. Thus, to choose a familia instance, the common red clover is visited by the hum ble bee; the petals are fused together, forming a nar row tube surrounding the honey glands and the organs that form the pollen. The long proboscis of the humble bee is able to reach the deeply hidden stores; but the hive bee, whose tongue is shorter, though bidden to the feast by attractive color and smell, is perforce an inactive spectator. When clover was first grown in Australia it never seeded, and it was found that the tongues of the native bees were too short to reach th pollen. Still more often the gorgeous blossous of the ropics remain sterile in England in the absence of the particular moth or fly to which they are adapted.
Sometimes, as Darwin showed in his fascinating volume on "The Fertilization of the Orchids," the devices to secure that an insect shall not visit a flower without coming in contact with the pollen are extraor dinarily complicated. An insect alights on a gaudy nd sweet smelling blossom. An inviting landing place is ready in the form of a conveniently placed loral leaf ; but the thing is a trick. No sooner is th platform touched than it gives way with a jerk, pre cipitating the hapless insect into a well of fluid. His wings are wetted, and he has to crawl out slowly. But pointed bristles prevent exit except by a narrow funnel, and, as he squeezes through that, his back becomes dusted with the sticky pollen. In most plants, however, the lures are simpler, and are adapted to however, the lures are simpler, and are adapted to
many different kinds of insects. Iu spring, when the many different kinds of insects. In spring, when to ers are sufficient to attract the notice of the few insects on the wing. During summer, when the world is covered with green, more glaring contrasts come into play, and the bold masses of orange and gold, of crimson and pink, appear. It is curious, however, that scarlet, the most clamant of colors, is the rarest in Europe. In the tropics and in South America it is one of the most common, and it were worth inquiring if European insects be color blind to scarlet. At night when crimson and blue, pink and orange, become in isible, pale yellows and luminous whites attract the ight-flying insect by their phosphorescent radiance.
The scents of plants are almost more potent lures than their colors. At night they are naturally more varied and more potent. To drift in a back water in a sumwer night, or to loiter in a wood, is to set one dreaming of the spices of the tropic isles. The scents of the day are shy and indistinct; only in the mass one notices them, as in passing through a bean field, or by thicket of gorse. But at night each blossom that is not asleep sends out a clamorous and insistent odor and at the same moment one notices a dozen distinct and striking perfumes. But, by day or by night, the cents are not all such as are pleasant to us. Some indeed are not even within our consciousness. Thus the flowers of the Virginian creeper are almost invisi ble; they have green corollas and are hidden unde the foliage. To us they have no scent, yet bees come to them from great distances, and during their season they are always crowded with visitors. Some of the cents most dear to us are despised by many insects Butterflies will pass honeysuckle itself, or, indeed any flowers with a honeysuckle scent, unnoticed. At night, however, large hawk moths, by their attention to honeysuckle, show that they share our ideas of what is pleasant. Butterflies and bees, like ourselves, are nattracted by the carrion-like smell of many plants but these latter are visited by many beetles and flies, to which the perfumes of the rose and the violet are unattractive.-London Saturday Review.

RECENTLY PATENTED INVENTIONS．
Railway Appiances．
Lifting Jack and Track Liner． Thomas McManus and George K．Smart，Atchison，Kan－
sas．For conveniently and rapidly raising and shifting the rails and ties without injury to the track bed o track，these inventors provide a device consisting princt pally of a horzontal base or lining bar on which slides ing bar adopted to On the inside of the lifting bar，which carries a support the bage of the rail，are ratchet teeth engaged by a pawl having its pivot end in a recess in the lifting ram which slides vertically in the lifting bar．For heavy tracks two jacks and track liners are preferably em ployed，the jacks being connected by a chain．

## Electrical．

Push Button．－Edwin A．Clark，Cleve－ land，Ohio．This button is made with a ferrule having an inwardly turned flange in which is a plug of insulat－ ing material carrying two contact points，a metallic cap
with flaring sides having movement within the ferrulein－ ide the flange，and being adapted to touch the contac and points，but being normally held away therefrom by a coiled spring resting on the insulating plag and press ing the cap o
inexpensive．

## Mechanical．

Pulley Block．－Oliver Spitzer，Brook－ lyn，N．Y．To enable the operator to instantly lock the pulley when it is desired to hoist or lower the release is the object of this invention．A star wheel on the pulle shaft is adapted for engagement by a pawl on one end o which is a shoulder against which a spring－pressed leve is adapted to abut，the lever being under the control of the operator，while a catch，also under the control of the operator，is adapted to engage the lever when its end is
swung out of contact with the shoulder of the pawl The device may be readily applied to any pulley block．
Hammer．－Clarence McC．Eveleth Plymouth，N．H．This is an improvement in hammer which the nails may be drawn without marring the ork and without bending the nails．A spring－pressed plunger，having a cushioned outer head，slides within socket of the hammer head and a longitudinal recess in he handle，the plunger having notches or ratchet teet on one side adapted for engagement by a spring latc hen it is in extended position，with its cushione head bearing against the work．
Brick or Tile Cutting Machine． James C．Steele，Statesville，N．C．In this machine
cutter is movable transversely through the clay bar as is fed out of the bar－forming mechanism，a support for the atter being movable in the arc of a circle transversely to the clay bar，and there being mechanism for con－ tinuously reciprocating the support laterally and for oscillating the cutter at the necessary intervals．The machine is automatic in its operation，and the several ferent lengths
Slate Dressing and Sizing Ma－ chine．－Humphrey F．Morgan，Delta，Pa．In this ma chine a bed frame is movable vertically in guideways in windlass shaft and lever supporting the bed frame． arriage is movable on the bed frame，and independen weights are connected with and arranged to operate the carriage in reverse directions．The carriage is wide nough to permit several plates to be rested side by side hereon，and it is drawn under the polishing wheel as ast as the latter cuts its way on the surface of the slate， carriage back and forth．
Continuous Cigarette Machine．－ Edward R．Colgin，Richmond，Va．This is a machine imple and is fed on endless aprons，and in which the fille od－forming devices and the wrapping，and the pasting and cutting mechanism，are so arranged and connected as to positively and uniformly operate to form the ciga rettes and cut them without reducing or marring th fller at the ends．There are also depositing and receivin evices whereby the cigarettes as they come from th o crumble and drop ont，making a bad－looking unsa able article．

## gricultural

Plow．－William H．Mitchell，Glasgow， ky ．This is a combined right and left hand plow，the right and left hand point being carried by the same mould board upon a single standard，and one land side being used in connection with both points．The plow is capa－ ble of use on hill sides as well as upon level land，and is
a right hand one going in one direction and a left hand a right hand one going in one direction and a left hand one when traveling in the opposite direction，the change Means are provided whereby the beam may bereadlly re versed upon the standard and held in any position neces sary by a simple locking device
Grain Separator．－Erastus E．Men－ cially adapted for separating wild onions，etc．，which ccasionally grow among wheat，from the wheat ker－ nels．The machine has toothed and yielding surfaced separating cylinders between which the wheat and for－ eign substances are fed．the hard kernels of wheat being received in the elastic or fexible surface of the cylinder， while the soft foreign matters are taken up by the teeth rate chate from that in which the wheat is discharged．

[^0]vides a cheap and practical composition of ingredients
for application to the fuel in a stove to for application to the fuel in a stove to intensify combus
tion，prevent clinkers，aid to burn the smoke，and effect a marked saving of the coal used as fuel．The composi tion consists of salt，charcoal，saltpeter，carbonate of zinc and borax，mixed in certain proportions with wate and sprinkled on the coal．These ingredients，vapor ff from the burning coal and render it more inflamma
Tree Sawing Machine．－Frank Costa，Carbonado，Washington．This is a machine de ide bars ach with a device to secure it to a tree a iage on which is jorngled a saw being slidable on the side bar，and a crank shaft on the carriage being geare to the saw，while gear wheels on the feed screw and the saw mandrel mesh with a gear wheel on the operating haft，whereby the saw and its feed mechanism are sim itaneously operated．The machine is so arranged tha when used on a large tree it may be conveniently mad
to saw a kerf first on one side and then on the other．
Window Curtain Hanger．－Charle M．Dilger and Henry Birnbaum，Rapid City，South Da－ ota．The hanger frame，according to this invention， earings for the roller，the frame being adapted to be raised or lowered on the window frame By manipula ing the cords the hanger may be raised or lowered to aise or lower the roller and the curtain or shate，so that ight and air may be admitted directly through the upper

Knotter and Binder．－Walter Con or，Toledo，ohio．This is an improvement in or binding bundles and tying knots in the binding twin It comprises a machine in which is a pivoted need nd a pivoted elbow lever，and a rod pivoted to both， hich is a pinion eugaged by a rack on a tilting arm ad being connected to the tilting arm and el ow lever．The machine is hand operated，and facili－ uch as butomatic tying of small bundles or packages， fter the knot is of flowers，etc．，the twine being severe of bunches tied．
Рот．－Robert L．Steen，Lawrence Kansas．In this pot it is designed to prevent all escape
of steam，so that none of the valuable properties of the naterials under treatment will be lost by escaping wit he steam．A valve is made to close the spout，an
weighted arms pivoted to the spout have their uppe weighted arms pivoted to the spout have their uppe
ends pivoted to the valve，stops secured to the spout miting the outward swinging movement of the arms．
Finger Protector．－Emma Grimes Norfolk，England．This is a gaard for the goods hold niger of soft rubber，having an opening at the finger ip，and an annular flange surrounding it，this end open－ ing exposing a sensitive portion of the finger tip for use Poun
Polish Composition．－William J． polishing marble and other stones，one sufficiently fin and homogeneous to give a high polish and sha enough to cause the poishing to be rapialy done，a intended to take the place of an ordinary grit．It is composition in which are brass，lead，sneelac and emes

Surgeon＇s Table．－Lyman G．Bar SURGEON＇S TABLE．－Lyman G．Bar－
on，Willsborough，N．Y．This table has independently movable leaves at opposite ends for the head and feet and means for changing the angle of the table as a whol without altering the angle of the head and foot leaves in elation to the middle section；it also has various at
achments for holding the limbs of a patient，and the achments for holding the limbs of a patient，and the parts of the table are very light and strong and readil eparable．The table may be readily taken apart a
Veterinary Appliance．－Joseph H Gunning，New York City．This is a can ula design to facilitate the brecding of a mare or other animal，an nt of a wound
Rat Trap．－Joseph Klar and Frank Herly patented invention of improvement on a for rovides safeguards or locks of a simple form to pre rent the animal when entrapped from leaving the com－ partment of the trap into which it may have entered． The invention affords a trap of inexpensive construc ion，and one in which the parts operate automatically． Note．－Copies of any of the above patents will be urnished by Munn \＆Co．．，for 25 cents each．Please
send name of the patentee，title of invention，and date send name of the
of this paper．

## NEW BOOKS AND PUBLICATIONS

The Origins of Invention．A stud By Otis T．Mason．With illustra New．London：Walter Scott，Ltd． New York ：Charles Scribn
1895．Pp． 419 ．Price $\$ 1.25$ ．
No subject has taken a more pleasing aspect with the advance of science than has anthropology．The present charming work，based largely on the collections of the
United States National Museam，cannot be too warmly commended，for the young and old alike．A deeply inter－ esting portion of it is that devoted to the manufacture of stone implements and the tools of aboriginal workers． One interesting point brought out is that the old stone worker would throw away，after a few blows，as many him．The results of Mr．Holmes＇investigations are given here，with full illustrations．The work is written on the principle of studying the past as largely as possible by the light of the present，thus making what might be a dry science one of the most vivid interest．The art of war seems somewhat insufficiently treated，the chapter being
very short，and，curiouly enough，the boomerang is en
irely omitted；that is，as far as the index is concerned．
On the whole，we feel that we cannot too warmly recom On the whole，we
mend the book．
Handbook of the Turf，a Treasury OF INFORMATION FOR HORSEMEN racing and trotting rules；laws of the States in their relation to horses and racing；a glossary of scientific terms
the catch words and phrases used by great drivers，with miscellaneous in formation about horses，tracks，and
racing．By Samuel L．Boardman． New York：Orange Judd Company 1895．Pp．x，303．Price \＄1
It is well to know a little of everything，so it is fair to sssume that this dictionary，which is an alphabetical cy in horsemanship．It seems as if the title hardly does it justice，as it really ought to be called a dictionary of eques trianism．In addition to the text proper，numerous quo
tations are given，and much specific informatiou ations are given，and much specific informatiou
帾
The Building of a Nation．Th growth，present condition and re
sources of the United States，with a forecast of the future．By Henry
Gannett．New York：The Henry T． Thornas Company．Illustrated with Pp．$x x$ ，252．Price $\$ 2.50$ ．
The particular subject of this work is treated definitel There are very numerous plates conveying by the censu sytem of colored areas，the greatest variety of statistical information．Many maps are given of the United States， each for the purpose of indicating some specific series of
data．The book really represents a small census pro data．The book really represents a small census pro－
vided with comments requisite to develop its full utility． tis based on the census of 1890 and，of course，much of is information refers to previous years as well．In orde make it an actual history，the total rural and urba opulation of each census is carried back to the last cen噱，and many of the tables of data begin in 1790 and and with 1890．Eleven different censuses，therefore，are index leave nothing to be desired．
＂The Bachelor of Arts＂is the title of ＂new monthly magazine devoted to nniversity interesta and general literature．John Seymour Wood is the
editor and Walter Camp and Edward S．Martin are asso－ ciate editors，Henry G．Chapman，of No． 15 Wall Street New York，being the business manager．The＂adviso board＂exhibite a lcng list of distinguished names fro
twenty－five different colleges and universities，andco tributions to its pages are expected from many emine writers．Typographically the new magazine is quit unique in its appearance，and its form is such that may be readily carried in the pocket
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References to former articles or answers should Rererences to former articles or answers should
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In inires not ansered meano reable time should
ne repeated；correspondents will bear im mind that

or in this department．each must take his turn．
Buy etter
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 Minerals sent for examination should be distinctly
marked or labeled．
（6560）W．H．K．says：Please advise hrough Notes and Queries，Scientific American，how to fasten rubber rollers used on clothes wringers which
have been torned loose from shafts．A．1．Clean shaft have been turned loose from shafts．A．1．Clean shaft
thoroughly between the sholders or washers，where the rubber goes on．2．Give shaft a coat of copal varnish，be－ ween the shoulders，and let it dry．3．Give shaft coat twine at once，while varnish is green，and let it dry fo about six hours．4．Give shaft over the twine a coat o rubber cement，and let it dry for about six hours． 5 ． Give shaft over the twine a second coat of rubber ce－
ment，and let it dry for about six hours．6．Remove washer on the short end of shaft，also the cogwheel，if the shaft has cogs on both ends．7．See that the rubber rolls are always longer than the space between the washers
where the rubber goes on，as they shrink or take np a little in putting on the shaft．8．Clean out the hole or inside of roll with benzine，using a small brush or swab． 9．Put the thimble or pointer on the end of shaft that the washer has been removed from，and give shaft over the twine and thimble another coat of cement，and stand same upright in a vise．10．Give the inside or hole ofrol force the roll on the shaft as rick stick．11．Pult jerk，then rivet the washer on with a cold chisel 12 Let roll stand and get dry for two or three days before using same．Cement for use should be so thick that it will run freely；if it gets too thick，thin it with benzine
（6561）G．S．W．says ：1．Give formula formaking a washing compound．A．A washing pow－
oda and 2 parts of borax．2．I want to manufacture ood lasting qualities．A．Plumbago， 2 lb ．；water， oz．；turpentine， 8 oz．；sugar， 2 oz．Knead thoroughly nd keep in tin boxes．Apply with a brush．3．A recip Putz）Paking a good silver polish．A．Silver Polishing few drope．Mix woroughy 4／2 parts vaseline wid to this by atining 716 parts elutriated chalk 11 ．Ad burnt hartshorn， 11 parts pulverized ossa sepia（cutt bone）．The misture should be of the consistency of （6562）A．M．says：I would request you
send me a receipt for making condensed milk．A． Condensed milk is made by boiling milk in condensin pans in which the atmospheric pressure is removed．The an for is escribed in detail in the Scientific Amer Supplement，No． 156.

Pusiness and Personal．

The charge for Insertion under this head is one Dollar a line
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BUILDING EDITION JUNE，1895．－（No．116．）
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2．An elegant plate in colors showing a cottage at Bronzw Park，Winambridge，N．Y．，recently floor plans．Mr．A．F．Leicht，architect，New York City．A neat design．
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architect，New York City．A picturesque design．
modern cottage at Bedford Park，New York City， recently erected at a cost of $\$ 3,000$ ．Perspective elevation and fioor plans．A picturesque design．
Mr．Edpar K．Boarne，architect，New York City． The Bedford Park Congregational Church．Two perspective elevations and floor Bourne，architect，New York City．
Colonial cottage recently erected at New Dorp． S．I．，at a cost of $\$ 3,675$ ，complete．Perspective Goll，architects，New York City．An attractive design．
A residence at Germantown，Pa．Two perspective elevations and floor plans．Cost complete，about
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York City．
8．The New Theater，San Luis de Potosi，Mexico． Archlect，Da Joriega．
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An elegant design．Architect and builder，Mr．E． An Sandford，Montclair，N．J．
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trated．－Woodworker＇s improved vise，illustrated． －African mahogany．－A new steam and hot water heater，illustrated．－Powers＇improved automatic
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## INDEX OF INVENTIONS

For which Letters Patent of the June 18, 1895 ,

## AND EACH HEARING THAT DATE















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Drilling apparatus. J. F. Willard.antig


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ingines, electric stop motion for, Myrick \& Doe Wxavating machine, c. A. Warren
Exbibiting device Ethier $\&$ Bauch.
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ran, pendulum, Baungariner $\&$ Engilish...........
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 Grain drill gearing, F. A. Rice
Grain scourer. W. Whe
Grate for cooking stoves. etc.
Grate for cook we stoves, etc., osciliating, Kaem
Grinding and powsishing machine, F. N. Gardner.

Hanger. See Trousers hanger.


Heater. See Tank heater.
Hidesor skins, machine for buffng or shaving, J










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