a WeEkly Journal 0f PRactical information, art, SCIENCE, MECHANICS, CHEMISTRY, and manufactures.


THE MANOFACTURE OF fHOTOGRAPHIC APPARATUS.
Among all the pleasures enjoved by old or young, we know of none more rational and elevating than that of photography. It inevitably cultivates the love of nature, elevates the standard of taste, beautifies the home, gives pleasure to one's friends; it brings to those who practice it new associations, and tends to break up the monotony of life and fill in the hours which, in all probability, would otherwise be wasted.
Photography is a grand science, of great value to the world as practiced by professionals, and it now has relations to very many of the arts and sciences. Its present and prospective capabilities will never cease to be a wonder to us. The popularization of photography and its extended practice by amateurs has, therefore, in a natural way, given rise to a number of industries of no inconsiderable importance and of large account in the aggregate. One of these industries forms the subject of the accompanying illustrations. They represent an establishment where are made cameras of every grade and size, from the first-class instruments used by professionals and many amateurs down to the simplest outfit. It would require a volume to adequately describe all the details of the business, running as they do into many quite distinct specialties, but we will note a few of the leading features.
The business requires the entire room of a factory structure 60 by 124 feet on the ground and five stories high, with a separate boiler house, in which are


THE MANUFACTURE OF PHOTOGRAPHIC APPARATUS

## 

HSNARI,I心HE
MUNN \& CO.. Editors and Proprietors. published weekly at
No. 361 BIROADWAY, NEW YORK.


TABLE OF CONTENTS OF
SCIENIIFIC AMERICAN SUPPLEMENT
No. 1020
For the week Ending July 20, 1895


## egular lives.

It is thus that the children can best recruit for an other winter of study and amusement. To parent who make this rational provision for their children and who have thus, also, time for reflection, mus sometimes come the questions: "When are $m$ children to get an education?" "Is the best pre paration for study in the winter, total suspension of directed mental activity in the summer $q$ " "Is it wis to allow the vacation to be spent in carrying out programmes for each day in the week of diversion such as tennis, driving, dancing, rowing, sailing, wheel ing, riding, slooting?"
Would not all this exercise be just as beneficial and enjoyed with even more zest if say two morning hours, five days in the week, were devoted to regular study?
It is for boys and girls who have no taste for books who never turn to one for companionship, that regular mental work is most desirable.
How necessary for usefulness in life is the equipment of a well disciplined mind.
Sumnier study can easily be adapted to the needs of the pupil, and the proper teacher will see that it is made attractive. If, during the school year, the pupil has from any cause lost progress, the time cannot be so well spent as in making good these losses, so that he may start in the autumn on an equal footing with his classmates. If, from lack of capacity, poor teaching
ematics, where they are most likoly to be found, in grammar or any other study which have not been un derstood, this is an opportunity to review them and have the rough places made swooth
A good beginning in a language may be made in a summer; or the foundations having been previously laid, a book of Cæsar or Virgil may be read, or two or three plays of Schiller or Moliere.
But for the study of science it is the very best time of year, and offers in every respect the best condition ever to be had by pupils who live in the city. Many a tone wall is not only picturesque, but the burial plac fossils which are a clew to the geologic history the ground whence they were gathered. What a pity not to learn it, when one may so easily. Even to chil not to learn it, when one way so easily! Even to chil
dren under twelve, elementary lessons in botany and dren under twelve, elementary
zoology may be made delightful.
Tracing the life of a dandelion from its early leare oits winged seeds, and learning the oyster's place in the animal kingdom and the delicacy of its organs amounts to discovering two new worlds to a child who has never known what the dissecting knife and the microscope may reveal.
The fact is that Earth's everyday wonders are as if they were not to thousands of grown people for lack o early eye opening. The actual knowledge to be gained a summer of the classification and peculiarities of plants and animals is not half so valuable as are the incidental lessons in observation sure to be gained.

## Tests of Agricultural Implements.

Bulletins No. 4 and No. 7 of the Utah Experiment Station contain interesting results from tests of draugh f farm wagons, plows, mowing machines and harrows, as measured by a self-recording dynamometer.
The conclusions as stated in these bulletins are a ollows:
That colters add to draught of plows by some 15 per cent. That trucks or wheels under the end of the plow beam decrease draught by about 14 per cent, add uniformity to the furrow and lessen the work of the plowman.
When the traces are not in line with the draught of he plow the draught is increased.
Lenthening the hitch slightly decreased the draught A share badly sharpened increased the draught 36 per cent over a new share. A dull share drew harder than a sharp one, but not as hard as a badly sharpened share. Draught decreases with the depth and with the width per square inch of soil.
Walking plows gave slightly less draught than ulky plows with rider. Sulky plows drew easier down hill, but much harder up hill than walking plows. A share straight on its lacd side and bottom took land well and gave a slight decrease of draught. A loss o draught was found on a sulky plow when its adjust ment to take land was made from the pole.
A wagon with fellies $11 / 2$ inches wide drew on moist but close, blue grass sward 41.6 per cent harder than wheels with fellies 3 inches wide. On a dirt road slightly moist, the narrow tires drew 12.7 per cent eavier than the wide tires
Draught on plank road is one-fiftieth of the load and not one-seventh of the draught on a dirt road in ts ordinary condition after a rain.
A load over the hind wheels drew 10 per cent easier than over the front wheels.
Lowering the reach, or the coupling pole, on the hind wheels decreased draught; wagons draw easie when the traction has an upward incline, and harde when horses are hitched to the end of the pole
Loose burrs reduced draught 4.5 per cent.
Au old mowing machine repaired drew easier than a An
The draught was 87 per cent greater for a well harpened sickle than for one more nicely sharpened A pitman box set tight gave less draught than one t quite loosely.
When cutter bar is not near right line with pitman dhe draught is increased
When guards are out of line the draught is in reased.
When cutter bar inclines upward draught is de ased.
When the sections of the sickle do not strike in the
enter of the guards the draught is increased.
The draught was decreased ten pounds by the driver alking.
A loss of force was observed when the wheel at the end of cutter bar failed to work well.

## Muck Land on Fire.

For three months a Blackford County, Ind., farm has been burning underground, and it has been impossible to extinguish it. The farm is owned by Frank Williams, auditor of Wabash County. Mr. Williams' arm contains sixty-six acres of muck, which, when dry, will burn like sawdust. Three months ago fire started in the muck land. Little attention was paid to it until within the last week, when it was discovered that the fire was burning under ten acres and was still spreading. Within the last few days the ten acre patch has been a glowing furnace.

## Reis's Place in Telephony.

In the German exbibit at the world's Fair at Cbicago was displayed a bust of Pbillipp Reis, of Friederichsdorf. Germany, and it was labeled with a card stating that be was the inventor of the electric speaking telephone. A monument built by the German people in bis memory bears the sume statement as an inscription. Reis's work on the telephone was all done between 1860 and 1863, yet in this country we bave heard of bim chiefly for what it has been alleged be did not do. Within a year or two it has been written in good English by persons who certainly ought to know, that Reis's telephone was only a tone telephone which would reproduce sounds of various sorts but not speech, and this in spite of the fact that Reis said emphatically in one of bis lectures that "words even were reproduced" by his apparatus, and in spite of the explicit testimony of a good number of persons yet living who were witnesses of his work in bis own hands that they beard it transmit speech, such for instance as Prof. Quincke, of Heidelberg, Dr. Messel, of London, Dr. Hagen, of Cambridge, Mass., now deceased. The question is not as to whether the speech was transmitted well or ill, but was it transmitted at all. If it was transmitted at all, then be was the inventor of the telephone. Improvements might come, but the apparatus to be improved was already invented. Henceforth it was simply a question of relative efficiency.
After improvements in both transmitter and receiver had been made and the telephone became of commercial importance, the owners of the improvements saw that to bold a monopoly on the business it was needful to show that Reis did not invent a speaking telephone, and to accomplish this, technical advantage was taken of every available thing. Reis's description of his apparatus was strained beyond measure, bis plain statements were ignored, the direct testimony of eye and ear witnesses was not allowed to be beard, and as Reis himself was dead, be could not be beard. Worse than that, inventors were allowed to patent apparatus which embodied what Reis showed in bis, without any improvement, if the description of it and its mode of operation was different from Reis's. As proof of this, compare the apparatus described in the famous Berliner patent about which there is now so much concern 1891 patent which was applied for in 1877, and issued in was not shown in Reis's devices, and for the purposes of speech transmission the latter will work as well as the former; but they are described in terms which will apply equally well to Reis. Now a change in description of a piece of apparatus does not make a change in its mode of operation. The latter is automatic. That which makes the transmitter of to-day better than the Reis transmitter is the substitution of hard carbon, and nothing else, in the same place and for the same purpose for platinum which was used by Reis. If Reis had cbanced to employ such carbon in the place of platinum, be would bave bad a good speaking telephone, and be might have described its mode of operation just as be did describe bis platinum-tipped electrodes.

The whole stress of the controversy was not upon the apparatus and its necessary automatic action, but upon Reis's description of its mode of operation, and so successful was this attempt that one judge declared that "a century of Reis would not make a speaking telepbone." This can only refer to the description, substitution of a bit of hard carbon for the platinum terminal would bave made a perfect transmitter.
Who made that substitution? Neither Bell, nor Blake, nor Berliner, nor Edison, but Hughes, of London, and be gave it to the world. Like many another testamentary gift, the legatee failed to receive the legacy through crafty legality.
Again, in 1866, Mr. Yates, of Dublin University, while experimenting with Reis apparatus, placed a drop of water between the terminals of the transmitter, for the express purpose of preventing the abrupt breaks in the current, and succeeded in transmitting speech perfectly, as one can see would be the case. There were several witnesses of this living when the telephone cases were being heard here and abroad, but their testimony was excluded. Notbing would answer but the printed page, printed at the time : and as it happened the ex-
periment was not described, only remewbered, it followed that what wasgood enough for true history wa not good enough for law.
Once more. Emphasis has been put upon the state ment that the inefficiency of the Reis transmitter is due to its breaking the current at every vibration, so it can only transmit pitch and not speech, whereas it is easy to show it is nothing of the sort ; and that when the transmitter is spoken, to gently it transmits fairly well, in spite of the breaks which may occur. Sud den breaks in the current make so strong a sound in the receiver of any type as to persist in the ear for an
interval long enough to drown weaker sounds if they be present. If the Reis transmitter be provided with a shunt circuit, so there will be a current in the receiv er all the time, whether the movable terminals be in
contact or not, one may discover at once whether the apparatus works the way it bas been alleged to work and as the courts have decided it does work. One may hear and understand nearly everything said, and this proves that the Reis transmitter has the proper microphonic action. This does not make it a commercial instrument, but it serves to show that all the arguments made against it were wrong and were based upon untrue assumptions.
Many substances bare been tried in the endeavor to find a substitute for bard carbon. None bave been found its equal for such a purpose, but the metal osmium works fairly well, while silicon and boron, the chemical relatives of carbon, can also be used.
Some day the whole story of the telephone will be written. Distinctions will be made where they exist and where they do not exist; identity will be noted. It is now very certain that then there will be no need tochange the inscription upon Reis's monument.-The Electrical Engineer.

## Professor Franz Neumann.

Professor Neumann, the eminent physicist and mathematician, died on May 23 at Königsberg at the age of ninety-seven. $\Delta$ t a recent meeting of the Paris Academy the secretary, M. Bertrand, in announcing the loss the academy had sustained by the death of such a distinguisbed correspondent in the geometry section, pronounced the following short eloge on Professor Neumann's contributions to knowledge :

Franz Neumann, professor of physics and mineralogy at the University of Konigsberg, made his debut in science more than seventy rears ago by some beau-
tiful works on mineralogy. Soon after be directed bis studies toward physics, and by an admirable 'Memoire sur la Theorie des Ondulations,' which was presented to the Berlin Academy in 1835, be took his place among the masters of science. Neumann, like Cauchy, but by very different means, was led to consider luminous vi brations as taking place in the plane of polarization, while Fresnel thought them perpendicular; he knew how to follow in the most minute details, always in ac cordance with the observation, the mathematical consequences of his hypothesis. But Fresnel's theory is not contradicted by any of the experiments; so doubt continues, and the ever renewed discussions, whatever their conclusion may be, will remain a noble bomage to the man of science and profound physicist who was the first to start them.
"Neumann's memoir on induction showed again the great mathematical skill of its author. In it Neumann translated by general formulæ the discoveries of Faraday and Lenz's laws; it is to bim that we owe the ex pression of the potential of a system of two closed cur rents of which merely the existence, independently of the very elegant form which he has given it, has played such a great part in science.
"Franz Neumann was a great professor. Even at the age of ninety he attracted numerous auditors; bis lessons, received and written out by learned students, have been studied in all the universities of Europe. The study of physics was bis aim ; but when he came across a flne mathematical problem be excelled in interesting his auditors by initiating them occasionally into the highest theories of analysis. It is with justice that in 1863 the section of geometry, making amend for a long neglect, elected this illustrious physicistinto
the Academy"" the Academy."

## The Effect of Volcanic Action Upon Earth

Signor L. Palmieri, of the Vesuvius Observatory, has taken observations during the past six years upon the action of earth currents on a telegraph line extending between the observatory and Resina. He has found
that when Vesuvius is inactive or during periods of that when Vesuvius is inactive or during periods o
mininum activity, the earth currents flow upward, ir respective of the azimuth at which the wire is placed, increasing and diminishing in versely as the activits of the volcano. When this activity reaches a certain point the currents cease, and if the volcanic action stil further increases, the earth currents begin fowing The experimenter, therefore, concludes that in the case The experimenter, therefore, concludes that in the case
of wires inclined to the horizon and out of the reach of volcanic interference the earth currents flow upward in whatever azinuth the wires are placed.

## National Meet or the Wheelmen.

The National Meet of the League of American Wheelmen was held this year at Asbury Park, N. J., where the visiting wheelmen, who numbered thousands of ladies and gentlemen, enjoyed the bracing sea air and ocean batbing. The place is admirably adapted for a bicycle meet, as the roads are superb and large hotels numerous. Almost every club through The Denver wheelmen, se have sent representatives The Denver wheelmen, seventy-eight strong, attracted much attention, and were pronounced the best dressed men at the meet, and, for numbers and appearance, great parade which occurred July 9.

Bicycle Notes.
The doorkeeper of the Belgian Chamber of Deputies has provided a rack on which members can dispose their wheels upon arrival, for a large number of them bave now adopted the practice of taking a morning spin before the opening of the session and arsive at the Legislative Palace mounted
An efficient electric bicycle lamp has been devised at last. The electrical part of the lamp is a dry bat tery composed in some cases of three shells one-half inch in diameter and four inches long and in others of six of these shells. A continuous light is furnished for one bundred and forty-four bours without recharging. The current is regulated by means of a switch; the lamp can be recharged at a cost of twenty-five cents by purchasing of local agents one more of these shells, just as a man buys cartridges for a gun. The advan tages of the lamp are that the vibration does not affect the light at all and there is no smoke, no leakage and no odor about it and it is far more reliable than the ordinary bicycle lamp.
Private Artbur E. Weed, of Company F, Ninth Infantry, left New York on a bicycle at 3 P. M., June 25, 1895, with a message to Col. Kline, at Madison Bar racks, reached Sackett's Harbor at 20 minutes to 4 June 29. Starting on June 9, Lieut. Wise and Private Weed made the trip from Madison Barracks to Governor's Island in eighty-eight hours. The return trip made by Weed alone was made in ninety-six hour and forty ruinutes. The distance is 397 miles. Weed rode a twenty-one pound wheel and carried the regu lation soldier's equipment, which weighs thirty-five pounds. Sackett's Harbor, where Madison Barracks are located, is 10 miles west of Watertown, N. Y.
The Customs Department of Canada bas decided that tourists' bicycles may be admitted free of duty on affidavit that the machines are the rider's personal property, and not brought into Canada for the pur pose of sale.
The injustice of requiring cyclists to carry lamps at night while other vebicles are not required to do so bas been recognized in New York City. Mayor Strong has signed the Vebicle Light Bill. All passenger cabs hacks and buggies will now have to bave a lighted lamp at night the sume as a bicycle.
An interesting test case came to an issue in Cbicago July 1, when Judge Payne denied the bill for an injunction restraining the owners of the Fort Dearborn office building from interfering with a tenant while taking his bicycle to bis office on the twelfth floor o the building. The judge, who is himself a wheelman, held that the bicycle was a vebicle not different from a borse and buggy as far as the right to exclude from the premises was concerned, and that the owners of the building have a right to make regulations regard ing the admission of vebicles.
Perles Burritt arrived in Cbicago at 12:45 o'clock, June 28, completing a ride on an eighteen pound bicycle from Jacksonville, Fla., to Cbicago. The total distance covered was 1,385 miles. Burritt started on bis ride on June 13, at 6.20 A. M. Burritt says that the ride was undertaken for pleasure. When he started on his ride he weighed 100 pounds. He gained twelve pounds on the trip. He carried baggage weighing twenty-five pounds strapped on his back.
A coupler by which two bicycles can be attached side by side is being introduced in New York City. A dispatch from Waltham, July 1, states that Arthur W. Porter, of Waltham, the crack cyclist, did a mile in the face of a strong wind in 1:514-5.
Well autbenticated stories about the scattering of tacks for the evident purpose of puncturing tires come from various places. It caused bavoc at Sag Harbor, Sunday, June 23, where some person strewed tacks ver the road with a liberal band. Of fifteen wheel men who reached the hotel at Sag Harbor, every one had a puncture and some had three or four. This form of malicious mischief should be severely punished.
The sum of 100,000 marks was included in the Ger man Army estimates, the present year, for the supply of bicycles to the army. Two wheels are assigned to each battalion. The bicyclesare to relieve the cavalry of a great part of its intelligence duty and to take the place of mounted orderlies. An Austrian officer bas recently invented a military bicycle with which a very bigh speed bas been obtained. The peculiarity of this bicycle is that the saddle is placed very low. The Russian, Portuguese and Belgian armies have now adopted the bicycle, regular instruction, practice and drill being provided for.
Military experts believe that there are few parts of any civilized country where a wheelman cannot in a day cover at least twice the distance possible to a borseman and in several consecutive days' riding the difference is still greater. The wheelnan can go across country or over almost any line practicable for a mounted man and often where the latter could not go, though of course good roads are desirable for bicycles as well as for ammunition or baggage trains. The wheel can be easily lifted over stone walls or bigh fences, and unless the ground bas been too recently tilled or the grass is too bigh, most open country is found to be practicalle for the expert arny wheelman.

## AN IMPROVED WINDOW SHADE

The shade shown in the illustration consists of a series of sections, each capable of movement to or from an adjoining section, all of the sections being simultaneously adjusted in a simple and easy manner. The improvement has been patented by Mr. Joseph Eckert, of No. 1127 Park Avenue, New York City. In

eckerts window shade.
Fig. 1 all the shade sections are drawn up and stand at right angles to the windo w, and in Fig. 2 they are down and held at a slight inclination, to regulate the admission of light and air. Projecting from a rod journaled at the top of the window frame is a series of U-shaped guides, and in a socket in the window frame over each guide is journaled a hanger or bracket whose lower horizontal member carries a drum or hollow spring curtain roller, the tendency of the spring being to maintain the shade section rolled up, although the shade remains in such position as it is placed when pulled down. A cord at one side of the window is connected with the pa wls of all the spring rollers, and by drawing upon the cord the various shade section will be simultaneously' raised by their several springs. Each hanger or bracket is held normally in a position to overlap the other by a spring coiled around its upper member in the socket, but in order that the shade sections may be carried to any desired angle, a bar pivotally connected with and extending across the upper horizontal members of the hangers is connected by a link with a cord extending over pulleys and down at one side of the window, the lower end of the cord having open links or loops for engagement with a but ton on the window frame. When this cord is left free the springs controlling the brackets cause the shade sections to overlap each other and stop the admission of light as would a one-piece shade. The bottom rails of the shade sections are connected together at their inner and outerends by pivotally attached longitudinal bars.

A SWINGING SEAT FOR AGRICOLTURAL IMPLEMENTS
A seat in which the motion of the machine and the inequalities of the ground will be but little felt, the


## BEYER'S AGRICULTURAL MACHINE SEAT.

seat being also adjustable to suit riders of different weights, has been patented by Mr. Louis Beyer, Jr., of Calumet Harbor, Wis. Mounted on either the front or rear axle is a hoop or bow spring, through which passes a seat beam supporting the seat on a spring shank at its rear end, the forward end of the beam passing through a sleeve connected by a link to a
sleeve on the tongue or on the reach. The upper sleeve has a set screw or pin to enter one of several holes in the seat beam, and the sleeves are adjusted backward or forward according to the weight carried in the seat. The seat beam is suspended in the hoop spring by links, whose upper ends have eyes secured to horizontal segmental meshing gears journaled in the upper portion of the hoop spring, one of the gears having a handle. By moving the gears to carry the upper ends of the links together to the center of the spring, which the rider may do without leaving his seat, a pendułum springing swing movement is ob tained, designed to counteract any unevenness in hil work, the vertical position of the links being designed to afford ample elasticity in ordinary rough ground, retaining the seatessentially level and unaffected by retaining the seatessentiall
the motion of the inachine.

## A CARRIAGE AND WAGON BRAKE

A convenient and readily attachable brake device which may be applied without interfering with any of the usual running gear, is represented in the accom panying illustration. It has been patented by Mr Henry C. Chamberlin, of Lanesborough, Pa. Fig. shows the application of the device on a carriage, Fig 2 representing the connection of the brake band lever with a link whose other end is connected with a lever in reach of the driver. Attached to the wheel spokes by a clamping plate, and surrounding the vehicle hub, is a friction hub, with cylindrical flange to atford a friction bearing, and on the axle is clamped a bracke arm on which is pivoted a lever, to whose outer end is attached one end of a friction band, adapted to sur round the friction hub, the other end of the band be ing affixed to the rear end of the bracket arm, which extends under the hub. It will be readily seen that the driver, by the movement of a hand or foot lever


## Chamberlins brake.

connected with the other end of the link which extend o the brake lever, will draw the friction band closel around the friction hub to retard or stop the wheel.

## English Patents.

It appears from the $t$ welf th report of the comptrol ler-general of patents, designs, and trade marks that ast year 25,386 patents, 21,230 single designs, and 8,013 trade marks were applied for, the number of patent applications being the largest in the group, though thi was not the case with regard to the other figures. O the 25,000 odd patent applications, 500 , or 2 per cent were made by women, about 100 being inventions connected with articles of dress. The number of reader requenting the Patent Office library showed an ad vance upon the previous year, 113,374 persons havin availed themselves of its use

AN AUTOMATIC LIFE GUARD FOR CARS.
This is a device designed to prevent the injury of any one, child or adult, who may be caugh in the path of a moving car, by picking up and safely carrying the individual until the car is brought to a standstill, the body being so caught and held in an elastically suspended basket that contact with the drawhead, dashboard or wheels is impossible. The improvement has been pa tented by Miss Clara M. Beebe, of Elmira, N. Y Connected by means of semi-elliptical springs with arms which extend beneath the car, is forward buffer having curved arms at its ends and a pneumatic cushion across the front, the device being shown applied to a car in Fig. 1, and Fig. 2 representing a bottom plan view The arms extending beneath the car are braced by cross rods, one of which serves as an axle for fron guide wheels, and on the rear ends of the arms ar taples engaging loop-like hangers secured to a trans verse swivel plate, which has a central bearing plat fastened between the car timbers, so that in rounding
ree movement in front of the car. Uprights secured to the buffer arms in front of the dashboard carry a ransverse rod from which is suspended, by means of prings, a cross bar to which is secured the frame of a wire basket having a curved or dishing bottom, and supported near its front edge by curved springs fastened to the buffer arms, the basket being thus yield


BEEBES AUTOMATIC LIFE GUARD FOR CARS.
ingly supported at the back and at its lower front end. Handles on the buffer arms facilitate the shifting of the device from one end of the car to the other. Ina atent which has been applied for, the inventor pro vides a further improvement designed to pick up a person prostrate on the track, without rolling the body along, the device being called into instant use by a touch of the motorman's foot, and as quickly withdrawn when no longer needed.

Hydrogen Peroxide as a Preservative
According to Barbi (Pharm. Centralh., vol. xxxvi p. 307), hydrogen peroxide is one of the best, leas harmful and most convenient agents for preserving sirups, wine, beer, cider and vinegar. For this pur pose 10 gm . ( $21 / 2 \mathrm{fl} . \mathrm{dr}$.) of the commercial peroxide of hydrogen may be added to each liter (say one quart of the article to be preserved.

## A HAND CRIMPING TOOL

To quickly and firmly crimp a cap on an oil can or other receptacle, the simple hand tool shown in the engraving has been patented by Mr. John Wood, of Seventh Street and Jackson Avenue, Long Island City, N. Y. The tool is represented in use in one of the views, the other view showing the caps employed and a section of a can top with its cap crimped on. A flanged crimping disk is adjustably mounted to rotat loosely on the lower end of a stock in which is a pivo on which are fulcrumed two hand levers, the lower end of one lever carrying a crimping roll which rotates and slides loosely, and the other lever having a forked lower end adapting it to similarly carry two crimping rolls. Each crimping roll has an annular flange, and is rolls. Each crimping roll has an annular fiange, and ia held down by a coiled spring to pressupon the annula flange of the crimping disk, the springs normally ex erting a pressure on the lower ends of the levers to nove their handles apart. When the cap is placed on top of the can and the tool applied, as shown in the illustration, the hand levers are in an outermost posi-

wood's hand crimping tool.
tion and the crimping rolls do not touch the flange of the cap; bat on pressing the handles together the crimping rolls move inwardly, and their flanges tra vel on the flanges of the crimping disk, causing the flange of the cap to turn in under the flaring mouth of the spout, the operator at the same time turning the tool to crimp the cap in place all around.

## THE MANUFACTURE OF PHOTOGRAPHIC APPARATUS

 (Continued from first page.)remaining illustration on our first page shows the hand camera department, in which are put together the various kinds of hand cameras for which this establishment is noted. We give illustrations of some of these hand cameras to show their convenient form when in use and their compactness when folded.
The Premo, shown in Fig. 5, is a complete and prac tical hand camera, having all the recent improvements, including the swing back and rising and falling front
 It is arranged to receive a tripod on two of its sides. The view finder is attached to the bed and is reversible. The ground glass screen has a new device, which prevents it from closing on the withdrawal of the plate holder, so that the latter may more readily be reinserted. A touch on the spring button Fig. 5.- PREMO HAND CAMERA, on the spring bution $\begin{aligned} & \text { closes the screen for }\end{aligned}$ focusing, and causes it to exert a pressure on the holder. Either glass plates or cut or roll films may be used in this camera
Fig. 6 represents the long focus Preuno closed, opened as an ordinary folding camera, and also arranged for extremely long focus. This is a new device, which will be readily understood and appreciated by the photographer, who has often failed of securing possibie results for the want of a few inches more of camera bellows.

We give in Fig. 7 an illustration of a Premo camera adapted for stereoscopic work. This camera is designed


The ground glass screen is covered by a lid, which, when raised, forms a shield at the top and sides, which enders the image very distinct and clear. The lid has mirror on the under side which is used for viewing th mage when the camera is reversed for vertical views. The folding Premier, one of the standard instruwents made in this establishment, is known the world over as a first-class practical camera. It has a fine lens and an efficient shutter. It is a favoriteformof camera mong amateurs.
In Fig. 9 we have shown some of the fine large cameras made at this factory. While these cuts give


Fig. 7.-PREMO FOR STEREOSCOPIC WORE. an idea of the shape and general appear ance of these instruments they do not convey a fair impression of the finioh.
In Fig. 10 we have shown a view in the testing department, where every camera is subjected to severe tests, both as to its mechanical and optical parts

The Scientific American Cyclopedia of Receipts. The Home Journal for July 3, 1895, says of the SCientific American Cyclopedia of Receipts, Notes and Queries : "After a use of several years, we can say that we know of no single volume which contains such a large body of practical information of value to the
in 11 we give a view in the shipping department, which conveys an idea of the activity whic:h here pre ails. Besides the various kinds and sizes of cameras uade at this factory, there are a number of excellent forms of tripod, adapted for the several forms


Fig. 9.-FINISHING LARGE CAMERAS.
views. The stereo lenses are matched and provided |of camera; also plate holders, printing frames, and a that will save its cost many fold, while to open and with a double shutter, designed especially for this large number of accessories manufactured by them. use.

The Rochester Optical Co., of Rochester, N. Y., whose
In Fig. 8 we give an illustration of the Carlton twin factory forms the subject of our sketches, was founded lens camera. This instrument will be appreciated by those who-desire to practice photography under the those who desire to practice photography under the same focus, one placed above the other, the low the forming the picture on the plate, while the upper one forms an image on the ground glass at the top of the inr faphers, thereby gaincamera, the glass being of the same size as the plate. well deserved patrona and


Fig. 10.-Testing department.


Fig. 11.-shipping department.

## Tachinery as an Edncator.

In looking at a complex piece of machinery, such as the great triple-expansion engines of a high-speed modern ocean racer, the first feeling of the uninstructed layman is apt to be that of confused awe. The huge mechanism appears to him as a leviathan, a great brute force, trained by man and under hiscontrol, but yet ready to strike down ruthlessly any one who shall get in its way. Education is about the last function that one feels ready to attribute to it. Yet in the Engineering Magazine, May, Alexander E. Outerbridge, Jr., tells us that a machine is a great educator, and he ranks its work in this line as of a very high grade. His ideas, which are worthy of careful attention, are given in the following extracts which the Literary Digest quotes from his article. The Literary Digest, by the way, is one of the most interesting weekly papers that comes to this office.)
"An impression prevails in the minds of many in telligent people, wore especially, perhaps, among those who are not directly engaged in mechanical pur suits, that the tendency of modern methods of manu facture in the substitution of machinery forhand labor is detrimental to the intellectual development of the wage earner. in that it makes him an autowaton, like the machine which he tends; that the workman in a great factory loses his indi viduality; that the handicraftsman of a former generation has disappeared, and that his successor is a mere marionette, to whom the gift of brains is a superfluity.
"It is the object of this paper to present briefly a different and, in some respects, a novel view of the edu cational influence that machinery exerts upon the mental and moral development of the workingman, and to show that the introduction of new inventions so far from being an oppression to the wage earner, is, in fact, his greatest boon. These conclusions, which are the result of daily observation for a number of years in a large industrial works, are at variance with the opinions of those theorists and ecouomic writer who maintain that mechanical occupation is neces sarily narrowing to the intellect.
"I am satisfied that an insensate machine, in the material combinations of which, however, the skilled designer 'has embodied his own mental faculties, so that it is constrained to do his will when power is ap plied,' performing accurately the most complex opera tions, exerts a stimulating educational influence upon the care-tender, even though he may be an illiterate man or boy entirely unconscious of this influence. It you give a boy of average capacity the simplest routine work to do in connection with a wachine-it may be merely to feed it with raw material-he will, at first perhaps, perform his task in a perfunctory manner, taking little interest in the work and having no comprehension of the mechanism of the machine. Little by little, however, the constant repetition of mechanica movements, producing always one uniform result, inpresses itself upon his latent powers of observation and comprehension, the underlying principles and heretofore hidden motive of the seemingly inexplicable com bination of wheels and gears is revealed, and simple order is evolved out of complexity; a new interest is developed and the boy becomes an intelligent operator.
" The educational influence of mechanical occupation upon the workingman is strikingly illustrated in auother manner. You will find in all large industria establishments employes who exhibit as much skill in their special work as that of well known original sci entific investigators; they are daily performing opera tions as delicate in their way as the work of the micro scopist, and with a degree of accuracy amazing to the novice. Take, for example, the simplest operation o calipering a tube or measuring a rod, and you wil find mechanics dealing quantitatively with minute fractions of an inch which ordinary people totally dis regard."
That all this close relationship between machine and operator has its educational value no one can doubt But Mr. Outerbridge goes farther, and pursues his sub ject into a realm that harsh crities might be tempted to call that of fancy. A machine, he says, is in a certain sense the representative of the human mind that couceived it. He states this as follows :
"I believe that every novel machine possesses something of the personality of its creator. I believe, furtherwore, that it is possible to trace through. the machine, back to the inventor, a positive and continuing influence of his ruind upon the mind of the ope rator.
"I believe that the special mental development of the present generation of American engineers and mechanics may also be traced through historical relies to the subtile quality of mind with which famous American inventors have endowed their creations. These forces have been silently working to mould the minds of men in characteristic grooves, so that it is as impossible to mistake a purely American machine for a foreign production as it is to mistake a Chinaman for an Indian. This characterization may be even more sharply defined. It is not an unusual observation among mechanical experts to-day that machines pro-
duced byone establishment may often be distinguished from similar machines of another make (without the aid of any name plate) through a peculiar 'something which the Frenchman expresses with a shrug and 'J ne sais quoi.'

## the electrical condoit systey in new yori city

In the city of New York some of the principal lines of street railway cars are at present operated by wire rope cables. This is an effective system when it is in good running order, but it is liable to breakage of wires causing frequent interruptions, during which all the cars on a given section come to a standstill.
In the northerly section of the great city the over ead trolley has been introduced. But in the south ern or more thickly populated portions, such trolley is considered undesirable, and a new electric line, in which the electric conductors are placed underground, has lately been inaugurated and the working prove to be highly successful.
The conductors are arranged within a slotted tube or conduit, which is located in the middle of the track. The appearance on the surface of the ground s similar to the cable system.
Projecting down from the floor of the car into the sot is a bar or plow which presses against the flat sur aces of two iron conductors running the entire length of the conduit: These conductors are placed each three inches on each side away from the center of the slot, to avoid deleterious effects of any drip which would otherwise reach them, and are of channel iron four inches deepand thirty feet long. They are sus pecded from the ceiling of the conduit by means of in ulators devised for this especial purpose, and are


EW YORK ELECTRICAL UNDERGROUND CONDUIT 8Y TEM-SECTION OF CONDUIT-INSULATOR SUSPENSION.

Each conductor is sufficiently rigid to require sus pension at the ends and centers only, and the ends be ing located in the manholes, and handholes being placed at the centers, inspection and repairs are ren dered comparatively easy. The conductors are bonded to each other by stranded copper wire securely rivete into the web of the metal.
The new line is constructed on Lenox Avenue, and xtends from 108th Street to 146th Street, a distanc of $21 / 2$ miles. The present power plant consists of two 650 horse power engines and 400 kilowatt generators. Steam is supplied from two Babcock \& Wilcox wate tube boilers arranged in one battery. Each has arated capacity of 250 horse power, furnishing steam at 120 pounds. The engines are horizontal cross compound Allis-Corliss machines, which during the experimental trips are run non-condensing. All the steam piping is placed beneath the floor of the engine room. To each of the engines is coupled a General Electric 400 kilo watt generator of-standard construction, but wound for 350 volts instead of 500 volts, as is the usual prac tice in railway work. The conduit was built along the grade of the street, but with sufficient pitch to permit any water flowing into the conduit to find its way into the manholes located every 30 feet, and from thence into the sewers.
The current does not return by means of the rails. Each conductor forms one side of the working circuit The current merely rises on one side of the plow, passes through the controllers into the motors, and after per forming its duty returns by the other side to the oppo site or negrative conductor
The plow or traveling contact arrangement is also essentially nowel. It consists of two pieces of iron, one on each side of the plow, supported on spring leave which cause them to press outwardly against the two conductors. The plow is suspended from a longitudinal bar bolted to cross beams set upon the track and is constructed of two sheets of steel laid each one upon a plate of fiber. The two sheets of flber are then brought together, inclosing strip copper conductors connected at the top to the motor cables and at the bottom riveted to two other pieces of sheet steel. These run on each side of the plow and serve as sup ports for the hinges which carry the sliding contact pieces. A heavy sheet of fiber continues downward and serves to separate these contacts.
The motors $\in$ mployed are the standard General Elec tric 800 machines, handled by " $\mathrm{K}^{2}$ " controllers. The cars which are used on the line were constructed by the John Stephenson Company, and are mounted on
standard cable trucks constructed by the Peckham Motor Truck and Wheel Company. The cars are brilliantly illuminated at night by means of incandes. cent electric lights.

Dr. Achilles Rose, in a paper recently read before the New York County Medical Association, says :
The study of the classics, especialls the Greek, has been greatly favored in this country during the past jears by the establishment of an American school at Athens. This school was founded in October, 1892, by the American Archmological Institute, and is supported by yearly contributions from eighteen universities in the United States. One result of the establishment of this school has been the gradual diffusion among cul tivated people of a more correct notion of the Greek language, and of the appreciation of the fact that it is not a dead, but a living language, and that what is spoken to-day by seven millions is practically the same Pongue that was used by Plato, Demosthenes and Plutarch.
"It is conceded that the study of the classical lan guages, and of the Greek more especially, cannot be dispensed with: it is the attribute of every cultured mind, the attribute of every true scholar; it is con eded that the classics are powerful means to elevate o ennoble our mind, our character. Greek is and should remain on the school plan. Only another, rational method of learning it, has to be adopted it has to be learned practically, for practical purposes as well as for ideal. The most perfect, the ideal language will then speak for itself, and will in spire scholars to unite in agitation for its general adoption
"Journals and new books are published regularly in Greece at the present day, and any one versed in ancient Greek need but to examine one of these publications fairly and without prejudice, to be con vinced that their language is the same as that of the Anabasis or of the New Testament. There are dif ferences, it is true, but they are merely in the way of simplification, such as every language-every living language, that is to say-undergoes in the course of time.

The fact that the Greek language alone has pre served itself in all its original beauty through thou sands of years is, to quote a modern Greek writer Because the beautiful is like the sunshine upon this world-because the beautiful lives forever.
"The Greeks of today speak a language which Pericles, Socrates and Phidias would undeniablr have understood. An unbroken chain stretches from those times down to the present. The Greek language is indeed immortal
"The pronunciation of Greek, as taught in our schools-which differs in a remarkable degree from that of the present inhabitants of Greece-lacks every scientific authority. The method of instruction in Greek in our schools and colleges is faulty
"In order to have command of a language, it is, above all, necessary to know how the people speak we must become familiar with the everyday language. Whoever is acquainted with the language of conver sation of a people has the key to its literature as much as the natives themselves have.
'Greek taught like other living languages, by one or the other of modern methods, is not more difficult to learn than French or Spanish,certainly less difficull than German
" Let us have a Greek school here in New York, with natives of Greece as teachers, with children of immigrated Greeks, with Greek as the language of the house, where our children can learn Greek just as they can learn French or German in French and in German schools in this our city."

## Metal Workers of Asia.

Among the half civilized peoples of Central Asia are many artistic workers in metals. One of these nations or tribes, the Burates, is famous for inlaid work. The Russians call these workmen "Bratskaya Robata." They use gold, tin and silver for inlaid work on iron. The art has been practiced by them for thousands of years, and their skill has been recorded in the ancient folk songs of Asia. A writer describing their work says they hammer the silver, gold or tin very thin. Then the part of the object to be inlaid is made rough with a hammer, the surface of which is roughened like a file. Templets of birch bark serve to cut the metal into the proper shape, which is laid upon the heated object and lightly hammered into the rough surface, then heated to a blue color, and the inlaid metal is hammered smooth with a polished hammer.

## our cilmax micyele Watch and Holder

In our illustrated notice, of May 18 last, of this device by Messrs. Ingersoll \& Brother, 65 Cortlandt Street, New York, we omitted to state the price of the article, which is $\$ 2.50$. This includes the timepiece. Every cyclist will appreciate the convenience of the article cyclist will appr
and its low cost.

## ELECTRIC LIGHT PLANT STEAMER BAY sTATE.

The accompanying illustration represents the electric light plant on the new steamer Bay State, of the Boston and Portland Line, recently installed by the Belknap Motor Company, of Portland, Me. The engines used are the Ideal. The dynamos are multipolar slow-speed macinines of 400 lights capacity each, but either machine will carry the entire load, amounting to 540 lights, it having become a general practice to use duplicate plants for marine work, so, in case an accident should happen to either engine or dynamo, the duplicate machine can do the work. The dynamos were de signed by Mr. W. H. Chapuan, electrician for the company. This plant does great credit to the company, and has secured further or ders for the installation of two di-rect-coupled machines for steamer Portland, of the same line ; also, for steamship St. Croix, of the Inter national Steamship Company which is practically under the same board of management. The system of wiring is most excellent. There are eight main circuits controlled at the switchboard in dynamo room, which lead to sixteen different dis tributing boxes, containing switches located in different parts of the boat, each switch controlling six lights, turning them on or off as may be desired. These distribut ing boxes have glass fronts, secured with lock and key, and are under control of the steward of the boat pilot lights on main and fore rigging Then there are of the boat. The fixtures are of the latest at the bows opalescent globes and stades. The dining saloon is fitted with ground glass globes, which gives this part of the boat a very pleasing effect. The freight deck lights are protected with guarded fixtures.

## Cats and Cold Storage.

A story to the effect that a new breed of cats had been produced in the cold storage warehouses of Pittsburg went the rounds of the newspapers some months ago. A letter received from the secretary of the Cold Storage Company, and published in the June number of tise American Naturalist, shows that the story has but slight foundation in fact. The letter reads as follows: "While there is some foundation for the newspaper article, it has been somewhat exaggerated. Our cold storage house is separated into rooms of various sizes, varying from $10^{\circ}$ to $40^{\circ}$ abovezero. About a year ago we discovered mice in one of the rooms of the cold storage house. We removed one of the cats from the general warehouse to the room referred to in the cold storage house. While there, she had a litter of had a litter of several kittens: four of these were transferred into one of $t$ he general warehouses, leaving three in the cold storage house. After the kittens were old enough to take care of themsel ves, we put the old cat put the old cat back into the house we had taken her from. The change of climate or temperature seened to affect large electric fans which are used to keep the meat her almost immediately. She got very weak and cool.
languid. We placed her again in the cold storage The fireboat Zophar Mills, which was soon on the room, when she immediately revived. While the feel- spot, poured lots of water into the hold, soon eainers of the cats in the cold storage room are of the usual length, the fur is thick and the cats are larger, stronger, and healthier than the cats in any of the other warehouses."

The Live Poultry Transportation Company, which has offices in the Rookery Building, Chicago, has recently let a contract to the Ohio Falls Car Company for 38 cars. These cars will have a capacity of 16,000 pounds each, that is, from 4,000 to 5,000 head of poul try. The cars are 34 feet 10 inches long inside. This company has 150 of these poultry cars in service. They are without air brakes or vertical plane couplers, and


BOSTON AND PORTLAND STEAMER BAY STATE. ness for what it is worth. The National Car Builder and distilling. some society for the prevention of cruelty ought to take it in hand. It would probably order a ew more cars then, as penning several thousand chick ens or other fowls in one car is as cruel as anything can well be, and probably quite as bad for the public health as any other kind of indiscretion prac ticed by greedy shippers."

Electric Fans Canse a Fire.
A fire started in the steamship Massachusetts at the loot of West Twenty-ninth Street, New York City, June 19. The outbreak was in the meat storage room meat storage room


ELECTRIC LIGHT PLANT STEAMER BAY STATE.
guishing the flarnes. About $\$ 750$ damare was caused. Several firemen were partly overcome by the fumes of ammonia, which is used in the refrigerating apparatus in preserving the meat.

Irone.
In the alcoholic extract of orris root the inventor has iscovered a new substance, which is the aromatic principle of the root, which he gives the name "irone." It is a ketone, having the formula $\mathrm{C}_{13} \mathrm{H}_{30} \mathrm{O}$. This body has the characteristic odor and flavor of the orris root, and may be preferentially employed in perfumery, etc Its preparation is carried out thus: The alcoholic or hereal extract of the root is distilled in a current steam. Organic acids, ethers, alco hols and irone pass over into the distillate, which is then treated with ether and the ethereal solution agitated with a dilute alkali solution in order to separate the free acids. The mixture is evapo rated down and the residue dis solved in alcohol, which solution is mixed at the ordinary tenperature with a weak solution of an alkaline hydrate in order to saponify the ethers of the organic acids. After some minutes it is poured into water, the neutral oil are dissolved in ether, the ether is evaporated and the residue dis tilled in a current of steam. Irone is one of the bodies distilling over irst, and by repeating this opera tion several times it may be ob tained fairly pure, but still containing small quantities of aldehydes, which are eliminated by treatment with weak oxidizing agents. The irone is then converted into its phe nylhydrazone or condensed with it issaid that the new cars are to be minus these im- another snbstituted ammonia to a ketone, from which provements. Evidently the company is in the busi- bodies it is obtained by decomposing with dilute acius

## Cavalry Telephone.

An interesting experiment of installing a telephone by trotting cavalry was recently successfully under taken by some Prussian Uhlans between Berlin and Potsdam. Two sets of one officer and two non-commissioned officers proceeded in the early morning respectively from Berlin and Potsdam. Each set wa equipped with a complete telephone apparatus which one of the men carried in a leather case on his chest, besides the requisite quantity of thin wire. The end of the wire was connected with the respective towns telephone station, and the wire was, by means of a for _


## -

 musk by means ofchemistry, which stands on the banks of the Rhone and the waste pro ducts are discharged into the river. As a consequence it is found that trout and other fish in the neighbor hood have a musky savor, but whether, like some other fishes, they are attracted by the scent of the musk and eat the waste products or simply becom impregnated with the perfume has not yet been ascer tained. fixed at the end of the lance, thrown over the tops of the trees along the road. As each kilometer of wire was thus suspend ed a baltwas made, and it was ascertained whether there wa connection with the station. A new kilometer of wire was then con nected with the former, and on went the men I'he two sets met at Teltow. The wires, having been respectively tested with their respectivesta tions, were connected, and tele phonic connection between Berlin between Berlin and Potsaam wa established. Th distance is about twenty miles, and the whole thing was done inabout four hours.

## Musky Tront.

In the vicinity $f$ Geneva the a manufactory a manufactory of

## adtomobile carriages.

Since the early days of the present century a practical road carriage which should carry its own means of propulsion has engrossed the attention of many inventors. To-day we are treated to a spectacle of an automobile carriage with four passengers which can travel 750 miles at the rate of nearly 16 miles an hour We have at various times illustrated all of the leading horseless carriages, and we now present views of the prize winners at the recent Paris-Bordeaux race.
This race began in Paris on June 11; the course was from Paris to Bordeaux and return. The distance was about 360 miles from Paris to Bordeaux. Under the conditions of the race only four-seated carriages could compete for the first prize of 40,000 francs, or $\$ 8,000$. Special prizes were also to be awarded to automatic and petroleum velocipedes. Sixty-six horseless vehicles propelled by petroleun, steam power, or electricity and five or six petroleum bicycles competed. The pre liminaries were arranged with great care, checking stations being provided to insure the integrity of the race. Special telegraph wires were laid along the route to transmit news of the progress of the race to Paris. The race was witnessed by many thousand Paris. The race was witnessed by many thousand
people on the line of march. The first vehicle to arrive made in New York to prove to the owners of
berge retail dry goods store that mechanical power i

Their factory is located at Steinway, Long Island City We illustrate the small carriage o? MM. Panhard and Levassor, which took the second prize, and also its arrival at the Porte-Maillot (Fig. 4), Paris, on the reurn trip.
The carriages were constantly accompanied by bicyle riders who were soon distanced. The roads along the route were filled with enthusiastic spectators.
Though the two-seated carriage (No. 5) of MM. Panhard and Levassor (Fig. 1) arrived first, it received only second prize, the first prize being taken by the fourseated carriage of Les Fils de Peugeot Frères, No. 16 he third was taken by a two-seated vehicle by the same party, No. 15, as was also the fourth, which was for a four-seated vehicle. (See Figs. 2 and 3.)
The Fils de Peugeot Frères carriages, like those of MM. Panhard and Levassor, were driven by petroleum motors. The gas, steam and electric driven carriage did not make a very good showing in the recent race
The roads in America are not good enough except in certain localities as yet to permit of a very rapid de velopment of the automobile carriage, but their use in great cities is likely to be rapid. An attempt will soon
by the fruit grower, and yet the second one of the curious suits or cases which the little caterpillar wears is conspicuous enough to reveal its presence to the casual observer. The first suit is manufactured in the fall, to be wornall winter, but about the 15th of May the half grown caterpillar finds this too small, and proceeds to make a summer suit which resembles a winiature cigar in shape and color. These cigar like objects can be seen moving over the leaf of a plant although scarcely more than one-fifth of an inch in ength, and when disturbed the little creatures retreat into them. The first indication of the insects' pres nce occurs on the swelling buds of apple, pear, or plum trees. Two or three have often been seen on a single bud busily at work eating holes into them no larger than a pin. The work on the expanded foliage is seen in skeletonized dead areas, which have nea heir centers a clean cut round hole through one skin usally on the under side of the leaf. The caterpillars also often attack the growing fruit. The bulletin give the life history of this most interesting insect, from which it appears that it is only practicable to fight it while in the caterpillar stage. and then it is so well protected in its case as to render its destruction improtected in its case as o render its destruction im-
possible unless the work is very thorough. it can


Fig. 1.-PANHARD and Levassor carriage (No. 5)- SECOND prize.


Fig. 3.-CARRIAGE No. 15, which arrived second-third prize.


Fig. 2.-The fils de pedgeot freres carriage (No. 16)-first prize.


Fig. 4.-CARRIAGE No. 5 ARRIVING FIRST AT THE PORTE-MAILLOT, PARIS.
at Bordeaux was MM. Panbard and Levassor's pe troleum carriage, which reached Bordeaux at 10:32 on Wednesday morning, the start having been made a Versailles at nine minutes past noon the previous day A stop of only four minutes was made, when the return trip was begun. M. Levassor's time to Bordeaux was 22 hours 28 minutes over a distance of 585 kilometers ( 363 miles). The speed was 24 kilometers 400 meters an hour, equivalent to about 15 miles. The carriage of MM. Panhard and Levassor met with an accident shortly after leaving Bordeaux, which delaved it over an hour, which makes the run more creditable. This carriage made the entire trip in 2 days and 53 minutes for the round trip of 1,170 kilometers ( 727 miles), being at the a verage rate of $14 \cdot 9$ miles an hour. Many of the "ther velicles made splendid time.
The contest was arranged by Mr. James Gordon Bennett, Baron de Neufeldt, and others, who it is said paid for the prizes. The Panhard and Levassor's car riages, four in number, were propelled by the wel known Daimler motor, which has achieved so much success in both this country and abroad. In the Scientific American for February 7, 1891, we illustrated the Daimler motor and some of its applications.
The American company will bring out, within a few months, a carriage adapted to our American roads.
cheaper and more efficient in the delivery of packages than wagons drawn by horses, and the Society for the Prevention of Cruelty to Animals is already figuring n the cost of making the change on its ambulances from horses to Daimler motors. For our engravings we are indebted to L'Illustration.

## The Cigar Case Horer.

A comparatively new pest of fruit trees is the insec called the cigar case borer, which last year probabl anked next to the bud moth, in New York, in destruc iveness. In a bulletin from the Cornell Experiment Station, Mr. Slingerland says that it has probably been present in limited numbers in the orchards of this State or many years, but public attention was not called to it until 1888, when Mr. Patrick Barry found it boring holes in newly set pear fruits. In 1892 Dr. Lintne received some apples from Oswego, which had appa ently been bored by this insect, and in 1894 speci mens were received at the experiment station of Ith ca from a great number of places, showing that it was present in alarming numbers. So far the insect is recorded only from New York and Canada, but it will probably be heard from soon over a much wide ange of country. Owing to its small size and peculia habits the insect in any stage will be rarely noticed
probably be kept in check by two or three thorough sprayings with Paris green. if used at the rate of one pound to two hundred gallons of water. The first application, which may be effectively combined with the Bordeaux mixture for the apple scab fungus, should be made as soon as the little cases are seen on the opening buds. A second and perhans a third appli cation may be necessary at intervals of from four to seven days on badly infested trees. These spraying will also check the bud moth. It has also been found in Canada that a kerosene emulsion spray applied at he same time as directed for Paris green is all wore effective check upon the case borer. and will probably be so on the bud moth. In pear orchards this insect and the psylla can be checked by a spray of the same emulsion when the leaves are opening. It should be remembered that a fruit tree ought never to be sprayed when in blossom, and that success in any case will depend almost entirely upon the thoroughness with which the work is done.

BAGGAGE is moved from one end to the other of the Victoria station, at Manchester, in basket trucks running along a light electric railroad suspended from the roof of the station. The trucks are lowered by chains to any platform desired.

THE NORTH SEA SHIP CANAL
In our number for June 22 we gave maps showing the location of this great engineering work, which, starting at the mouth of the River Elbe, in the North Sea, extends across the peninsula, a distance of 61 miles, to the bay of Kiel, on the Baltic. The canal passes through a level country for the most part, , mo me surface, and at the part where pictures ar although in some places the cutting down of high embankments became necessary. We give from IUustrirte Zeitung characteristic illustrations, showing some of the scenery along showing some of the scenery along
the route of the canal, and also picthe route of the canal, and also pic-
tures of some of the machinery employed in the execution of the work.
One of our engravings is a pastoral scene near Burg, in Dithmarschen, showing the canal in the distance.
Another is a view of the banks of the canal near Knoop. In the work of removing the earth to form the ditch or canal proper, strong bucket scrapers operated by steam were employed. ers operated by steam were employed.
These lifted the dirt into cars with These lifted the dirt into cars with
great rapidity and economy. One of our engravings shows a steam scraping machine at work. Another engraving shows one of the great steam dredging floats at work. In this case the silt, which is lifted by an endless chain of buckets, is cearried through a tube for a long distance and deposited along the bank of the canal, as shown.

Gold Lacquer Pliotographs.
Before entering into the details of making such gold lacquer photographs, we shall describe their appearance, and, in outline, how they are made. The patented pictures appear like our ordinary gold lacquer work with photographic picture on them. They are very beautiful and artistic. Wooden boards or boxes which have a flat or nearly flat or a which have a findrical surface, such as hanging cylindrical surface, such as hanging
panels, handkerchief boxes, cylindrical flower vases, etc., are coated with black lacquer, and the part where the pictures may be put on is gold lacquered- with some layers of gold leaf, and the remaining part or margin of the pict ures is decorated with gold lacquer paint ings. The picture is put on the gold ground by the well known "dusting on" process, fixed with anothe coat of rather transparent lacquer and is polished.
The margin of the picture is finished in brigh polish or matt, with gold lacquer decorations painted or plain. In the case of panels, the decorated mar gin itself makes a very attractive frame.
Lacquer work is one of Japan's chief products. In no other place in the world is this work done except in China, and Chinese lacquer work is far behind Japanese. There is, in fact, no comparison betwee the two. Every one who has seen really good Japanese lacquer work must admire its ioeautiful appearance and hard texture. The lacquer hard texture. The lacquer protects the materials from
injuries arising from dampness of air and from all kinds of acids

Lacquer is made from the gumms juice of a particular tree, growing both cultivated and wild, called Urushi-no$\mathrm{Ki}_{\text {, which }}$ means lacquer Ki, which means lacquer tree. The trees from which the lacquer is collected are mostly cultivated for this particular purpose. In the season of the year when the sap current is rising, men make a cut on the trunk of the lacquer tree, and from this cut gummy juice is collected by scraping it with a peculiarly shaped stick. This is refined to lacquer by evapis refined to lacquer by ev
This refined lacquer may
This refined lacquer may
be used with or without colbe used with or without col
oring matter. That used

Japan or to be satisfied with a fine black French polish, gilded where the picture is to be printed.
Upon this prepared surface we might put the pic ture by the "dusting on" process or ordinary carbon transfer process. The picture being fixed might be protected by some hard transparent oil varnish, such
as best copal varnish. Dammar varnish is the most transparent of all, but it is not so hard as copal. Although no varnish pro tection is as hard and strong as lac quer, we consider that a really good varnish is as strong as is necessary for the purpose under consideration. The method we suggest will make quite as attractive a picture as that pro duced by the patentee's process and at a cheaper rate.
As to the patentee himself, we trust that he will adopt no proces more simple and cbeap than the one he has patented, but will continue to turn out the high class articles that he has heretofore, and will retain his well merited reputation.- Shashin Sowa Photographic News.

## Shipbullding for the Year.

The Bureau of Navigation has re ceived preliminary returns showing that 682 steam and sailing vessels of 132,719 gross tons were built and documented in the United States during the last fiscal year, compared with 776 steam and sailing vessels of 121,547 tons during 1894, an increase of 11,00 tons. Final and revised returns will somewhat increase the figures by the addition of barges, etc. Steam ves sels numbered 283, of 75,728 gross tons sailing vessels, 399 , of 56,990 tons, a de crease of 8,000 tons steam and increase of 19,000 tons sail compared with 1894 Among notable additions of the year to the merchant fleet are the steamers St. Louis, Northland and Newport News.
Among the notable American marine disasters of the year are the recent foundering of the steamship Colima; the loss of the steamship Keweenaw, reported missing with thirty one lives on the Pacific; the strand ing of the steamships Cienfuegos and the loss of the steanship Cbiprotective coating of lacquer When the work is cora on Lake Michigan. so far tinished, the things are sent to a gold lacquer painter, where the decorative gold painting is done.
The patentee takes these prepared boards, panels, etc., he makes photographic prints on them by means of the "dustiug on" process. Any good formula for the "dusting on" process will be found suitable.
First, this dusted on picture is fixed in the ordi-
nary way, and when it is dry a protective lacquer
coating is put on and polished. This is all that has
without coloring matter is
always black. chocolater or light umber, and those been patented by Mr. Mizuno, of Yokohama, in conwith the mixture of coloring matter can be made in nection with the gold lacquer process. various colors.
The lacquer coating is done as a special branch of occupation; the patentee also leaves it in the hands of the lacquer painters. The things to be coated are first prepared with body lacquer consisting of a mixeen patenten by Mr. Mizuno, of Yok
nection with the gold lacquer process. We suggest a method quite similar to the patented process, as regards result, which is easier, and at the same time cheaper. In this country it is very easy


THE NORTH SEA CANAL-A STEAM DREDGE AT WORK. to get lacquer would be necessary to import the materials from ${ }_{\$ 2}$ nor more than $\$ 20$ for each offense

## Sorrespondence.

## Force and Energy

To the Editor of the Scientific Aminican
In your issue May 11, 1895, an editorial article ap pears under the above caption. While the subject is discussed in a profound and intelligent manner from the standpoint of experience. yet in the mind of a less intellectual person, like the present writer, there is more or less doubt on the conclusions arrived at, and stated as axioms. The terms energy, force, and work are plainly defined, as is also the various relations of the trio. The assumption that "the doctrine of the conservation of energy tells us that the available en ergy of the universe is tending to zero" is without foundation on bed rock. Your statement that "euergy is defined as the capacity of doing work" cannot be doubted, but that such energy in the universe is tending to zero may be confuted by a reference to that which has existed without diminution for all known time in the past. Our earth has continued in its revolutions and circles around the sun, as well as all the bodies in our solar system, for all past ages without deviation. The power or energy which causes the lightniug's flash and the thunder's bolt, with all its destructive effects, is the same to-day as it was a thousand years ago. Why should it be said that the accomplishment of what is termed "perpetual motion" is impossible? Who knows but that some genius may arise who will grasp the situation and comprehend the power or energy that moves the worlds? There is no steam engine in the clouds to run a motor. Yet the ligh tning comes forth with a power that cannot be computed! A million horse power could not produce the effect that a single flash has been known to accom plish.
The age for doubt has gone by, and he that will look around and behold the wonders that have been ac complished within the past fifty rears will set no Nature which are as unalterable as were ever the law of the Medes and Persians, and much more perpetual. that may be yet used by the coming man.

We are constantly learning something, and new and unexpected results follow investigation.
Energy will yet accomplish many things that are now deemed impossible, among which will be a contrivance that will move by Nature's fixed forces, without any outside help from man. The mistaken notion that man must produce the energy is but human. Nature will produce and furnish all energy necessary to accomplish great ends; and it only remains for man to put the giants in harness and stand at the helm.
May the good time hasten on!
Asbury Park, N. J.
David H. Wyckoff.

## Sclence Notes.

The Decimal System in the Measurement of Time and Angles.-According to the Genie Civil, the Geo graphical Society of Toulouse has for some years been studying the possibility of the application of the decimal system to the measurement of time and angles. As a result of these studies, a scheme has been devised which is to be presented to the coming Geographical Congress at London. It is proposed to divide the cir cle into 100 "cirs" (abbreviation of circulus), with deci mal subdi visions of "decirs," "centicirs," "millicirs," and "dimicirs." The letter $\mathbf{X}$ (initial letter of Gree $\varkappa v \varkappa \lambda 05)$ is chosen to represent the cir, and an angle of
7 cirs, 77 centicirs, and 51 dimicirs would, therefore, 7 cirs, 77 centicir
For the decimal measurement of time, the day, from midnight to midnight, is divided into 10 decimal hours each hour into 10 "ces" (abbreviation of centijour), each cé into 10 "décicés" or decimal minutes, and th latter into " centicés," " millicés," "dimices," etc.

The passage from the present measurements to the new ones will be easy to realize. The conversion of the degrees, minutes, and seconds of ares into cirs and divisions of the cir will be effected by means of a table that Mr. De Rey Pailhade has calculated up to less than a half unit of the seventh decimal, that is to say to less than $0.000618^{\prime \prime}$.
From experiments made in Italy for calculating the time gained by the use of decimal measurements, it results that such use shortens the duration of the work by two-sevenths (almost one-third), either in observatiou or in calculation. It will be seen that such a gai is not negligible.
Tannin from Palmetto Leaves.-The extraction of tannin from the leaves of the palmetto has now become a practical industry, and it is claimed that leather tanned with this product can be produced wore economically than that which is treated with oak or hemlock bark, while the residue forms a valuable pape stock, which is also utilized. In the process of extraction the leaves and stems are separated, the stems are crushed flat through rollers, while the leaves are finely shredded. This material is then placed in a large ooden tank and covered with water, the mass brought to the boiling point, but not allowed to boil
violently, being kept near but below the boiling point
for fortv-eight hours, the liquid being then ready for the tannery. After the tannin has been extracted, the palmetto is steamed in a chemical solution, which removes the silicate contained in the leaves and changes the glossy shield to a gummy mass that can be removed without injury to the fiber. But in making imitation horse hair this gummy mass is allowed to dry, since it adds elasticity to the fiber. There are several combinations in which the production of tannin and fiber is said to be practicable and advantageous, so that tan neries situated in the vicinity of paper mills can grind the palmetto in the same mannerasbark, and the resi due, after bleaching, is in proper shape for the paper mill.
Origin of Chemical Terminations.-The terminations in the words "sulphate" and "sulphite" are of French origin. In 1787 the method of chemical nomenclature proposed by Morveau, Lavoisier. Berthollet, and De Fourcroy was published, and this still forms the basis of the present system. Lavoisier's ideas were most prominent in the scheme which was practically an embodiment of his antiphlogistic doctrines. The compounds of oxygene were divided into oxides and acides, and the names of the latter were distinguished by the terminations -eux (Ang. -ous) or -ique (Ang. -ic) respectively, according as the acids contained more or less oxygen. The important rule was also introduced, and is still maintained with its original force, that the names of salts formed from acids distinguished by names ending in -eux (-ous) should terminate in -ite and those from acids in -ique (-ic) should terminate ate.-Pharm. Jour.
New Adjunct to the Balance.-In order to enable workers with the balance to read the position of the pointer more accurately and readily, resort is often had tothe device of fixing a magnif ying lens before the divid ed scale. A nother simple contrivance is suggested by W H. F. Kuhlmann (in Zeitschrift fur Instrumenten), in which the scale is reversed, so as to face a concave cylindrical mirror attached to the column that sup ports the balance. The pointer is made finer at the end than usual, and moves between the scale and the mirror in which a magnified inage of the pointer and the scale appears.
Influence of Trades on Faces.-A curious paper is contributed by Dr. Louis Robinson to a recent numbe of Black wood's on the influence of trades on faces. I is pretty generally agreed that association with horses gives a person a horsey look; butit appears that circus riders and ring-masters are exempt from the genera rule, because with them the horses are regarded as with "properties," and their minds areoccupied solely tion of the public. Dr. Robinson takes as types professional musicians, priests, actors, actresses, and blacksmiths, and shows how their pursuits induce strongly marked facial expression. Even the style of hair which has become associated with musicians is not altogether dependent on fashion, but is evidence of trophic changes resulting from mental habits. The growth and vitality of the hair are profoundly influ enced by emotions. Priests cannot change their priestly countenance if they wished. For some mys terious reason the subcutaneous tissue over the cheekbones and under the jaws of the cleric's face gets an undue supply of nourishment, which leaves distinctive marks, while the consciousness of a share in the apos tolic legacy gives a muscular set to the lips. Dr. Robinson goes on to discuss the other classes mentioned in the same strain, and he ends by saying that the aim of the paper is to aid those who are endeavoring to place physiognomy on a sound basis. The task is a nits that , because in the course of the a man show every sign of guilt when there is no guilt, but only temptation; but it may even go further, in attaching a slanderous libel to the countenance, owing to the in terlocking mechanism of emotion, passion, and nu rition.
Masonry Bridges.-Two masonry bridges have re cently been constructed in Austria which are said t be the largest of their kind in the world. Oneof them situated at Jaremeze, has a main span of 206.5 feet The other, situated at Jaruna, has a span of 1575 feet A bout thirty-five thousand cubic feet of cut stone were used for the first of these bridges. About fifty-five tons of Portland cement and some four thousand cubic feet of ordinary mortar were used in the work. In be inning the work, the centering was loaded simultan ously at eight different points. The weight over the haunches is relieved by spandrel arches. The othe bridge is similar in design. The total cost of the Jare meze bridge was $\$ 36.000$.
Improving the Flavor of Butter. - Prof. H. C. Conn, says Food and Sanitation, has for the past two year been experimenting in the direction of discovering and cultivating the proper bacteria forimproving the flavor of butter, and recently experiments havebeenmadeby him in the production of creamery butter. As a result of such experiments, it is now stated that Prof. Conn has discovered a species of bacterium to which be ha applied the insignificant name of "Bacillus No. 41,"
organism for the artificial ripening of cream in butter making. These experiments, as carried on by him, were thoroughly satisfactory, and were made in the following manner : One-half a pint of milk was steriliz ed, by incessant steaming, during a period of three or four days. Then this bacillus No. 41, which had been cultivated in the bacteriological laboratory of Wesleyan University, was inoculated into the milk, and for two days was allowed to develop. The large creamery at Cromwell, Conn., was then visited, and six to eight quarts of cream were put into a metal vessel and "pasteurized." The cream was then heated to 158 degrees Fah., and left for ten minutes. The vessel was removed and cooled quickly by means of cold water, and when the temperature had dropped to 80 degrees bacillus No. 41 was poured in and the mixture stirred thoroughly. The vessel was then covered and put into the ripening room. After a couple of days the cream was churned, and the buttermilk remaining was set aside for future use. These six quarts were ripened for the purpose of increasing the number of bacteria, and securing a strong culture for use in the large cream va of the creamery. The buttermilk was then inoculated nto the day's cream supply, and this cream allowed to ripen in regular time, at a warm temperature, and churned as usual. Before churning a quantity wa set aside to use for inoculation in the next day's sup oly, and in this manner continued indefinitely. The effect was always uniform. The first six quarts of cream produced moderately good butter, but not quite of the flavor wanted. The first large churning was a trifle better, and each day's product was an improve ment. A delicate flavor also developed, which seemed to deteriorate after two or three weeks. This deterio ration was remedied by a fresh inoculation from the laboratory. Two vats of cream, from which June butter was made, were taken. One quantity was in oculated, and the other was not. The butter produced by each was of high quality, but that which had been noculated with bacillus No. 41 had an aroma stronge and more pleasant than that without. It was also superior both in taste and odor. One lot was sent to a Mr. Beck, in Massachusetts, who makes the highest grade of butter, and who commands a very high price in the Boston market. Mr. Beck used the culture and reported a decided improvement. It is the purpose o Prof. Conn to introduce this inoculation process in al the large creameries in the United States within the

The Size of Drops.-At a recent meetingof the Rosa Society of Edinburgh a communication "On Drops" was read by Mr. J. B. Hannay, who appears to have obtained experimental verification of Tait's conclusion reached some years ago. Thus, the size of the drop does not depend upon the weight of the liquid, but is proportional to the diameter of the delivery tube while its separation is regulated by surface tension ather than by cohesion. In the experiments, the dis urbing element of viscosity was got rid of by causing a given liquid to drop into another of different specific gravity. The separated particles of water, for exam ple, were allowed to rise in oil. It was further ascer tained that when water was dropped in an atmosphere of benzine vapor the drops formed were much smaller than when the surrounding medium was ordinary air. Diffusion of Perfumes.-J. Passy (Comptes Rendus, Ex, 513) considers that the fixation of perfumes by olid bodies, when diffused in an inciosed space, mus be due to a process of solution similar to that by which dyes are fixed in tissues. He argues that, in the same way that crystallized fuchsine is greenish with a metal ic luster, and only manifests its characteristic colo when in solution, so coumarin in the crystalline state does not present its characteristic odor. Presumably therefore, tissues perfumed by coumarin contain it, as $t$ were, in solution.
Recovery of Tin from Tin Plate Clippings.-Mr. T Hunter extracts the tin from scrap tin plate by treat ing the latter with a solution of sulphate of copper which dissolves the tin in the state of sulphate, while at the same time metallic copper is deposited. In the presence of the iron the sulphate of tin is decomposed in turn with the setting of metallic tin at liberty and the formation of a solution of copperas.
In reality, it is found that the solution of copper cor odes the iron and detaches the tin that is fixed to it Beneath a double bottom, upon which the tin clippings are arranged, there collects a mixture of tin and cop per, which is separated, or which is utilized directly for the manufacture of stanniferous brasses or bronzes.
Prevention of Boiler Scale.-To prevent the forma tion of scale in steam generators, Mr. Alwin Nieske, of Dresden, recommends the addition of chromic salts to the feedwater. The lime existing in the latter in the state of bicarbonate or sulphate is precipitated by such salts in the form of a non-adhesivelightmud. Bichro mate of potash may be used in the proportion of two ounds for a small boiler; but an excess of the salt would be attended with no inconvenience.

Trunk wires to connect London by telephone with Edinburgh, Glasgow, and Dublin have just been erected by the British post office.

## [Froy the New York Sun.] <br> The Horse and the Bicycle

The present prices of horses of average and even the better quality are lower than ever before in the history of the market. The business of horse raising has ceased to be profitable, unless it is confined to varieties of the breed for which there is a fashionable demand or which are distinguished for their speed. At the same time there is a falling off in the demand for carriages. With very good reason, the horse dealers attribute this decline in great part to the present $\left.\right|_{\text {their business. Children ride it to school. Clergymen }}$ passion for bicycle riding : and the use of electricity and cables for horse traction on the street railways throughout the Union has, of course, very much to do with it. The horse has been displaced, to a large extent, bs these new agencies both as a beast of burden and an auimal used for pleasure. The dealers, however, profess, and perhaps feel, confidence that the competition of the bicycle is due to a merely passing fancy or hobby. They say that the passion for bicycle riding is too violent to last, and that in the course of one or in the course of one or two years the horse will resume his place in the interest and affections of men and women, and the machine will be laid away as a toy of which people have grown weary. The diminution of the dewand for draught horses because of the substitution of electricity for horse power, they admit, will continue indefinitely and steadily become greater. Here steadily become greater. Here in New York, for instance, the time is near at hand when it will displace horses en tirely from the street railways, and the same will be the case with the cities and towns of the Union gen erally. The experiments with carriages run by elec tricity or petroleum, which have been made recently in France, suggest that the horse will have a new competitor not merely in the cities, but along country roads and in agricultural operations. As it is, a ver fair horse can be bought for about the price of a cow. The rare and incontestably superior beast may fetch about as much as ever, but the ordinary horse of or dinary and even good breeding is very cheap.

The use of the bicycle has increased at a rapid rate during the last year. It would be safe to say that there are three times as many wheelers as there wer last summer, though then the number was great Probably there are five times as many. The level roads in the neighborhood of New York are crowded with bicycle riders on Saturday after noon more especially, and on all days they are numerous and much more numerous than the people who drive horses for pleasure. Men who were once accustomed to take a drive for recreation when they reached the country from town, now to a large and increasing extent prefer bicycles. Consequently the driving has undergone a very driving has undergone a very
perceptible diminution. perceptible diminution.
Neither are they generally young fellows of sporting pro clivities. Very many of then are gray haired men, who de clare that they find in wheel ing a needed recreation which driving does not furnish. Very many of them also are women, old and young. A great part of the country girls great part of the country giris
themselves are now expert wheelers, and the feminine visitors from town swell the numbers largelr. Doubt a
to the propriety of riding a
bicycle has passed away, for fashion has set its stamp of approval on the practice and supplied conspicuous examples of it which have released the feminine mind from fear of offending conventionality by mounting a bicycle. Accordingly, man and wife, father and daughters, are frequently seen wheeling along the roads together in a high state of enjoyment.
The ambition to acquire the art of managing the machine, thus stimulated, is rapidly extending among men and women both, and as it is easily gratified now that numerous schools for the preliminary instruction
carriages. With very good reason, the horse dealers long or considerable distances to go in the pursuit of
have been established, the practice of bicycle riding is increasing faster than at any previous time since the If people cannot afford to buy bicyclesthey hire them. Meantime the use of the bicycle simply as a means o transportation and for business purposes is extending orrespondingly. It is in general employment in the correspondingly. It is in general employment in the ountry by messengers, mechanics, professional men, ng or considerable distances to go in the pursuit o


THE NORTH SEA CANAL-VIEW NEAR KNOOP.
five more years remain of this century, but they are ikely to be accompanied by some of the most im portant changes in civilization, wrought by new mean of transportation and locomotion, which have occurred since this wonderful nineteenth century of mechanica invention and scientific discovery was ushered in.

## Naval Notes.

The plans fur the two new battleships, the construction of which was authorized by the last session
of Congress, are now being drawn. The act provides that the cost shall not exceed $\$ 4,000,000$ each and that they shall be designed to carry the heaviest armor and the most powerful ordnance suitable to vessels of 10,000 tons displacement. It is also pro vided that one shall be built on the Pacific coast and the other on the Atlantic const.
In the matter of protective linings against leakage from shot holes, both fire and water tests continue to show the advantages of the corn talk cellulose over the coco product The coco fberwa made to flame by an ignition which only blackened a little of the cornstalik cellulose Streams of water were di rected against the holes made in the cofferdams by the gun in the recent tests at Indiai Head proving grounds. The hole made by the six inch sho in the cocoa cellulose washed out in half a minute to th epth of eighteen inches and that of the cornstock cellu ose to a depth of les than four inches. Powerful use it even in making their pastoral visits, doctors in streams were directed upon the eight inch shot hole going their rounds. Its first cost paid, it requires no and the cocoa cofferdam was bored completely through further expenditure except for occasional repairs. It in nine seconds, but the cornstalk cellulcse took twice does not have to be fed like a horse, and no one needs as long.
to be hired to take care of it. It extends greatly the The war ship Columbia made the trip across the region over which carpenters, masons, plumbers, or gardeners can make their work profitable, and to such it has become indispensable. They have all the advantages and none of the dissdvantages involved in keeping a horse. They can make better time than the millionaire in his costly equipage. Accordingly, the assumption of horse dealers that bicycle riding is a mere fad, an ephemeral hobby, does not seem to be justified. Evidently the machine has come to stay. It may be that its use simply for sport and recreation
will diminish hereafter, something else coming up to


THE NORTH SEA CANAL-VIEW NEAR BURG IN DITHMARSCHEN.
eplace it in the popular faney, but before that decline sets in, if it does occur, the passion for bicycle riding will doubtless increase ana extend greatly. Multitudes of people yet remain to be affected by it; but as a machine for various use as a means of necessary transportation it must continue to be employed permanently by greater and greater numbers of people. Vers many of them, it is true, have never been horse buyers, but the machine will enable thousands of people in all parts of the Union who have depended on horses to get along without them wholly or in part. Only
tered canoe of cedar wood, 7 feet long and $11 / 2$ feet wide, an arborvitæ mortar, and two earthen ware ves sels were found with the skeletons.

Dr. Chadwick thinks that bicycling is a most deirable form of recreation and exercise for women, and his purpose in bringing the subject up for discussion is to stimulate the inventive minds of its advocate to devise a saddle which shall not inflict local injury or discomfort upon women riders.

## Washington Timber．

The Puget Sound Lumberman says：＂Many esti mates have been made of the amount of standing timber in the Pacific Northwest．In every case they were confined to the western portion of the State， leaving to the reader the task of＇guessing at the rest．＇ The estimates，too，were made in round numbers reaving the impression that truth was lacking．The estimates that the Lumberman presents in this issue were carefully made．Of course，in a country so sparsely settled as the Pacific Northwest，it is im practicable to get at the actual number of feet，but the figures here given are as nearly correct as it is pos sible to get them．In gathering these figures，the Lumberman used three sources of information，viz．， county surveyors，mill men and cruisers．The county surveyors，through intimate knowledge of their re－ spective counties，were able to give the number of spective counties，were able to give the number of
acres of timbered land；the mill men and cruisers， acres of timbered land；the mill men and cruisers，
through their familiarity with the timber，were de－ pended upon to give the number of feet to the acre． The surveyor also gave his estimate，and between the three it was possible to obtain an average．The figures given by the surveyors，mill men and cruisers were
higher than those printed，and in rare cases an under－ higher than those printed，and in rare cases an under－
estimate was made．Therefore，all things considered， the figures are very conservative and represent rather the minimum of the forest area than the maximun． The work represents the labor of three months＇time The work represents the labor of three months time．
The result shows the immense wealth we have in our The result shows the immense wealth we have in our
forests．At the present valuation of $\$ 269,561,329$ ，or 65 forests．At the present valuation of $\$ 269,561,329$ ，or 65
cents per 1,000 feet，for the State of Washington，what will our forests be worth when stumpage brings the Minnesota price of $\$ 2.87$ ？
＂They then give the figures of the forest area of
Washington by counties，which amount in the aggre Washington by counties，which amount in the aggre－
Number of feet standing， gate to 23,588,
$410,333,33 \overline{3}, 000$ ．
＂The estimates are very conservative．Many mill men，loggers and persons who have cruised the timber in various counties，assert that it is entirely too con servative．We have aimed to make the figures rather
too low than too high，believing that the above will too low than too high，believing that the above will
give as correct an idea as possible of the amount of standing timher in the State that might be termed merchantable．While these figures may seem incredi－ ble to persons not accustomed to our timber，our own mill men will readily appreciate our efforts to be fair in these estimates．The Eastern mill man or timber
land owner may find it hard to believe that the timber in Chehalis County will average clear through nearly

32,000 feet of merchantable timber per acre，but the writer knows personally of whole townships in that
county that will cruise from $6,000,000$ to $12,000,000$ feet to the quarter section．On one occasion he stood and counted within a radius of about two hundred feet no ess than sixty－four trees，not one of which was less than four feet in diameter，and from two hundred to four hundred feet in height，besides as many more smaller ones that might be termed＇merchantable tim ber．＇The Secretary of the Board of Trade of Anacor tes writes that $16,000,000$ feet of merchantable timbe to the square mile in this county（Skagit）is not a high figure，when it is considered that there are many forty acre tracts that will cut from three to four million feet each．＇All of which is perfectly true，as many loggers in that section can testify．A cedar tree from twelve to twenty feet in diameter and from one hundred and fifty to three hundred and fifty feet high，the first limb being nearly or quite one hundred feet from the ground will cut a considerable number of feet of clear lumber or quite enough shingles to fill several cars．While o course this is not average timber，it is not difficult to find such enormous trees，when occasion requires，in
any of several of the counties of western Washington．
＂It is evident from the above that the heariest tim ber is in the counties in the northern portion of West ern Washington and in those bordering on the Pacific Ocean．It is a singular fact that might be mentioned in this connection，that the best timber does not grow directly on the coast，but beginning about a mile back from the ocean，it gets larger and better for two or three miles，where it becomes large and fine，this con－ dition prevailing for a number of miles eastward Again it becomes very large and heavy at the base of the Cascade Mountains，diminishing again as the summit is reached and increasing yet again as the de scent is made on the eastern side，until the foothills are reached，where the best timber of eastern Washing ton is found

It has been generally supposed that practically al the timber of Washington was in the western portion and that perbaps two－thirds or three－fourths of tha was in the Puget Sound region proper．It has been generally conceded that there was but little timber of value in any of the eastern counties except possibly Spokane，and that several counties were absolutely treeless．This is a mistake．as will be seen by th
above．There are just two counties out of thirty in the entire State that are without any standing timber whatever．These are Adams and Franklin
both in the eastern portion of the State，adjoining each other，exactly similar in topography，the two counties comprising an arid sage brush desert，unfit for agricultural purposes without irrigation，and with no neans whatever as yet in sight for supplying the de ficiency of rainfall，as all streams flow from them，af fording no opportunities for easy irrigation．
＂The following table will give an idea of the amount of timber，both east and west of the Cascades
East Wasbington．
Weet Washington
$\begin{gathered}\text { No Acres } \\ \text { Timber．} \\ 11,616,720\end{gathered} \quad \begin{gathered}\text { No．Feet } \\ \text { Standing．}\end{gathered}$.
11，974，792 303，355，294，000
＂The kinds of timber in the State of Washington are yellow fir，red fir，white fir，cedar，spruce，Alaska pine larch，yellow pine，bull pine，tamarack，alder，maple， oak，yew，cherry，cottonwoud，Alaska cedar，curly maple，birch，madrone，willow，elm．
＂The quality of the timber of Washington，taken as whole，is better than that of any other State．
＂Therefore，it is self－evident that Washington is the great lumber yard of the United States from which must come the supply for all parts of the country．In addition to this，China，Japan，Mexico，Australia， South America，and Europe must look to this State South America，and Europe must look to this State
for much of their supply，and already the ships of all or much of their supply，and already the ships of all
these countries are in our ports after cargoes．As from all quarters in ancient time did they go to Egypt for grain，so will they now from the four corners of the eartin come to Washington for lumber．As did then Egypt prosper and grow rich，so will Washington now，and as did her seaport cities become great，so will those of Washington．＂

## Naphtha for Cleaning Wool．

The employment of naphtha as a cleansing substance n the scouring of wool is a new method favorably commented upon by the scientific papers．By the use of a pump the naphtha is forced through and through the wool，extracting all the natural oil，it being also laimed that the naphtha does not injure the fiber of the wool，as does alkali cleansing，but leaves the fleece in an actually better condition than when cleansed by any other process．A further valuable feature mentioned of this method is that the grease that is ex tracted from the wool may be again extracted from the naphtha in＇a pure state，thereby becoming valnable as a medicinal agent or for a saponification into the purest of soaps．A plant following this method is said to have scoured 500,000 pounds of wool，and had saved a prodact of 80,000 pounds in pure wool oil．

## recently patented inventions．

Ralluvay Appliances．
Car Coupling．－Edward R．Brown Tallabassee，Fla．This is an automatic coupling employ－ fected from the top or side of the car．The drawhead is spring．cushioned and arranged to receive a limited ver－ tical rocking movement，the link also rocking slightly in
the drawhead chamber，thus facilitating the eeady coup． he drawhead chamber，thus facilitating the ready coup． ling of cars of verying heights．The drawhead and all
parts of the coupling are readily disconnected from the car，thus rendering it easy to make repaire．
Switch Lock．－Samuel E．Barlet， RedBank，N．J．This is an improvement on a patent ormerly cranted to the same inventor for interlocking ble lock which positively prevents the operator in charge of the tower from wrongly setting the switch or sipnal．
The mechanism is so arranged that the operator or lever－ The mechanism is so arranged that the operator or lever－ man cannot manipulate the lock lever and connected mechanisms to display the neceessary signal unless the
switch is in proper postion，as the lock controls the signal．
air Cushions for Cars．－Linford $\mathbf{E}$ Ruth，Connellsville，Pa．This invention relatesto flling mattresses or cushions of sleeping and parlor cars with compressed air without any permanent or organized con－
nection of pipes．It provides for either permanent or
detachable cushions with socket－shaped outlets and nection of pipes．It provides for either permanent or
detachable cushions with socket－shaped outlets and
air reservoirs which can be cut off from the air brake air reservoirs which can be cut off from the air brake
pipes，in combination with a detachable hose having a pipes，in combination with a detachable hose having a special form of nozzle at each end intting in the socket
shaped outlets，whereby the cushions may le readily inflated and the hose removed．

## Electrical．

Signaling．－Douglas L．V．Browne， Denver，Col．For signaling from the moving buckets or cages of mining shafts or from elevator cars，or other apparatus operated by a movable rope，electrical con－
ductors are，according to this invention，concealed within a rope or cable，the operation of the cable in winding and unwinding not being interfered with， ing mechanism and electrically－operated signals in such a way that the signale may be instantly operated with－
ou：：egard to the position of the rope or cable．The in－ vention affords a simple and positive means of signaling
designed to act surely and always make good electrical lesigned
contact．
Conduit Electric Railway．－Louis R．and Albert H ．Lavalle，Holyoke，Mass．This inven－ tion provides a system in which a continuous supply wire is used，and the trolley arranged in a series of blocks sup－
plied therefrom，but out of circnit except when the trol－ plied therefrom，but out of circnit except when the trol－
ley is in contact with them．A positively working switch automatically cuts in the successive blocks and cuts them out as the trolley progresses．The trolley makes positive
contact with the trolley wire and also operates the
switches．It is vertically extensible．to adapt itself to
the varying load of the car，and is separable longitudin． the varying load of the car，and is separable longitudin－
ally，so that in caee a car jumps the track the trolley parts and no great barm is done．

## Mechanical．

Split Pulley．－Mablon B．Lorah， Readıng，Pa．The rim and web of this pulley are made has two pulles sections forming a continuous rim and an apertured web having projecting members at each side on which are clamp devices with clamp portions of wood glued together alternate layers having the grain in the same direction．The pulley may be quickly axed in position and readily changed to ft different sized Marts．
Metallic Packing．－Edward L． Raynsford，Susquehanna，Pa．This packing has an beveled sides in its periphery，there being tonaving one end and a recess at the other，while in the outer sec－ toonal ring each section has lugs projecting from its per－ iphery，there being a tongue at one end and a rabbet at the other．The joints between the sections of the inner
and outer rings are made to break joints，forming at and outer rings are made to break joints，forming at Treating Sheet Metal Plates．－ John D．Grey，Baltimore，Md．For treating iron and steel plates for han，terne，and galvanized work，instead provides in process of black anealing，this inventor cold rolls，a series of racks to support the plates in the pickling and washing baths，carriages to receive the racks an intermediate drying oven with open ends and tracks
on which the carriages run，driven by an endless chain on which the carriages rimg driving mechanism．
and
Bolting Cloth Brush．－Harry 1. Mowson and Roswell F．Corey，Scottsville，N．Y．The under side of the bolting cloth，according to this inven－ tion，is engaged by a traveling revolving brush，which has a backward and forward movement，the brash being in constant contact with the under side of the cloth，and keeping its meshes perfectly free at all times，so that it
will work to the greatest advantage in producing very ne four．
Windmill．－Edward S．Crawford，Mil－ ford，IIl．This is a simple and strong machine，designed which may be regulated to run with the of gear，and ness and nicety．The head has a laterally extending hol－ low spindle on which turns the boss of a wheel having pivoted fans provided with crank shafts connected to their pivots，there being a slide shaft in the hollow spin－
die and a cross arm on the outer end of the shaft．Thure die and a cross arm on the outer end of the shaft．Thure
is a spring between the arm and the end of the spmdle， is a spring between the arm and the end of the spmale，
and a spring connected to the outer end of the shaft is and a spring connected to the outer end of the shaft is
adapted to bear on the onter face of the cross arm， while rods connect the ends of the cross arm to
the cranks of the pivoted fans．

## Miscellaneons．

Matte and Slag Separating Well． John D．Davies，Butte，Montana．This well has two
compartments，bothpreferably lined with frebrick，the compartments，bothpreferably lined with frebrick，the
larger and higher compartment receiving the molten larger and higher compariment receiving the molten
metalfrom the furnace，having in its top edge at the rear a notch forming an outlet for the slag，and next to the notth a vertical slot to be closed by a plate held in brackets．In the partition between the compartments
is an opening near the bottom to conduct the matte rom the larger to the smaller compartment，which has on its top edge a matte discharge notch leading suitable spout at a lower level than the slag discha apor．in the outer end of the smaller compartment is to the smaller compartment． Dumping Scow．－John Russell，New
York City．The hull of this vessel has transverse water－ tight compartmente with inclinedouter surfaces ad jacent tight comstern and bow sheathings，longitudinal water ments，vertical bulkheads，and over the compartments are alrtight tanks held in place by the deck．There is a central well whose bottom is formed of hinged trap oors，readily opened for dumping the garbage or and is designed to carry a greater load and be
by fewer menthan heretofore．The scow may also employed for transporting lamber，stone，etc．
Bicycle Case．－Norman W．Mum－ ord，Jaffery，Fla．To obvlate the necessity of taking wheel into or out of the house，this inventor has de－ vised a cheap and simple case in the form of a closed
structure adapted to hold the bicycle upright，readily handled and cransported，practically burglar and weather proof，and which may be conveniently locked to a build－ ing or fixture．It has an end door and interior parallel
guides to receive and guide the wheel，and within the guides to receive and guide the wheel，and within the
case at the top and sides are straps for eccurely holding e machine in place．
Pedometer．－Anton Reinisch and Lorenz Kratochwil，Vienna，Austria－Hungary．This is toreceive an impulse each time the foot is set down，a suit able counting mechanism registering thenumber of steps made．The device may also be attached to the hoofs of
horses or other animals for ascertaining the number of

## ps made

BanJo．－William F．Libby，Gorham， Me．In this instrument an improved construction of the rame of the head is provided for，designed to afford in hand edge of the neck is a longitudinal groove adapted to receive the fifth string，waich is carried in engagement with a suitable guide to a key located between the keys receiving the other strings．All of the keys are thus
grouped together，and the neck at both sides is free for the passage of the player＇s hand．
Penholder．－Thomas C．Campbell， New York City．The hollow barrel of this holder has a
side opening，a spring tongue holding the pen in the bar－ rei，and a slide connected with the tongue being capable
of having one end dropped through the opening to dis－ of having one end dropped through the opening to dis－
engage the tongue and pen．The pen is as firmly held as in the ordinary holder，but may be rcadily freed by the releasing device，which does not in the least inter fere with the ordinary use of the holder．
Bill Holder．－William J．Whitwood， Welisville， N ．Y．This is a convenient device for relain－ ing folded bills or other papers，permitting any or all of the papers to be readily removed．Combined with a
holder plate and clamping pieceare bow springsattached holder plate and clamping piece are bow springs attached
to the holder plate，a flexible strip being attached in－ to the holder plate，a flexible strip being attached in－
termedlately to the clamping piece and at its ends to the termedlately to the clamp．
DENTAL Bridgework．－Bernard B． Bray，Astell，Texas．This invention provides an Im． proved crown，cap or band for attaching the bridges to
the natural teeth，the crown or band having a lug at each side of a split portion，the lugs facing one another and having inclined outer side faces．A pin or screw is adapted to enter the lugs and draw them together，form－
ing subetantially a dovetail tenon．The improvement ing substantially a dovetail tenon．The improvement is designed to dispense with the large quantity of gold
usually required in this character of work，and make usually required in this character of
artificial teeth look much more natural．
Mop Holder and Wringer．－Albert m．Bien，Deer Lodge，Montana．This is a device for ase with a mop of any size，to facilitate effectively wringing the mop without placing the hands on it．The
mopstick has at its forward end a screw－threaded por－ tion on which travels a head block with a wringing frame having a sliding movement，a locking device of the frame engaging the head block．A mop－holding do－ vice secured to the mop stick has divercing loops adapted Nut Sheller．－Julien Prade，Waco， Texas．This is a simple machine especially adapted for shelling pecans，and which may be used on other nuts． It has an adjustable holder which adapts itself to various sizes of nuts，the holder having a number of radially
yielding plates carrying knives and a plunger with radial yielding plates carrying knives and a plunger with radial
blades engaging the plates．The plunger cuts the shell from the nut，and the machine cleans out the holder and knives，so that it works well every time．
Well Bucket．－William H．Tilford， Wartrace，Tenn．This bucket is arranged to fill itself automatically when lowered into the well and drawn
out，and it may also be conveniently emptied．It has in its bottom a valve seat in which slides a tube open at the lower end and carrying at its upper end a fixed valve adapted to be seated on the upper face of the bucket Sottom．
SHE
Sheer Shears．－Leonard J．Lohlein， Lusk，Wyoming．These shears have a special form of
handle adapted to receive and combine with a series of handle adapted to receive and combine with a series of
detachable cutting blades，which are quickly inter－ detachable cutting blades，which are quickly inter－
changeable．One handle may thus be used with a great number of blades，and the latter are more easily ground， number of blades，and the latter are more easily ground，
the blades being made in a series of different sizes to

## better adapt ent sheep.

Nect Yore J. Sykes, Troutville, Pa. Three straps are included in collar to the neck y holdback another strap extending from the the neck yoke to the belly band, and a third strap ex tending from intermediate position on the belly band
strap to the upper end of the holdback strap. The imstrap to the upper end of the holdback strap. The ima collar.
Anal Bougie.-Franklin P. Stukey Lancaster, Ohio. Thisis a device for mechanically $r$ r of hemorrhoids.
Nore.-Copies of any of the above patents will be furnished by Munn \& Co., for 25 cents each. Please of this paper

## NEW BOOKS AND PUBLICATIONS.

The Telephone Systems of the Con
TINENT OF EUROPE. By A. R. Ben mans, Green \& Company, 1895. Pp.
xiv, 436. 12mo, 169 illustrations
Price $\$ 4.50$.
A painstaking work which should be in the hands of of the telephone services in twenty-six countrice. It gives such information as the history and present posi ion of the telephone in the various countries, the sarvices rendered to the public, the cariffs, the exchanges,
the switching arrangements, the hours of service, subcribers' instruments, payment of workmen and opera ors. The details of the various telephone system though brief are of value, as the author was thoroughly quainted with practical telephony. having served seve companies as chief engineer. The statistics regarding ariffs are particularly ine various companies and the iscussion regarding the high telephone rates iu the nited States. The illustrations consist of views of ex anges and instruments, diagrams of switch board ross arms, insuiators, etc. Great stress is laid on telephone exchange towers and turrets; most of these supondsome dome of iron erected over the central pos handsome dome of iron erected over the central post
offce at Stuttgart. It is capable of carrying 14,000 wires the whole surface of the dome being covered with in ulators. The effect, though a littlestartlingatifrst, is

## SCIENTIFIC AMERICAN

BUILDING EDITION JULY, 1895.-(No. 117.$)$ TABLE OF CONTENTS.

1. An elegant plate in colors showing a residence at
Bridgeport, Conn., recently erected for Cbristian M. Newman, Esq. Three perspective elevations nd floor plans. Cobt $\&, 50$ complete. Architect, Mr. Samuel D. P. Williams, Williamsburg, N. Y. erected for Wm. R. Innis, Esq. Two perspective elevations and floor plans. An attractive desigu.
2. A modern cottage of attractive design recently erected at New Rochelle, N. Y. Perspective elevation and loor plans. Estimated cost $\$ 8,000$. Architect, $\mathbf{C}$. B. J. Snyder, New York City. Denign in the American order of architecture.
A summer cottage at Great Diamond Island, Me., recently erected for Edward L. Goding, Esq. Two
perspective elevations and floor plans. Cost $\$ 2,500$ complete. A picturesque design. Mr. A. Dorticos, architect.
3. An attractive dwelling at Oakwood, Staten Island, re ently erected for Mrs. Margaret Dutche. Cost $\$ 3,800$ complete. Two perspective elevations and floor plans.
4. A Colonial dwelling at Springfeld, Mass., erected or Messes. J. D. and W. H. McKnight, at a cost of $\$ 6,000$ complete. Two perspective olevations and
foor plans. A pleasing design. Architect, Mr. G. Wood Taylor, Boston, Mass.
5. Colonial house recently erected at Groton, Mass., in vation and floor plans. Architecta, Messre Child \& De Goll, New York.
6. View of the Hotel Majestic, New York. One of the fineet hotels in the world. Architect, Mr. Jacob 9. A cottage in the Colonial style, recently erected for Margaret Deland at Kennebunkport, Me. A picplans. Mr. Henry P. Clark, Boston, Mase, archi-
ngestions in corner decorations.
7. Miscellaneous contents: Hoop poles.-How to drive rate away alive.-Dambwaiters and elevators, illustrated. - Saws. - Translucent fabric.-Improved spring inges, illustrated. -Ventilated school wardrobes, illustrated.-Hanger for storm sash and screens, illustrated.-The hygienic refrigerator,
illustrated.-Improved door hangers, illustrated.Improved steam heater, illustrated. - Concrete roofs.-A trackless sliding door hanger, illustrated. - A first class hot water heater, illustrated.

The Scientific American Buildiug Edition is issued monthly. 82.50 a year. Single copies, 25 cents. Thirtymagarine of archirectrre, richly adorned with elegant plates and fine engravings, illustrating the most interesting examples of Modern Architectural Construc
tion and allied subjects.
The Fullness, Richness, Cheapness, and Convenience
of this work have won for it the Laroser CricuLstion of any Architectoral Publication in the world. Sold by all newgdealers. $\quad$ MUNN \& CO., Purilimizes,
361 Broadway, New Yor

Business and æersonal.
The charge for insertion under this head is one Dollar a line for eaci insertion : aiourt ciont wordis to a iine. Adver-
tiononts must be received at puobication office as cariv Thursiav mornino to appear in the foilowino weeik's issuc.
.s. metal polis. In inapali. sampes fres.
For pile driving engines. J. S. Mundy, Newark, N. J.
Presses \& Dios. Ferracute Mach. Co.. Bridgeton, N. mery Wheel Salesman Wanted. Morgan, care Scl. Am. Handle \& Spoke Mchy. Ober Lathe Co.,Cbagrin Falle, 0 Screw machines, milling macnines, and drill presbes,
rhe Garrin Mach. Co. Lalght and Canal Sts, New York. Emerson smith Beaver Falls, Pa send Sawyer's Hand Book on Clrculars and Band Saw ree to any addre
The best book for electricians and beginners in elec mall. 84 ; Diunn \& Co... publlishere, 361 Broadway, N. Y For the original Bogardus Universal Eccentric Mill, oot and Power Presbes, 3 Rodney St., Brooklyn, N. Y
IT Send for new and complete catalogue or Sclentif and other Books for sale by Mann \& Co., 361 Broadway

## 

hints to correspondents.
Na mes and Address must accompany, all etters,
or no attention will be paid thereto. This is for our







(6572) L. J. W. writes : 1. I would be pleased to know what is the cost of a horse power, and
what goes to consitutut the cost 9 This $I$ would require wat goes wo consitute the cost ? This I would require
na a general average. Also what price is current In sell. ing steam for horse power in engines at the usual conditions8. A. The cost of steam pawer is very variable. soe
Sciemtiric Americun supplemsr, No. 429 , on the cost of steam power. Prices vary Prom $\$ 1$ to 81.50 per annum. 2. What is the relative value of an electrical
horre power to boiler horse power 9 That lis, I buy coal horge power to boiler horse power 9 That is, I buy coal
and I sell electrcitr, and I buy coal and sell horse power and I I ell electracity, and I buy coal and sell horse power
to an engine. A. The relative value of boiler borse power o electrical horse power varies with the economy of the engime, which varies with the amount of steam required
to produce a horse power, say from 90 pounds to 12 . o proace a horse power, eay from 90 pounds to $12 \%$.
pounde, upon which about 80 per cent will be the electrical output of horse power. 3. What is the greatest ing surface in marinepractice and under what draught ? A. The evaporation is
say 246 to $33 / 8$ pounds draught may increase the evaporation from 10 to 15 per cent. 4. What is the weight of iron per horse power in
the usaal run of marine boilera in racing cratt pedo boata? A. There is a wide difference in the weight of the different types of boilers ; as low as 40 pounds sand the engines is noted. 5 . What is the thorse power re quired to generate and make 100 tons of ice per day, evaporating water and pumping it also, with a modern improved plant? A. About 4 horse power more or less
according to the nature of the process. 6 . Can steam according to the nature of the process. . C. Can steam
from large condensing engines atter poingl trough rom large condensing enfines atter goingl through a
grease extractor be used for making icee? A. No. Arease extractor be used for making bileef A. Ao. in America being built and run water tube exactly vertical and short tor large hors ful and economical A. As Not successful heretofore. 9 How many electric horse power can a 100 horse power
engine developr A. About 80 per cent of the indicated rse power of engine
(6573) P. C. C. writes: Suppose there is a double railroad track where all the trains uniformly
travel on one track going north, while the trains all uniformly travel on the other track going south. In suc cases it has been observed by experienced railroad men that on the track where the trains travel north, one of other; while on the track where the train moves south, the opposite rail (east or west) is uniformly worn more than the other. In each case which rail is it that wears more (inside or outside) and why ? A. North and south railway tracks in northern and mid latitudes are radial to the earth's axis, as shown by the meridian lines on a polar map or globe. As cars move to the south at
great speed they meet an increasing spead of the earth' surface, which forces the track against the west side of the train and wears the west rail. When running north the train is constantly meeting a decreased speed of the earth's surface, and having left and partaken of the higher speed of the earth's surface at the south, 9 re thrown against the eastern rall, causing wear. 2 . Is it sate for a lightuing rod to come in contact with any part (eape
cially these parts expoed to the weather) of a wooden building? A. It is eafer to attach a lightving rod to the building than to use insulators, provided the ground connection is perfect or in thorough connection with moist earth. 8. Can a cheap battery be made without
using either of the following: Zinc, copper, bluestone (cupri sulphate), carbon, and bichromate of potish 9 I
so, how can I make it \& A. There is no rellable battery (6574) A. S. De V. writes: Would yo indly inform a number of readers the theory of a canno exploding while ramming home the load arter it cas on vents an explosion, and also why the some is not neces ary when loading a large pistol or muzzle-loading sho gun $?$ A. Muzzle-loading cannon are loaded by pushin a powder cartridge or bag of powdor to the breech, fois fired by the intense heat of the discharge and its rea end left in the gun. If airis allowed to reach any frag ments of the bag that may not have been removed ba ridge. By closing the vent instantly after a discharge air is prevented from entering the gun and the act o swabbing does not displace the product of combustion mostly carbonic acid gas, which is a destroyer of combustion. The swab acting ae a churn in the gas does no draw air in to set fire to any heated particles of combus.
tible that might remain in the gun. In muzzlo-loading shot guns and pistols the powder is poured in loose and is onsumed and blown out at each discharge, so that the the possibility of anything in the gun or pistol that would gnite a fresh charge is very small, yet premature explosions occasionally occur in quick fring of muzzle-loading arms.
(6575) W. T. B. writes: I am running so-called 25 horse power engine, cylinder 10 inches horse power, 60 to 80 pounds pressure, nominal speed 150 revolutions per minute. I do not think that it usee steam economically. Would I get better results or more
power by putting on a larger drum (present one is 96 nches ions per minute \& A. The the engine. The boiler appears to be too small for the conomical generation of steam for the apparent power rom the engine, and you may be wasting heat by the chimney froman overstrong ire and smallbolercapacity. The throttle valve and cut-off plays an important part in requires as oull pressure at the steamchest tas possible and he valve set to cut off at a point to give the power re ver-pressure or extreme release of load. Without rurther facts as to the cat-off, kind and amount of work and the kind of boiler, we can only suggest that a larger
and horizontal boiler be used, and an automatic govand horizontal boiler be used, and an au
ernor operating the slide valve be adopted.
(6576) W. S. asks: 1. What size plate nd how many of them would I have to use in a 60 cell lorage battery to light three 110 volt 16 candle power amps? The celis built like the Faure battery described in your June 21,1881 , issue. A. For the best results the
plates should not be less than $7 \times 10$ inches, 13 or 15 plates per cell. To secure the 110 volts the battery having two volts per cell, you will need ${ }^{1} 1^{\circ}=55$ celle for 1 lamp or any number up to the capacity of the battery. 2. In he induced current in a transformer, using an alternat ing current in the primary, an alternating or direct cur rent \& A. Alternating current. 3. I cannot understand becond by the multiplar and Works of Tesla." Please explain. A. We cannot give a detailed description of Tesla's experiments. It is conceivable that 100,000 alternations per second could be secured by properly proportioning the number of ele-
ments in the machine and the number of revolutions.
(6577) M. McG. says : I see in your SUPPLEment, No. 397, August 11, 1883, on the subject of produced by paseing steam over red hot iron, but it does not explain just how they did it. Can you give me the information? A. See the Scientifio Amrrican SupLEMENT, Nos. 828, 849.
(6578) C. R. W. asks how the bottoms of rousers are cemented. A. Use thin sheetgutta percha, for tailors' use. Place a piece of the tissue between the layers of cloth to be cemented and prese with a hot iron. This causes the cloth to firmly adhere on account of the melting of the gutta
(6579) H. A. McE. says: Can you give me some information regarding the beverage "perry"? A. A fermented liquid, prepared from pears in the same way as cider is from apples. The reduced pulp must not
be allowed to remain long withoutbeing pressed. In the be allowed to remain long withoutbeing pressed. In the
cask, perry does not bear changes of temperature so well cask, perry does not bear changes of temperature so wel
as cider. It is therefore advisable, if at the end of the succeeding summer it be in sound condition, to bottle it, sorts of pears are principally used for making perry. They should be quite ripe, wilhout, however, approach ing to mellowness or decay. The best perry contains about 9 percent of absolute alcohol; ordinary perry from 5 per cent to 7 per cent. Perry is a very pleasant tasted
and wholesome liquid. When bottled champagne fashion, it is said to frequently pass forchampague with the fraud being suspected.
(6580) A. D. asks how to make buff wheels. A. Turn up the wooden disk to form the wheel
on the mandrel on which it is to run. Cover the periphery of the wheel with good glue, preparei. as for gluing wood, stretch the leather around and confine it with shoe
pegs driven in about 2 inches apart. When dry turn off true with a sharp chisel. Give the leather a coat of glue and roll it in the emery, eo as to make it retain it by being embedded in the glue. Let the wheeldry, until the glue is hard and it is ready for use.
(6581) W. P. P. asks for a formula fo carton pierre ornaments. A. The following is a for mula or such a composition : Glue, previonsly dissolve lead, 8 parta; plaster of Paris, 1 part; cory ine eawdust,
10 parte. Oll the moulds in which it lo cast to prevent 10 parts.
adhesion.

TO INVENTORS.



## INDEX OF INVENTIONS

Tor which Leteors Patent of tho
United States were Granted
July 9, 1895,
and bach bearing that date.



 AMERICAN PATENTS.- AN INTER-



## CATALOGUES FREE TO ANY ADDRESS

## BUY

TELEPHONES

 WESTERN TELEPHONE CONSTRUCTION CO.,
Largose Monadnock Block, CHICABO.
Lamufacturers of Telophones in the United Statas

 ELECTRICAL PHENOMENA ILLUS




## CATESE BREAKER ${ }^{5}$ <br> MiNfing Machisery GATES IRON WORKS $\$ 50$ ELSTONAVE CHICAGO

THE HYPNOSCOPE For physiclang, dentisese in

 AR'TESIAN WELLS -BY PROE


 BALL BEARING AXLES AND RUB-


THE M. \& B. TELEPHONE. Absolutely Non-inf ringing.
Absolutely Guarnute ell. Absolutely the Best Exchnnge Catalogue on appDS


BI-SULPHIDE $\begin{gathered}\text { for use in the arts, Killing Insects } \\ \text { in Grain, Kiline } \\ \text { Rurrowing } \\ \mathrm{AD}\end{gathered}$


d machinery Send foneer Cutting.
Handle Machinery
 cunod. Pup May Trevor Mrg.
Lockport, $\mathrm{N} . \mathrm{y}$.
NOW READY !
Seventeenth Edition of
Experimental Science

reviged and enlarged.
10 Pages and 110 Superb Cuto added.
Just toe thing for a boriday present for any man.
woman.







MUNN \& CO., Publishers. Office of the SCIENTIFIC AMERICA

| Foundod by Mathew Oarev, 173s. |  |
| :---: | :---: |
| HENRY CAREY BAIRD \& CO. <br> INIOSTRIALPUBLISHERS, BOOKSELLERS\&IMPORTER <br> S10 Walnut St.. Philadelphia, Pa.. U. S. A. 8clentific Books 90 peges, 8vo, and our other Catalogn and Circulars, the woole covering every branch of Sc ance appliad to the Arts, sent free and free of postag to ans one in any part of the world wbo will furnish bi |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| The Scientific American |  |
| Deference Book. |  |

A most useful little bound book of 150 pages, com-
prising, probabis, the most extensive varlety of standard, practical, condensed information ever furnished Among its contents are: The LLast Census of the
Anted States (1890), by States, Territories, and CounHies; Table of Cities having over 8,000 inhabitants Map of the United States -minlature outline; The
 reams-of value to to inventors and designers of mechan-
sm; Medallon 1 Portraits of Distinuished Amer nventors; Valuable Tables relating to Steam, Elec tricity, Heat, Metals, Weights, and Measures.
25 cents.
MUNN \& CO., Publishers,
 mia Ppumitiar EXCHANGE, $1 \frac{1}{2}$ Barclay St., New York
 or per cent. on
oll make.
Esend for
EXPERT MODEL MAKINB. Estaplusbe
 "WOLVERINE" GAS and $^{\text {D }}$ GASOLINE


 A.W. FABER LEAD PENCILS, COLORED PENCLLS, SLATE
PENCILS, WRITING SLATES SEEEL PENS, GOLD GOLD STATHONRRS RUBBTR GOODS, RULEERS, 78 Reade Street, Naw York,

THE BI BACHELDER ADJUSTABLE SPRING INDICATOR. Always rendy for use at any
speed in pressure
This instrument recelved a special
 Cousiruction, nnd Accuracy under all A Valuable Book


12,500 Receipts. O US Pages. Price This spendid wort contans a caraful complation the most useful Receipts and Repries fivenil the Notes
 Orer Ivelve Th ournud selected Recelpts are here conecteant ned. It is bryar the most comprebe
belma repres.
volume of the kind ever placed before the public. lithe mork may be regarded as the product of the stud-
 Aimost everg inquiry that cen be thonght of, relating
to formuiz use in the various manuactur ing finus-
tries, will here be found answered. Instructions fo
the arts are given
Thoso who are engaged in any branch of industry


MUNN \& CO., Publishers,
BCIENTIFIC AMERICAN OFFICE,
 $101 /$ Made of Large Blocks of Emery Set In Metal Fastest Grinders known. Can grind anything NO PICKING.
Mrde Sharp. Stay Will Fit any mill Frame.
Cheap as Best Erench MILLSTONES.


 8mall Foot Power Drill Press


 WANED ${ }^{-1}$ Aompetent Atanger for Bolier Worka If you want the best CHUCKS, buy Westcott's



## TENTS.

We manufacture Tents of every varlety and stze,
for all conceety ble ple purposeb. Wer have bedetin the business for fity-four yeari
Win and know bow to make them propdriy.
We have male Xeats for the Wal Depdrtment of We have mape Peats for tho Wal Department of Weg\%e now puoting the lowees pricese ever heare
of, sying to tye low price of cotton can was



GEO. B. CARPENTER \& CO. 202-208 So. Water St. CHICACO


MEASUREMENT OF POTER-BYG



T
The Berkefeld House Filter


Co


## A~

Experimental \& Model Work EXPERIMENTS IN AERONAUTICS.





ELECTRICITY AND PLANT GROW

 Conis ers

THE STURTEVANT

##  <br>  <br> Parson's Horological Institute.

School for 7Watchmakers engravers and jewelers.
IT Send for cataloonce and Referronee.
Parson's Horological Institute, 302 brailley A venue, PEORIA, ILL. Valuable Typewriter Patent for nale to
"Pacific" \& "Union Gas \& Gasoline ENGINES. Marine and station
Mrat 1to hit
Safe, Slmple, Eco-


ELEG'TRO MO'TOR. SIDPLE. HOW TO make. ByG.M. Hoptnan.. Deseription or a amall electro
motor devieei and constructen with a view to assisting

 REPAIR BICYCLES FOR A LIVINC.


 |CE MACHINES, Corligs Engines, Brewers

|  |
| :---: |
|  |  |
|  |  |
|  |  |
|  |  |

Piano Organs.
REPAIRING
TUNING
19 SULLIVAN STREET
NEW YORK.

ENGINEERING FALLACIES.-AN ADdress to the praduating classof the stevens Institute of
Technolog, by President Heary Morton, on certain


AMERICAN GAS FURNAGE CO. of ELAZABETH, N. J., PATENTEES of
Complete System for the generation of a GHEAP AND PERFECT FUEL GAS. GAS BLAST FURNACES,
HICiH PRESSURE BLOWERS, ETC.




DO YOU WANT A LAUNCH?


Are perfect in construction, workmanship and finish, and contain more modern immake several styles and guarantee them all ROCHESTER OPTICAL CO.
A WENTSWANTED MDAFINETOOLSIN EVERYSHOP.


|  |
| :---: |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

Messning Lufkin's, Eddy's, Roe's, kinds for Architects', En-
gineers' and Draughts
Tapes (Ex: $\int 39 \begin{gathered}\text { Established in } 1848 . \\ \text { Cornhill, } \\ \text { BOSTO }\end{gathered}$

## HEsspersisivelis

## The

## American

Bell Telephone Company,

125 Milk Street,
Boston, Mass.

This Company owns LettersPatent No. $463,5{ }^{6} 9$, granted te Emile Berliner November 17, 1891, for a combined Telegraph and Teleph(ne covering all forms of Microphone Transmitters or contact Telephones.
s

That you can run yourself. That is Clean and Safe.
-


That requires
neither Licensed
Engineer nor Pilot.

THE ONLY NAPHTHA LAUNCH. gas engine and power company, 185th St., Morris Heights, New York City.

## 

CONnTumptER
 FELT \& TARRANT MMGG Co.
S2-S6 ILLINOIS ST.. CHICAOO.

## 

?




KODAKS ${ }^{500}$ The lightest and most practical camerasfor hand
or tripod use. An illustrated manual, free wwith
ond every
pictures.
Eastman Kodak Company,
 A NEW PIP WRENCH Au
Dealere
,end for Little Book, Free.
sAmUEL HALL'S SoN, 229 West 10th St., New York.
The "ClimaX" Stereotyper The "Climax" Stereotyper



[^0]ENGINES, Boilerand Machine Toolifo New
EMERY, Emery wheels, firinding Mat
Patented Novelties Manufactured. CIDER \& WINE PRESS MACHINERY. (Capacity, 10 to 1200 Bbls. in ten hours.) Send for 50 -page Catalogue.
Empive State Pulley and Press Co. CALENDOLI'S TYPESETTING MA-chine.-Description of a machine recently invented by
Father Catiendoli, a sicilian Dominican. Which permits
an experienced operator to
Dornpose filt


## GCMENEC MERICN

ERESABLISHED 1845
The Most Popular Scientific Paper in the World
Only \$3.00 a Year, Including Postage.
This widely circulatell and splendidly illustrated
paper is publis'?ed weekly. Every number contains sixteen pages of useful information and a large number of
original engravings of new inventions and discoveries representing Engineering Works, Steam Machinery, New Inventions, Novelties in Mechanics, Manufactures, Chemistry, 出ectricity.Telegraphy, rhotography, Archi-
tecture, Agriculture, Horticulture, Natural History, tecture, Agriculture, Horticulture, Natural History
etc. Complete list of Patents each week. TIFIC AMERICAN will be sentfor one vear - 52 numberspostage prepaid, to any subscriber in the United States,
Canada, or Mexico, on receipt of Three Dollars by Canada, or Mexico, on receipt of Three Dolla rs by
the publishers; six months, 81.50 ; three months, 81.00 . Clubs.- Spocial rates for several names, and to Postmasters. Write for particulars.
T'he safest way to remit is by The safest way to remit is by Postal Order, Draft, or
Express Money Order. Money Express Money Crder. Money carefully placed inside
of envelopes, securely sealed, and correctly addressed, seldom goes astray, but is at the sender's risk. Address all letters and make all orders, drafts, etc., payable to
MUN $\mathbb{E}$ CO., $\mathbf{3 6 1}$ Broadwas, New York.
§ciemitic Aurcrican §upprement This is a separate and distinct publication from THE SCIENTIFIC AMERICAN, but is uniform therewith in
size, every number containing sixteen large pages full of engravings, many of which are taken from foreign
papers anc accompanied with translated descriptions. papers and accompanied with translated descriptions.
The Scientific American Supfuement is pubmed Tratis end includes a vesy wide ronge of contents. It preesects the most recent papers by eminent writers in all the principal departments of Science and the Useful
Arts, embracing Biology, Geology, Mineralogy, Naturat History, Geography, Archæology, Astronogy, Chemistry, Electricity, Light, Heat, Mechanical Engineering, Steam and Railway Eneineering, Mining, Ship Building, Marine Engineering, Photograyhy, Technology. Manu
facturing Industries, Sanitary Engineering, Agriculture Horticulture, Domestic Economy, Biography. Medicine, etc. A vast amount of fresh and valuable information obtainable in no other publication.
The most important Engineering Works, Mechanisms,
and Manufactures at home and abroad are illustrated and described in the SUPPLEMENT.
Price for the SUPPIEMENT. for the United States, Canada, and Mexico. 85.00 a year; or one copy of the SCIENTIPIC AMERICAN and one copy of the SOPPLE
MENT, both mailed for one year to one address for $\$ 7.00$ Single copies, 10 cents. Address and remit by postal order, express money order, or check,
MUNN \&CO., $\mathbf{3 6 1}$ Broadway, New York.

出uixdixy gixitionx.
The Scientific american biliding Edition is lssued monthly. $\$ 2.50$ a year. single copies, 25 cents.
Thirty-two large quarto pages, forming a large and Thiry-two large quarto pages, forming a large and
splendid Magazine of Architecture, richly adorned with elegant platesand atherfine engravings; illustrating the most interesting examples of wodern Architectural Construction and allied subjects. A special feature is the presentation in each number
of a variety of the latest and best plans for private residences. city and country, including those of very mod-
eratecost as well as the more expensive. Drawings in eratecost as well as the more expensive. Drawings in
perspective and in color are given, together with Floor Plans, Descriptions, Locations, Estimated Cost, etc. The elegance and cheapness of this magnificent work have won for it the Largest Circulation of any
Architectural publication in the world. Sold by all Architectural publication in the world. Sold by al
newsdealers. $\$ 2.50$ a year. Remit to
MUNN $\$$ CO., 361 Broadway, New York.

Expoxt
of the Scientific American, with which is incor-
porated "La America Cientipica e ind porated LA AMERACA CIENTIFICA E INDUSTRIAL,
or Spanishedition of the SCIENTIFIC AMERICAN is pub-
lished lished monthly, and is uniform in size and typography with the Scientipic Amerion. Every number con-
tains about 50 pages, profusely illustrated. It is the finest scientific, industrial export paper published. It circulates throughout Cuba, the West Indies, Mexico, Cen-
tral and South America, Spain and Spanish possessions tral and south America, spain and spanish possessions entific american Export Edition has a large guaranteed circulation in all commercial places through-
out the world. $\$ 3.00$ a year, postpaid, to any part of the world. Single copies, 25 cents.
Manufacturers and others who desire to secure
foreign trade may have large and handsomely displayed announcements published in this edition at a very
moderate cost. Rates upon application. cost. Rates upon application.
MUNN $\&$ CO., Publishers,

PRINTING INKS,



[^0]:    4
    Address THE SMITH PREMIER
    Imponvement the $\mathbf{O}$
    Smith Premier Yypewriters
    Nos. 2, 3 and 4
    THE SIITH PREMIER Many Improvements kzertofore Overiooked by other Manuracture Branch Offices in Twenty-Nine Princifal compais in the United States.

