

THE WORLD'S COLUMBIAN EXPOSITION-THE GREAT FERRIS WHEEL, 250 FEET IN DIAMETER, 36 GGRS, 40 SEATS PER CAR -[SEe $r$

## Sosimentifir Smmican.

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ginking of the british war ghip victoria.
On June 23, the British first-class battle ship Vic oria, flagship of the Mediterranean Squadron, and car rying Vice-Admiral Sir George Tryon, K.C.B., was maneuvering off Tripoli. In the course of the man euvers she came into collision with the British war ship Camperdown. The ram of the Camperdown struck the Victoria forward of the turret on the star board side. In fifteen minutes the Victoria sank in eighteen fathoms of water. In sinking she turned bottom upward, and now lies in that position on the bottom. Announcing the disaster in the House of Commons, Mr. Gladstone said that there were 61 officers, seamen and boys, and 107 marines on board the ship. It was feared of this total of 718 souls, 430 had been lost. The Camperdown was injured in the collision and will require extensive repairs. The vice admiral with a number of the officers were among the lost.
The Victoria had been several times illustrated and escribed by us, and on page 11 is a picture of the great ship, at one time the pride of the British navy She was one of the most powerful battle ships in the world. Her length was 340 feet, beam 70, mean draught 26 feet 9 inches. The tonnage displacemen was 10,470 , the indicated horse power 14,244 , speed developed in trial 17 3-10 knots. She was protected by a belt of compound armor, 18 inches thick, for about half the length of her hull, rising 2 feet 6 inches above the water. On the forward deck is the grea turret, 17 inches thick, and inclosing the breeches o two 110 ton guns, mounted in parallel. These im mense pieces of artillery carried 1,800 pound projec tiles, the full charge of gunpowder being 960 pounds for each discharge. Aft of the turret came a strongly protected battery of 5 ton guns of 6 inch caliber six projecting on each side through protected ports Back of this structure came the stern gun-a 29 to breech loader of 10 inch caliber. Triple expansion engines drove twin screws. She could carry a coa supply for 1,600 nautical miles, full speed, and at cruising speed for 7,000 miles. She was launched on April 9, 1887, from the Elswick yards of Armstrong, on the River Tyne; 150,000 persons witnessed the launch. The above account is far from complete. Torpedo tubes, rapid-firing machine guns, a fighting mast, a most extensive system of hydraulic machinery, heavily armored conning tower, and many other features in the ship cannot be more than mentioned within our limits. She was built to be the most pow crfully equipped British war ship atioat. The Victori was an example of the highest development of de structive capacity in a ship, and at the same time she illustrated the great weakness of these monuments of modern naval science. By accidental collision with a sister ship, in a quarter of an hour this vessel, repre senting $£ 800,000$ sterling of value, ignominiously turned turtle and sank, bottom upward, carrying over 400 men with her. Not only was the weakness of an at tacked ship shown, but the Victoria in being sunk with this dreadful loss of life was an instrument in showing the weakness of the involuntarily attacking vessel. It was only at the expense of damage to her own structure that the Camperdown, striking her sister ship below the armor, penetrated the iron hul with her ram. It is not long since the British ship Howe, with her bottom pierced by a rock, sank in the harbor of Ferrol, Spain
The British turret ship Captain went down at sea To descend from greater to less calamities, numerou instances can be cited of collisions between war ships and the minor vessels of commerce, the war ships suf fering in the encounters. Even during the recen naval review on the Hudson, some damage was don to the ships of war by these collisions. It is eviden that one point of construction is insufficiently provided for by modern naval engineers in war vessels. This is the rendering them unsinkable. They are necessarily topheavy, and their enornous weight and relatively small freeboard in many cases makes them peculiarly liable to destruction by sinking and capsizing. The efficacy of the ram as a weapon is also exemplified in this deplorable affair, the Camperdown giving a practical example of the use, or ra her misuse, of the
ship as a quasi-projectile. A very thorough system of ship as a quasi-projectile. A very thorough system of
bulkheading, both longitudinal and transverse, seems to be the only suggestable way of disposing of the points of weakness.

## the great fair

One of our weekly New York papers, justly noted for the excellence of its illustrations, prints the follow ing as a caption to an editorial, "A Fair or a Fiasco ?" Such articles have a tendency to do harm. If the Fair is a failure, the press of America will have its full share of blame to answer for. From the very first the papers all over the country, not even excepting those of Cook the devoted head, not of a "Chicago Fair," but"on the World's Columbian Exposition.
During the first days of the Fair there were n During the first days of the Fair there were no
doubt many just causes for complaint, nearly all of
which are now settled in a satisfactory manner, and even the photographic nuisance has been abated After the Fair has been in operation over six weeks, or one quarter of the allotted period of exhibition, it really seems time to call a halt. It is now time to sit down and enjoy the rare treat which has been pre pared at such cost of labor and monev. Good natured banter or just criticism will not injure the Fair, but when every altercation at the gates is magnified into the proportions of an international episode it cease to be a joke and tends materially to injure the Fair. The stories of extortion, quarrels among officers and the incomplete state of the Exposition have kept many thousands away during one of the most charming months in which the gates will stand open. Take the advice of the circus manager, who at the close of the afternoon performance said (in reference to the evening), "Come yourself and bring your children." Let it be said to the credit of the American people that the great Exposition, which has cost in round numbers $\$ 34,000,000$, is the grandest affair and the grandest success of our day and generation.

## PROPOSED SUBMARINE WAR BOATS.

The Fifty-second Congress appropriated the sum of $\$ 200,000$ to build and experiment with a submarine torpedo boat. Nine bids for a submarine boat have been opened and referred to the Naval Ordnance Bureau for examination. Secretary Whitney asked twice for similar bids, so that this is really the third call which has been made for such a boat, and it is noteworthy that this call has brought out a larger number of bids than before. Only three out of the bids submitted contemplate the actual construction of the boat, for the advertisements for proposals were so worded that a poor inventor might submit his design, which, if accepted, the government would buy and contract for the construction of the vessel where they chose. There is no doubt a good submarine torpedo boat would do much to revolutionize modern naval warfare.
A surface torpedo boat, owing to the high speed re. quired, must of necessity be built very light, which of course exposes it to the destructive fire of the ma chine guns, for the torpedo range is very short as com pared with that of a naval gun. A submarine torpedo boat should have the advantage of being able to sink when approachinga vessel, so that the fire of the rapidfire guns can do no harm. A semi-submerged torpedo boat can be easily constructed with an armored turret, but the aim of inventors should be to produce a boal which can be instantly submerged, capable of main taining a good speed under water, the course to be directed accurately, and to be able to fire the torpedo in an effective manner without danger to the boat itself.

## Early Steam Navigation.

The Liverpool Journal of Commerce has the fol wing article on early steam navigation

With the increase of trade and population there is progressive demand for steam navigation facilities. Without sufficiency of cargo and passengers to make venture pay, or no help of a bounty or subsidy when traffic is sparse, financial success is out of the question. Prejudice or ignorance may, however, serve to stop progress.

The Grand Treasurer of Spain did not believe n the safety of vessels propelled .by steam, and he retarded the introduction of ships propelled by that agency. On the $1^{17}$ th of June, 1543, the La Santissima Trinadada, of 200 tons, was driven at the rate of one league per hour in the roanstead of Barcelona, in the presence of the Emperor Charles V., his son, Philip II., and several high dignitaries. The Treasurer, Ravage, believing that a boiler used for uch a purpose would burst, denounced the enterprise but paid the inventor, Don Blasco de Garragher, hi expenses. ('The Ship,' by Francis Steinitz. W. H allen \& Co., Leadenhall Street, London, 1843.)

From several official sources it is made evident that the practical application of the steam engine to marine propulsion was an accomplished fact three cenuries and a half ago. Seagoing steamers date from the building of the James Watt by John Wood \& Co. in 1818, for the Leith and London trade. The Soho and Monarch were subsequently constructed for the same company. All three ships were built at Green ock, the birthplace of James Watt, and of William Laird, who settled in Liverpool and established a line of steamers from the Mersey to Dublin in 1822. The James Watt, Monarch, and Soho were purchased by the General Steam Navigation Company, and employed in their service for many years. Hull and machinery did their work admirably. They were built of wood, and had paddle wheels. All three were in existence a few years back as coal hulks. The James Watt was the first deep-water steamship built in Europe. The Savannah, American-built boat, which eame to Eurppe, can scarcely becalled a machine-pro pelled vessel, but may be classed as an auxiliary-driven pelled
ship."


Every day brings more people to the World's Co umbian Exposition, but, even with the greatest at tendance, the grounds do not seem to be overcrowded. Even on such a day as June 15, which was German day, and brought an attendance of 200,000 within the grounds, there was no uncomfortable crowding, except in the vicinity of the German building, where the formal exercises of the day were held. The most discomfort from crowding is experienced by visitors who wait until the last minute before leaving the grounds. This is always a time when the majority of people are seeking transportation home, and no facilities could be so ample as to handle in a few minutes crowds vary ing from 50,000 to 150,000 or more.
In the Manufactures and Liberal Arts building there are always people watching the interesting exhibits in the department of horology, which faces Columbia Avenue just north of the clock tower. One of the most drawing exhibits in this department is that of the American Waltham Watch Company. The attractive feature of this exhibit is the automatic machinery in operation for making different parts of the works of a watch. There are ten of these automatic machines, each of which is of most remarkable mechanism, and which seems to have as delicate a touch and to possess the intelligence of a skilled workman. These machines are in operation adjoining the aisle, so that many people can be accommodated to observe themi. Inside the pavilion is a large collection of historic and antique watches. Among the more famous of these watehes are those that belonged to King James I., Oliver Cromwell, John Milton, Sir Isaac Newton, Queen Elizabeth, John Calvin, John Bunyan, Lady Jane Grey, and Robert Burns. This collection contains over six hundred watches. They represent all sizes and shapes, and are of great interest because of the variety of their mechanism.

Another exhibit in this department, which attracts a great deal of attention, is that of the Waterbury Watch Company. In this pavilion several bundred Waterbury watches are shown, both in cases and the movements. But what draws the crowd to this exhibit is the Century Clock, which has required years of work in construction and which has cost the company $\$ 80$,000 to complete. This clock records the hour, minute, and second, gives the day of the week, the day of the month, the month of the year; records the movements of the tides in New York harbor, gives the changesof the moon, etc. Immediately under the dial is a large picture of the factory of this company, and under this picture is a reproduction of the train room in the factory. Here are represented twenty-six girls at work at lathes, pinion cutters, and other machines, reproducing in close detail every movement that would be seen in actual life. The figures are ten inches tall, finely carved from wood. On the right are four more rooms with figures in miniature, which are reproductions of historical or other scenes. These represent miners at work in a mine, digging rock; the development of the hand in the back of the room, while a mechanic--supposed to be Elias Howe-stands at a bench making a model of a sewing machine, and two women are operating modern sewing machines in the foreground. Underneath this is a telegraph and telephone room, with a man in the foreground in the act of telephoning; several operators at work at telegraph instruments, people coming and going with dispatches, messenger boys running in and out, etc. The other scene is an electrical one, with a Corliss engine operating a dynamo, and an electrician-representing Leo Daftexperimenting and watching the results of his experiments. On the left side of the clock is a saw mill scene; a scene representing a cotton plantation, with Eli Whitney testing his first model of the cotton gin, and bales of cotton lying about and colored men at work. Another scene represents the flax industry, with men and women whipping the flax and otherwise preparing it. The fourth scene represents an old style German watch factory in a peasant house, with two
men at work at a bench, $a$ maid serving beer and lnnch at a table, etc. The figures in these scenes were all carved in this country, and reproduce movements
of the human arm and hands with much accuracy. In of the human arm and hands with much accuracy. In
addition to these scenes there are many carvings on the clock which represent important events in the history of the country during the past century, beginning with the signing of the Declaration of Independence. The machinery in this clock is operated by an electric mo tor onehalr horse power, and the nine scenes, repre
senting the several industries, are illuminated with miniature incandescent lamps. Another interesting exhibit in this department is that of the Ansonia Clock Company, which exhibits an infinite variety of clocks of all sizes, from the cheap nickel clocks to most expensive clocks, reaching hundreds of dollars in value. Near this exhibit is the pavilion occupied by the Wm. Rogers Manufacturing Company. Here are shown knives, forks, and spoons in great variety, but the feature of most particular interest is that of the several operations required in making these. For in-
stance, there is shown the steel bar from which the stance, there is shown the steel bar from which the
knife is made, and the results of the several operatinn through which this bar passes to become the knife ready to be plated. The making of spoons and forks is illustrated in the same way.
The Norway exhibit, in the Manufactures and Liberal Arts building, is remarkably instructive, and a study of it is like traveling in the. country itself. The main structure is constructed of Norway pine, the design being representative of Norwegian architectural
effects. An interesting feature of this exhibit is the arge display of spoons, ornaments, and cold and silve trinkets manufactured of these metals and enamel. In much of this ware the enamel is transparent, and the filigree work is so fine and so beautifully done and the coloring in the enamel so rich in variety and effect that the exhibit is well worth closeinspection. Many typical Norwegian things are, of course, shown. These in clude furs, mounted birds, traveling vehicles, native costumes, etc. On a raised platform in the pavilion is a stuffed reindeer harnessed to a sledge which is covered with skin from the hair seal, giving a truly Arctic effect. The ski, or snowshoe, so much used in winter in Norway, is shown in all stages of elaborateness. Not the least attractive part of this exhibit is a collection of photographs of mountains, fjords, villages, etc., which are beautiful specimens of photography, as well as of landscape scenery. Many richly colored photograph portraits are also exhibited.
In the gallery of the Electricity building are three exhibits which always have an interested audience about them. One of these is the exhibit of the Ameri can Electric Heating Company. Here are shown elec tric heaters in great variety for all purposes. Cooking is carried on the greater part of the time, showing the
convenience and utility of this method of cooking convenience and utility of this method of cooking The exhibit of the Commercial Cable Company reproduces the writing and the method of cabling on ocean cables. The delicate devices used for this purpose and the difference in this method of transcribing messages from ordinary telegraphy cause much comment by people who had never suspected but what the two methods were the same. The exhibit of the Gray Telautograph Company adjoins that of the Commer cial Cable Company. This remarkable invention was fully described and illustrated in the Scientific american of April 1. It can be seen in full operation, reproducing the writing sent by the transmitter.
In studying the exhibits made by Mongolian countries in the Manufactures and Liberal Arts building it is well to begin with Siam, and after studying this exhibit, take the Chinese next, and then the Japanese. The exhibit made by Siam is small and in its way is interesting. The pagoda it occupies is decidedly Oriental and is more fantastic and gaudy than other pavilions in the building. The exterior finish is composed of small diamond-shaped pieces of glass studded in gilt woodwork. The most attractive features of this exhibit are carved ivory and ornamental brasswork. In front of the pagoda are four huge tusks of ivory. So far as the art work of this exhibit is concerned, it is quite crude as compared with that shown in the Chinese exhibit. China, however, makes a comparatively small display, as the space it occupies is only about four times that occupied by Siam. This exhibit is rich in carved ebony furniture, much of it inlaid with pearl. There are several rich tapestries in silk, and beautiful specimens of carved ebony screens, carved ivory, etc. This exhibit is not made by the Chinese government itself, but by private individuals, which may perhaps in a measure count for its not being more complete. In itself it would be regarded as an instructive and choice exhibit, but when compared to the displays made by Japan, it appears almost rudimentary.
Too much praise cannot be given Japan for its exhibit in this building, and adjectives would be quite useless in attempting to describe it, because of the exquisite workmanship and touches of art that are seen in such abundance throughout the whole exhibit. The pace occupied is very large, containing more area than tbe exhibits of other countries, with the exception of three or four of the larger nations of Europe. The collection and variety of bronzes of all kinds is superb and should not be neglected by visitors at the Expo sition whose time is very limited for looking about. The display of silk goods, carved wood and ivory, porcelain, lacquered work, in shortall Japanese wares, is very complete. The pavilion was constructed by
Japanese artisans who were brought over for the purJapanese artisans who were brought over for the pur-
pose. It is a fine specimen of Japanese anchitecture
and is one of the mostattractive and ornamental structures in the building. It is of true Oriental type and is not built of staff. This exhibit faces Columbia Avenue and is in the north end of the building.
Last week reference was made in these columns to the exhibits made by the Canadian Pacific and the London and Northwestern Railway in the Transportation building. In some respects the exhibit made by Germany in the railroad department is more complete, because of its variety, than that made by Great Britain, although historically it is not of so much value. Two locomotives are shown; one is a ompound freight locomotive, the other is an engine for local service. Both engines are excellent specimens of workmanship, and attract much attention from their difference in design from the large display of American locomotives adjoining. \& very elaborate passenger day coach is shown on the same track as the engines. This coach is constructed on the Amer ican plan, but is not over three-fifths the length of our usual type of coach. This coach is painted a ich blue on the exterior. It is constructed mostly of oressed steel and iron. Much of the interior finish is wood and bronze, while the draperies are silk. Two open cars are shown, such as are used for freight service. Very little wood is used in the construction of these cars, the truck and framework being almost wholly of pressed steel. These cars have a single pair of wheels to a truck. The regular type of German compartment coach is also shown on this track.
The statue of Columbus, designed by Bartholdi and made of silver, requiring thirty thousand ounces for the purpose, has been placed in position in the ex hibit of the Gorham Manufacturing Company in the Manufactures and Liberal Arts bulding. The figure is fully life size, and stands immediately in front of the exhibit in this pavilion in the entrance way. In many espects this is the strongest statue of Columbus that has been shown in Chicago. It represents the disoverer first seeing land.
The inauguration of the great Ferris Wheel took place on the 21st June, and was a very happy affair. A large number of guests were invited, speeches were made by several distinguished persons, and many compliments were showered upon the engineer and projector of the wonderful machine, Mr. G. W. G. Ferris, of Pittsburg, Pa. Several illustrations of this remarkable piece of mechanism will be found elsewhere. The charge for a ride in the novel machine is 50 cents, for which the passengers enjoy two revolutions, occupying half an hour. If all the seats are full, the company take in $\$ 1,440$ an hour. It is truly a wheel of fortune for its owners.
The loss of the British battle ship Victoria made a great sensation among the exhibitors and visitors at a'sad interest the news came, on the 23d instant splendid model of the vessel, which occupies a conspicu ous position in the Transportation palace. Thousands of people flocked to see the model, which model is a large one and very perfect. There is a double stair way with brass railings around the model and plat forms.
A new feature was introduced at the Exposition on Massachusetts day, June 17, which was a decided novelty. This consisted of a parade, in which all the oncessions on the Midway Plaisance were represented The Laplanders led the procession, followed by the Amazons, whose color was superb. The Libby glass works sent a couple of hundred of their employes, each with his glass cane and badge of spun glass The swarthy glass blowers from Murano followed. The Mongolian orchestra gave their usual rendering of discords, while stately mandarins rode on horses. A huge dragon nearly one hundred feet long was supported by twenty-five Chinamen, who caused tbe dragon to undulate in a becoming manner. Breton peasants in blouses and wooden shoes came from the French wine press. The Swiss guards attracted much attention. Amid a wailing of pan pipes and tomtoms came the Algerians, including the dancers. Then came the inhabitants of the most interesting part of the whole "conglomera," the Cairo street. Priests, with all the pride of their heritage of thirty centuries, carried aloft the sacred vessels and utensils of their heathen rites; the donkeys and camels followed with the veiled women, the wrestlers and the dancers. The Persians followed with their wrestlers, whose bodies were rubbed with oil, which brought the great knotted muscles into relief. A clatter of hoofs announced the approach of the Bedouins of the desert, who were mounted on little horses of the purest Arabian stock. They brandished long spears, and the noble carriage of these wild people and their mag. nificent horsemanship charmed all beholders. The procession became wilder as the South Sea Islanders approached, dancing their weird, awful war dance. seen by thousands who occupied the line of march. The frequent repetition of this parade will givelife and color to the Exposition and will doubtless induce many to visit the Plaisance who for lack of time might (Continued on page 7.)

The simple form of wheel shown in the illustration is arranged to be operated so that the water passing though the flume twice exerts its force on the wheel, each paddle being twice acted upon by the water at every revolution of the wheel. The improvement has been patented by Mr. Asa B. Frame, of Boyden, Iowa. The wheel has circular end pieces carried by a shaft journaled in bearings in opposite sides of the flume, the shaft having a pulley from which power is transmitted. The blades or paddles arranged around the


## frame's water whebl.

wheel are each pivoted at one edge at both ends in the outer edge of the circular end pieces, and the center of the other edge of each blade is connected by mean of a rod with a ring hung loosely on the central shaft. Any number of these rings may be used, according to the size of the wheel, an independent rod connecting the ring with each blade. As the ring hangs by gravity on the shaft. the inclination of each blade relatively to the center shaft is constantly changing as the wheel revolves, each blade as it approaches the top being brought into a nearly horizontal position to re ceive the fill force of the water, the blade being then tilted to a nearly vertical position as it passes down through the water, and again being shifted to a horizontal position at the bottom, whereit receives the force of the water a second time, to be afterward thrown back into the vertical position again, so that it passes easily up against the current of the water. The blades at the top and bottom of the wheel, upon which the water exerts its force, are each designed in their varying positions to afford an equal amount of power in proportion to the amount of water used.

## IMPROVED SELF-LOADING VEHICLES AND DUMP WAGONS.

In the improvements represented in the accompanying illustrations, for which two patents have been


FISCHER'S 8ELP-LOADING VEHICLE.

fischer's raik attaciucht fog wacoka.
issued to Mr. George F. Fischer, of No. 235 Jay Street, issued to Mr. George F. Fscher, on design of the inventor to furnish trucks which are light, simple, strong, and which can be taken apart and put together quickly and with great precision.
The front portion of the body of the self-loading vehicle consists of a horizontal, skeleton, segmental frame, which supports the front board and serves as a guide for the clevis to which the pole is secured. Beneath this frame is a shovel, whose bottom is inclined downward and dish-shaped, the shovel being mainly supported by a yoke whose upright members are threaded at their upper ends and connected by a truss, centrally through which passes a vertical adjusting screw connected at its lower end with the shovel, and having a handle or cross bar in easy reach of the driver. By turning this screw in one direction the shovel is lowered, and the opposite turning of the screw raises the shovel. The adjusting screw is also adapted, by an adjustable connection, to raise and lower a dumping block having attached links adapted to engage the body of the wagon near its forward end. The wagon body is made in two L-shaped sections, the sections being practically hinged at their angles upon truss rods. When the body is in position to carry a load, the horizonta members of these sections closely approach each other, but they may be readily opened and carried to a dumping position by operating the adjusting serew to move the dumping block and links connected with the horizontal or bottom portion of each section of the body. The wagon body is independent of the front board and of the tail board, and the latter ha a hinge connection with the rear axle. To load the wagon, the turning of the adjusting screw lowers the front portion of the body and the shovel until the latter strikes the ground, when, by driving the team forward, over or through a pile of coal, sand, gravel or other material to be loaded, the latter is forced up ward into the wagon body, and the body is then brought upward into its carrying position by turning the screw in the opposite direction. To dump the wagon, the dumping block is operated through a changed connection with the adjusting screw, so that by turning the latter the bottom members of the body are forced downward and outward, the side members being forced inward and downward, where by the load is dumped, the body being subsequently returned to its normal position by turning the screw in the opposite direction.
The rake attachment is especially designed for dump wagons, and it provides means whereby the dirt, gravel, or other material dumped may be readily lifted and distributed over a large area. Its construction is such that it acts automatically with the dropping of the material from the vehicle, and whe the latter is returned to a carrying position the rake is restored to its normal place at the rear of the wagon body. Upon the rear axle are two vertical guides in which the tail board is adapted to have a pivotal movement, and on each rear wheel, near the hub, is an eccentric flange. The body of the vehicle is in two longitudinal $L$-shaped sections, as in the self-loading wagon above described, the sections turning upon truss rods passed through blocks on the axle and through the lower ends of the guides and the tail board The lower portion of the tail board extends beyond the sides of the body, and on its lower edge are teeth adapted for raking purposes. From each side of the upper portion of the tail board extends a bracket in which turns the upper end of a vertical shaft upon which is a spiral thread having a long outside pitch, and the lower end of each shaft carries a rake-head provided with teeth. Each shaft passes through a keyhole slot of a reciprocating blook, a jaw of each of the blocks receiving the eccentric flange near the hub of each rear wheel. When the tail board is in its upper position the rakes are folded and of herculean strength. At the time of the race, inward beneath the axle, but when the load is dumped he rested but twice on the way, first at Juvisy, after the downward movement of the body of the wagon forces the tail board downward until the teeth on its lower edge engage the material dumped. As the tail board drops, the threads of the vertical shafts are drawn through the reciprocating blocks, and the rake heads carried by these shafts are thrown outward back of the rear wheels and diagonally across them. When the wagon is now drawn forward over the material dumped, the shafts are rocked by means of the reciprocating blocks, so that the rake heads are carried from their outer position to the center of the tail board and then back again, quickly spreading the dumped material aver a large area, the work being done by the vehicle and the team.

## The Telegraph in China.

The United States minister at Peking, China, re ports to the State Department that the Chinese telegraph system has been connected with the Russian system, so that measages may now be sent overland be-
tween any part of China, Russia, Europe, and by cable to Africa, North and South America, and Australia. The whole world is now wired and telugraphically connected.

## foot race of market porters at paris.

Everybody knows those strong market porters who carry upon their backs bags of flour that sometimes weigh 150 pounds. They are lusty fellows, with square, massive shoulders, who are endowed with extraordinary physical energy.
We have thought it of interest to record the feat that has just been executed by one of the most romarkable of them, Jean Labasse, the victor in a race of a new kind, got up by a Parisian journal. It was a question of starting from Feydeau Street with a bag weighing 220 pounds and proceeding to the octroi of Corbeil, a distance of 19 miles. There were ten com-

fig. 2.--portratt of jean habasgr
petitors. The start took placeat 8 o'clock in the morning of the 6th of March. Each porter carried upon his shoulder a bag containing a mixture of sand and sawdust weighing 220 pounds. Jean Labasse was the first to arrive, at 10 o'clock at night, having traveled the distance of 19 miles in 14 hours.
Labasse was born at Saint-Andre-d'Appel, in Dordogne, March 19, 1869, and is consequently twentyfour years of age. He is 5 feet 9 inches in haight,


Fig. 1.-FOOT rage of market porters at paris.
making 14 miles, and next at Evry-Petit-Bourg, at about 3 miles from the goal. He distanced all his competitors by several hours. He was not much fatigued at the finish.
Received at Corbeil bythe municipality and a flourish of trumpets, he was the object of the ovations of the population, which had been awaiting him since six o'clock in the evening.
Although Labasse is remarkable by the development of his muscles, we must add that he does not shine by the qualities of instruction. He can neither read nor write.
We shall complete this note by recalling that a tentative similar to that of which Labasse is the hero once found a victim among the market porters. One of them had wagered that he could carry a 350 pound bag of flour to Corbeil. Having got as far as Evry, the Hern cales drank a glass of cold water and dropped stone dead. Such useless excesses of muscular fatigue and not anaccompanied with danger.-La Nature.

AN INEXPENSIVE WINDOW LARDER
The illustration represents a box or larder which may be easily fastened in position in windows of varying widths, so that provisions or other contents of the box may be better protected by being kept in a receptacle exposed to the outside temperature. The improvement has been patented by Mr. James Ponisi, of No. 1014 Third Avenue, New York City. The box has a slanting, overhanging cover, and beneath its bottom is a longitudinal slideway, the slides in which have considerable movement outward from the ends of the box, and have at their outer ends curved braces adapted to be secured to the frame of the window. The box is designed to rest on the window sill, and when the slides are adjusted they may be fastened to


## PONIBIS WINDOW LARDER.

the sill by screws or other means. On the inner side of the box is a swinging lid with a suitable catch or lock. The box is preferably made with a false bottom beneath the slides, and, if desired, the top may be of non-conducting material to prevent the heating of the box and its contents by the sun.

## A THRASHING MACHINE ATTACHMENT.

The engraving shows a device which receives straw from the thrashing cylinder of a machine, and loosens and fans it in such manner that the chaff will be separated from the straw, permitting the grain to fall down

keeling's thrashing machine attachment.
through the straw and rattle rake. It is a patented improvement of Mr. Richard Keeling, of Walhalla, North Dakota. At the rear of the apron or carrier belt of the thrashing cylinder of the machine is a three-cornered picker, back of which is a combined blower and beater driven by a shaft journaled in the casing. Still further back is the rattle rake, above which is a divide board secured to the deck of the casing, and pointing to the central portion of the beater, two deflecting plates, some distauce apart, and having a rearward inclination, being placed back of the divide board. As the grain passes up the endless belt from the thrashing cylinder, the straw is loosened and tossed by the picker to the blower and beater, being thrown up by the blades of the latter, while the current of air created by the revolving of the blower blows the chaff from the straw. The divide board separates the air current, and the chaff is carried rearward at each side through the rear outer end of the machine, the straw falling upon the rattle rake being comparatively free from chaff, and the grain being more readily separated therefrom. The current of air is designed to be at all times sufficiently strong to pre vent the straw from winding about the beater. The attachment may be applied to any form of thrashing machine.

The Aermotor Company, whose fine representa tion in the windmill exhibit at the Columbian Exposition was mentioned in the Scientific American of June 3, is located at Twelfth and Rockwell Streets, Chicago, and not at Batavia, Ill., as was inadvertently stated.

Mere walking exercise, although it is invaluable, hardly fulfills the idea of perfect recreation. Sir James Paget says "good active recreations" ought to include"uncertainties, wonders and opportunities for the exercise of skill in something different from the regular work." The present writer is always longing for cricket in the summer and football or hockey in the winter and spring. But he cannot find a man anywhere above forty years of age who will agree with him. Why should the literary man, the doctor, and the stockbroker or the merchant not play cricket after forty-five? What is to become of his dinner hour, is it asked? If a better luncheon were taken at midday, and a lighter dinner at six in the evening, there is no reason whatever why a man of forty-five, and up to sixty-five or seventy, should not be in the cricket field at half-past seven and play briskly until nine or half-past. An hour and a half at cricket after a light dinner would make middle-aged men so young that they would not know themselves. Writers would write twice as brilliantly, and business men would be cleverer and keener by half. As it is the average mid-dle-aged Englishman of the professional and business classes grows fatter, wheezier, more pompous, and more dull and uninteresting every year of his life. To get a laugh out of him is impossible; to crack a joke at his expense is to commit the unpardonable sin. "Poor old porpoise," as somebody has called him. His innocent pleasures have vanished with his youth, and "he has nothing now left to live for but his respectability: his solemn respectability, and his money bags." The contrast between the youthful Englishman and his middle-aged parent is sometimes startling. The former is all life and fun : the latter is a moving mountain of ponderosity and fat. It is all for want of outdoor exercise and recreation. Twentyfive years ago the solemn father of to-day was the funloving son of a middle-aged father. If anybody had then shown him in a prophetic mirror the figure he would cut at the end of a quarter of a century, he would have committed suicide in sheer vexation and disgust. But all this rotundity, wheeziness, irritability of temper, incapacity for work, and general disgust with life and all things in it can be cured, cured easily, and cured for ever; and the cure for the vast majority of cases is one or two hours' daily exercise and recreation in the open air.-Hospital.

## AN IMPROVED LUBRICATOR.

The engraving shows a lubricator adapted to properly feed any grade or quality of oil in either an up or erly feed any grade or quality of oil in either an up or
down direction. The improvement has been patented by Mr. Henry C. Roller, of.New Castle, Del. The oil tank is connected by a pipe with the boiler, so that the oil will be in contact with the steam, and under the influence to some extent of the boiler pressure. The supply pipe from the tank is passed through the steam pipe into which the lubricant is to be diseharged, so that the oil may be heated. The supply pipe connects with a casing supported from the steam pipe, as shown in sectional plan view in Fig. 2, and in side elevation in Fig. 1, the casing having a valve controlling the quantity of lubricant entering. The casing also connects with a sight feed tube, and the latter is connected with a second casing discharging into the steam pipe to be lubricated, the quantity of oil and steam to be passed through being regulated by a valve. On the top of the second casing is a steam condensing chamber, the water of condensation from which fills the sight feed tube, while a drip cock at the bottom facilitates cleaning the tube. To feed the oil downwardly the positions of the casings are reversed and the condensing chamber is omitted. As shown in the illustration, the oil from the supply tank is forced into the first casing partly by the displacement due to the condensation of steam and partly by the boiler pressure, so that the oil rises


ROLLER'S SIGHT FERD LUBRICATOR.
in drops in the sight feed tube, passing through the second easing into the steam pipe. In feeding downward the oil enters the first casing under boiler pressure, and is forced downward through the sight feed tube, to be finally passed through the second easing into the steam pipe. As the lubricant is under the boiler pressure, any grade of oil can be readily fed, and the casings may be placed sufficient distance apart to provide for any desired length of sight feed tube.

## A STAMP MILL GUIDE.

By means of this guide, which has been patented by Mr. Edmund Major, of Terraville, South Dakota, the bearing blocks are securely held in place and can be readily adjusted whenever desired on account of wear or other causes. Fig. 1 shows the application of the improvement, Fig. 2 being a plan view, with parts in section. On the front of the girt or rail, secured by bolts or other means to the battery posts, are formed vertical recesses, into which fit ribs projecting from the backs of keepers secured in place on the girt by bolts. Each keeper is in the shape of an open casing, its back being engaged by the bolts whose heads extend into the casing. On the rear of each keeper are side flanges with front beveled faces to receive the correspondingly shaped rear side of the bearing block, and on the front of each side of the keeper are short flanges, there being a recess near the middle to be engaged by a flange plate, held in place by a bolt, by screwing up which the bearing blocks are firmly held in position. The sides of the blocks are beveled to correspond to the inclination of the sides of the keepers, so that the blocks are free to slide upward and out of contact with the keeper, or they may be held in fixed position by means of the flange bolt, and when the blocks be-

major's guide for stamp mills.
come worn by the vertical movement of the stamp stem they may be adjusted by placing a thin piece of wood between the keeper and guide block.

## Plug Wheat.

A gentleman who has been down in the Red River Valley tells of a new way the honest farmer has of getting even with the elevator companies. There is considerable of last year's damaged wheat in the locality referred to, which is notsalable at the elevators. So the ingenuity of the sons of toil was brought to bear to contrive some way to make them take it. Finally the following plan was devised:
The bottom of a grain sack is filled with good wheat. A length of stove pipe is inserted in the center of the sack and filled with the rejected wheat. The sack is then filled around the stove pipe with good wheat and the pipe withdrawn, and on top of this is put good wheat. In this manner a neat "plug" of rejected wheat seven inches in diameter and two feet in length is inserted in the center of each sack, and is so surrounded by good wheat that it is ${ }^{\text {balal }}$ most impossible to detect it when dumped inte- the hopper, especially if the contents of a sack thich has not been "plugged" are immediately dumped on top of the contraband wheat. It is said to be a scheme which will circumvent the most eagle-eyed elevator man.-Valley City (N. D.) Times-Record.

An Early Plan for an Electric Hallway.
The following item is given on page 37 of the Pictorial Times, London, of January 17, 1846 :

## MAGNETIC RAILWAYS

Experiments of a highly satisfactory nature are being made with regard to the application of electromagnetism to railway propulsion. Thegreat ditịiculty to be surmounted is the weight and size of the gaivianic batteries requisite for sufficient energy. To obviate this difflculty, it has been proposed to have stationary batteries at anded distances and to make the rails themselves the conducting lines of the batteriea.

## position of the planets in july.

 JUPITERis morning star. He has attained once more the supremacy that belongs to him as leader of the planetary brotherhood, and outshines every other star in the heavens in the small hours of the morning. He is a marked feature in the sky on beautiful midsummer mornings, as he pursues his path toward opposition. Jupiter's opposition occurs 34days later every year. It took place last year on October 12. It will take place this year on November 18. The reason is that his synodic period, or the time it takes him to move from opposition to opposition again, is 339 days, an easy number to remember. Meantime, the earth has made one revolution, and advanced 34 days on another, before the sun, the earth, and Jupiter come into line with the earth in the middle. The oppositions of the great planet, therefore, are retarded 34 days each year.
Jupiter rises at the close of the month about midnight, and observers will find him an interesting object from the time he comes looming above the eastern horizon until he is seen no more in the glow of the mbrning dawn. He is specially attractive as a telescopic study in his present position, a small glass bringing out his brilliant belts and shining moons.
Jupiter's satellites are again in good position for observation. A favorable time to look for them in July is at 2 o'clock in the morning. We give a few of the configurations for an inverting telescope at this hour. On the 1st, the four satellites are visible, III, II, and I being on the left or west of the planet, and IV being on the right or east.
On the 4th, $I$ is making a transit on the planet's disk, II is on the left, and IV and III are close together on the right, probably looking like a single satellite. On the 11th, III is occulted by the planet, IV and II are on the left, and $l$ is on the right.
On the 20th, I is making a transit, II, IV, III are on the right.
On the 21st, the four satellites are on the right. IV, III and I closely clustered near the planet and III farther away.
On the 30th, II is occulted, III is on the left, and IV and I near together on the right.
As we watch the manifold changes in these bright orbs, we cannot fail to recall the fifth satellite, the great astronomical discovery of 1892, and the third greatest discovery in the nineteenth century, and to hope that when Jupiter rolls round to his most favorable position again, Barnard with his bright eyes and the aid of the Lick telescope may find a companion for his tiny satellite.
The moon, four days before new moon, is in conjunction with Jupiter on the 9 th, at 0 h .64 m. P. M., being $3^{\circ} 35^{\prime}$ north.
The right ascension of Jupiter on the 1st is 3 h .21 m his declination is $17^{\circ} 28^{\prime}$ north, his diameter is $89^{\circ} .4$, and he is in the constellation Taurus.
Jupiter rises on the 1st at 1 h .35 m. A. M. On the 31st he rises at $11 \mathrm{~h} .54 \mathrm{~m} . \mathrm{P}$. M.

## vENUS

is evening star. She has reached a position where she may easily be seen, setting during the month a little more than an hour after the sun. Observers must look for her a half hour after sunset a little south of the sunset point during the first part of the month, and still further south as the month progresses, until at its close she will be found $6^{\circ}$ south of the sunset point. Few directions are necessary for flading the peerless star, excepting to learn her position in the sky. She herself reveals the secret of her presence as she glows in the evening twilight, and is beautiful to behold, even when smallest in size and just free from the eclipsing sunbeams.

Venus has an incident to diversify her July course. She makes a close conjunction with Mars on the 9 th, at 9 h .2 m . A. M., being $18^{\prime}$ north. The event would be more interesting if it did not occur in daylight.
The moon is in conjunction with Venus, the day after new moon, on the 14 th , at 4 h .42 m. P. M., being $3^{\circ} 24^{\prime}$ north.
The right ascension of Venus on the 1st is 7 h . 54 m ., her declination is $22^{\circ} 18^{\prime}$ north, her diameter is $10^{\circ} .4$, and she is in the constellation Gemini.

Venus sets on the 1st. at $8 \mathrm{~h} .32 \mathrm{~m} . \mathrm{P} . \mathrm{M}$. On the 31st she sets at $8 \mathrm{~h} .20 \mathrm{~m} . \mathrm{P}$. M.

## MERCURY

is evening star. He reaches his greatest eastern elongation on the 11 th at 8 h . A. M., when he is $26^{\circ} 30^{\prime}$ east of the sun. He is then visible to the naked eye in the west as evening star, but is too far south of the sun to be easily picked up. Southern observers will see him to better advantage.
The moon, two days after her change, is in conjunction with Mercury on the 15th, at 2 h .15 m. A. M., being $6^{\circ} 10^{\prime}$ north.

The right ascension of Mercury on the ist is 8 h . 28 m , his declination is $20^{\circ} 18^{\prime}$ north, his diameter is $6^{\prime \prime} .8$, and he is in the constellation Cancer.
Mercury sets on the 1st at 8 h .68 m . P. M. On the 31st he sets at 7 h. 22 m . P. M.

## SATURN

is evening star. He ceases to occupy the most prominent place on the records of the month, but there are interesting points in his course. The telescopic view of his rings, belts, and moons is superb, and calls forth much admiration from many observers.
A correspondent of the English Mechanic describes the conjunction of Saturn and Gamma Virginis on April 8 as an extremely beautiful sight. The actors in the celestial scene were but $6^{\prime}$ of arc apart, almost touching each other, and visible in the same telescopic field. The contrast between the yellow planet and the brilliast white double star was exquisite. Observers should improve the present opportunity for a telescopic study of the marvelous planet, for his best period of visibility is passing away. It extends from February to July.
The moon, two days before the first quarter, is in conjunction with Saturn on the 18th at 8 h .36 m . P. M., being $1^{\circ} 5^{\prime}$ south. The conjunction will be visible, but the resulting occultation will be seen only in the southern hemisphere.
The right ascension of Saturn on the 1st is 12 h .28 m., his declination is $0^{\circ} 19^{\prime}$ south, his diameter is $16^{\prime \prime} .8$, and he is in the constellation Virgo.
Saturn sets on the 1st at 11 h .43 m. P. M. On the 31st he sets at $9 \mathrm{~h} .48 \mathrm{~m} . \mathrm{P}$. M.

## uranus

is evening star. He is in quadrature with the sun on the 20th at $11 \mathrm{~h} .49 \mathrm{~m} . \mathrm{A}$. M., being $90^{\circ}$ east of the sun This planet, after retrograding or moving westward since February 18th, becomes stationary on the 14th, and changes his course to direct or eastward motion, continuing to move in this direction until the end of the year. The foar giant planets, Jupiter, Saturn, Uranus, and Neptune, are now all moving eastward or in direct motion.
The moon, the day after the first quarter, is in con junction with Uranus, on the 21st, at $6 \mathrm{~h} .4 \mathrm{~m} . \mathrm{A} . \mathrm{M}$., being $1^{\circ} 12^{\prime}$ north.
The rightascension of Uranus on the 1 st is 14 h .18 m., his declination is $13^{\circ} 21^{\prime}$ south, his diameter is $3^{\prime} .7$, and he is in the constellation Virgo.
Uranus sets on the 1st at $0 \mathrm{~h} .60 \mathrm{~m} . \mathrm{A} . \mathrm{M}$. On the 31st he sets at $10 \mathrm{~h} .46 \mathrm{~m} . \mathrm{P}$. M.

NEPTUNE
is morning star. He is of little importance on the ceestial record, for he is very near the sun, and very far from the earth. Several months must elapse before he is ingood position for observation.
The moon is in conjunction with Neptune, three days before her change, on the 10 th , at 6 h .38 m. P. M., being $5^{\circ} 16^{\prime}$ north.
The right ascension of Neptune on the 1st is 4 h .43 n., his declination is $20^{\circ} 46^{\prime}$ north, his diameter is $2^{\prime \prime} .5$, and he is in the constellation Taurus.
Neptune rises on the 1st at 2 h .38 m. A. M. On the 31st he rises at 0 h .49 m . A. M.
mars
is evening star. He will be found low down in the west, and during the first part of the month in the vicinity of Venus and Mercury. The close conjunction of Mars and Venus on the morning of the 9th has been described. The planets will be near each other on the evening of that day, and on the evening preceding, and may be seen together in the field of a small telescope, giving an opportunity for comparing their size, color, and brilliancy.
The moon, when one day old, is in conjunction with Mars, on the 14 th, at 11 h .19 m . A. M., being $3^{\circ} 49^{\prime}$ orth.
The right ascension of Mars on the 1st is 8 h .14 m ., his declination is $21^{\circ} 7^{\prime}$ north, his diameter is $4^{\prime \prime} .0$ and he is in the constellation Cancer.
Mars sets on the 1st at 8 h .48 m. P. M. On the 31st he sets at $7 \mathrm{~h} .46 \mathrm{~m} . \mathrm{P} . \mathrm{M}$.

## THE OCCULTATIUN OF ANTARES

The moon occults the star Antares or Alpha Scorpii on the 23d. The immersion takes place at 8 h .28 m . P. M. The emersion takes place at 9 h .19 m. P. M., in occultation continuing 51 m . The data are given in Washington mean time, and will vary in other
localities on account of the moon's parallax. The localities on account of the moon's parallax. The
moon is then three days past the first quarter and moves with her dark edge foremost. The star will disappear at the dark edge with a startling effect, as if it were suddenly blotted from the sky. Antares is a double star, of the 1.4 magnitude, of a fiery red color. It has a companion of the 7 magnitude of a bright green color, so near the priacipal as to be nearly involved in its flaming rays. It was not known for a long time if the smaller component shone with complementary or inherent light. The problem was solved in 1856 during an occultation of Antares, when the tiny companion emerged from behind the dark limb of the moon before its overpowering neighbor and gave a curious proof of its independent and not contrasted reen color.
The occultation commences more than an hour after sunset. It will be visible and very interesting. The
obeerver as soon as it is dark enough will see the monn
approaching the star, and can watch the phenomenon through its whole progress, for when the occultation is over the moon is three hours above the horizon. A small telescope or an opera, glass will greatly aid in the observation.
Mercury, Venus, Mars, Saturn and Uranus are evening stars at the close of the month. Jupiter and Neptune are morning stars.

## [For the solientifio Aiterionas.]

Ethan S. Chapin.
America is the home of self-made men. Thenumber of those who rise from the poorest homes and from most unfavorable surroundings to wealth and eminence is large. Comparatively few, however, become distinguished as scholars, unless while young they receive the advantages of a fairly good education.
Four years ago last March there died at Springfield, Mass., a man whose name should be widely known, Ethan S. Chapin, Esq. While a boy he went to school barely long enough to learn how to read and write. He began to support himself when he was but twelve years of age, and was a hard-working man all his life. Many will remember him as one of the proprietors of the well known Massasoit Houss in its palmiest days. Notwithstanding the disadvantages under which he labored, Mr. Chapin became a distinguished scientific scholar. He published several books; the latest, "Gravitation the Determining Force," is the one on which his reputation as a scientist must chiefly depend. As early as 1867, he advanced the theory of "The Instability of the Earth's Axis," a theory which no scholar of importance had ever taught, and which, when proposed by Mr. Chapin, was treated with contempt. Latterly, however, it has received increasing attention, and is now generally accepted by students of physical science. It has long been noticed that the geographical position of the observatories on the continent of Europe changed each year. They have been slowly receding from the North Pole. Various suggestions have been made to account for this phenomenon. There seems to be no alternative but to admit that this variation of latitude is caused by a movement of the poles. In other words, the geographical axis of the earth is not identical with its axis of rotation. The pole of the former is about fifteen miles distant from that of the latter. The geographical pole actually moves about four feet every year.
In consequence of this unsteadiness of its axis, the earth, as it moves along its orbit, has an eccentric, wabbling motion.
It is anticipated that further study in the line of this discovery will throw important light upon three facts of great interest to students, viz, the glaciation of the earth, the presence in the Arctic regions of flora which at present is characteristic of Southern Europe, and the tides.
Is it not possible that the variation of latitudes, which now is known to exist, and the changes in the level of the earth's crust, which have been going on in all ages, sufficiently account for all the evidences of glaciation found in various parts of the world, without upposing an extensive "glacial epoch"? This was Mr. Chapin's belief.
The presence in the regions around the North Pole of flowers and fruits which require an amount of light and heat now found in the southern part of the north temperate zone leads us to suppose either that the earth formerly received far more heat from the sun than it now does or that the position of thosenorthern latitudes has very perceptibly changed. This latter hypothesis has been made more probable by the discovery of the instability of the earth's axis.
The eccentric motion of the earth caused by this instability of its axis is of great importance in explaining the phenomenon of the tides. In no other way can we so easily account for the accumulation of the tidal waves on opposite sides of the earth, and for their tardy movement following the track of the moon. It is very interesting to know that it was the study of his subject that led Mr. Chapin in the first place to discover the now generally accepted and important phenomenon of the instability of the earth's axis.

## Fast Traveling.

The train which tbe Pennsylvania Railroad furnished or carrying the naval officials to Chicago on their recent visit to the World's Fair, the Ruilway Master Mechanic says, astonished most of those Europeans who participated in the journey, by its elegance and many conveniences. The train consisted of eight Pullman cars, which, with the engine, weighed over 500 tons. But notwithstanding the heary train, the time rom Chicago to Jersey City was made in less time than the "Limited." The distance from West Philadelphia to Jersey City, 92 miles, was covered in 102 minutes, and 18 miles between New Brunswick and Elizabeth were covered in 14 minutes, which is believed to be the fastest ever run with such a heavy train. From Pittsburg to Altoona two engines were employed to haul the train, but all the rest of the trip was made with the class " $P$ " engine.

World,s Falr Notes.
(Continued from page 3.)
think it advisable to skip this thoroughly delightful part of the Exposition. There is more real harmless amusement and instruction for the average person to be had in the Plaisance for $\$ 5$ than can be obtained for three times the money elsewhere. It is something to hear the orchestras of all nations, which run ina direct line from the German band down to the Chinese artists, who will certainly be lynched when the cow boys come.
The Russian pavilion was opened with all the pomp and ceremony incident to the practice of the rites of the Greek Church. His Eminence the Most Reverend Nicholas, Bishop of the Russian Greek Church of America, was the celebrant of high mass, and after an address the bishop dipped the gold cruciix in holy water and sprinkled the temporary sanctuary, and then, amid the eager gaze of thousands of spectators and the chiming of bells, he sprinkled each of the exhibits with hols water. The party then returned to the temporary church, and all present were sprinkled with the water and allowed to kiss the crucifix.
One of the engineering successes of the Fair is the transmission of power by compressed air. From the huge compressors in Machinery Hall the air is carried to the Transportation building, in a nine-inch pipe, at a pressure of eighty pounds to the inch. The stately Baldwin locomotives and other exhibits are run by the air thus delivered. In the Mines building live steam is provided, which runs a compressor, which in turn furnishos the power for nearly all the machinery in the building. One peculiarity which was noticed particularly when the locomotives were started was that all the stuffing boxes leaked, until repacked. The gain in comfort is remarkable, as the Transportation building would be insufferably hot, if the machinery were to be run by steam. As it is, the exhaust air assists ventilation. Compressed air is also used in the sewage system of the grounds.
The legislature of Illinois has passed a bill enabling the Park Commissioners to purchase the Art Gallery building at the close of the Exposition. It is noted as being one of the purest and most beautiful architectural designs in the world.

## Gorrespondence.

## Square Shafting Made of sheet steel.

## To the Editor of the Scientific American:

Your illustration of the broken shaft of steamship Hecla in your issue of June 3 shows clearly the inconsistency of onesolid shaft forging. Had the same consistency of iron been secured together in sheets of steel say one-half to one inch thick, the shaft made square, bolted or clamped together to prevent either twisting or buckling, with the bearings collared on the square, I will venture to assert the practical engineer will agree with me in saying the steel plates composing a shaft as suggested will be naturally stronger than a single forged body of iron. I claim also a square shaft when broken is more readily mended by clamps and bolts than the round shaft now in common use. My reasoning for this is the same in building a timber of several boards from different lumber when secured properly together is much stronger than one solid timber.
New York, June 8, 1893.
G. W. K.

## A Simple Method for Determining the Velocity

To the Editor of the Scientiflc American:
It may be of interest to amateur riflemen to know the following simple method for ascertaining the effect of gravity on a bullet shot horizontally from a rifle to any distance:
Sight the rifle upon the target, keeping the sights plumb above the center line of the bore of the rifle. Mark where the ball strikes. Then reverse the rifle, so as to have the sights exactly beneath the line of bore. In this reversed position sight it on the target as before, and inark where the bullet strikes. One-half the difference in the elevation of the two bullet marks will represent the effect of gravity in drawing the bullet away from a straight line.
Divide the difference in elevation of the two bullet markd by 32 and extract the square root. This will give the time in seconds that it took the ball to travel the distance.

The distance divided by this time will give the spee of the bullet per second.
J. A. G.

Grand Rapids, Mich.

## The Litchfield Mill.

To the Editor of the Scientific American:
In your issue of June 10, I notice a communica tion from Mr. E. L. Otis, of Minneapolis, who good naturedly brings you to task for referring to the great mill which exploded in this city, March 21, as probably the largest fiour mill in the world. Mr. Otis exhibits true loyalty to his own city, and grows indignant at the thought that outside of his famed flour-milling city of

Minneapolis could exist the largest mill in the world If the Scientific American had qualifed its assertion by adding " winter wheat," no objection to the statement could possibly be sustained, for the Litchfield mill was, so far as we know, the largest winter wheat flour mill in the world, having a capacity of $2,000 \mathrm{bar}$ rels of flour a day. The product of this mill was all sold in Europe, not a pound being put upon the mar ket in this hemisphere.
A scientiflc explanation of this most disastrous, and at the same time most wonderful, explosion would not only interest Litchfleld people, but your readers in general throughout the country

Harry E. Kelly,
Editor Herald, Litchfeld, $12 l$.

## The White Pine Aphis.

To the Editor of the Scientific American:
I send you by to-day's mail some specimens of a bug or beetle that is destroying the pine trees in this coun $y$, and any information that you may give, either by mail or through your valuable paper, will be appreciated by this community. You will perceive two small horns or teats on their backs that the common ed ants nurse from. This I watched for an hour this morning. Would like a remedy for destroying them without injury to trees. By request of several citizens
Ainsworth, Neb., June 6, 1893.
Reply by Professor C. V. Riley.-The specimens reerred to by Mr. Miles were in extremely bad condition when received, but from the partially decayed rem nants it is evident that they were a large species of plant louse belonging to the genus Lachnus and closely related to, if not identical with, L. strobi, Fitch, the condition of the specimens not permitting positive specific determination. This insect is known as the white pine aphis, and is the commonest species of it family upon that tree in the Atlantic States. The lice congregate in colonies on the ends of the pine twigs the bark of which they puncture. They are almost always accompanied by ants, which are attracted by the honey dew which the plant lice secrete from the little honey tuhes referred to by Mr. Miles. The species has been observed in the past to be extremely abundant in certain years and comparatively rare in others. Thisalternation in the relative numbers of the Lachnus has been found to be due to the rapid increase of its natural enemies when?ver the conditions favor and to the succeeding necessary decrease of the Lachnus itself. Later in the season a great many, if not the large majority, of the plant lice will be found dead, the dried remains clinging to the leaves and branches, and upon close inspection these dead bodies will be found to have a minute hole, from which a hymenopterous parasite has issued. Ladybirds, lace-wing flies, and syrphus flies are all active in preying upon them.
It is difficult to deal with any insect trouble of this kind upon large trees over extensive forests, but indi vidual trees may be sprayed with ordimary kerosene soap emulsion diluted with from five to ten parts of water, and such spraying will undoubtedly have a good effect in destroying the bulk of the plant lice. Otherwise it is pretty safe to trust to the natural ene mies which I have mentioned, and which will, in the course of the summer, effectually do their work. An interesting note has been published in one of the earlier numbers of Insect Life (Vol. II., No. 10, p. 314) upon the subject of the honey secreted by one of these pine-inhabiting species of Lachnus. I have sent Mr Miles a marked copy of this bulletin for his informa tion.

It is quite possible that some other agent is at work in the destruction of the pine timber referred to by Mr. Miles and that the Lachnus is only an incident. It would be well for him to have the trunks thor oughly examined for bark borers. Their presence may be known by the exuding pitch and by their exit holes, like shot holes, in the bark. Just now, also, another plant louse, Chermes pinicorticis, is proving very destructiveto pines,especially white pines,in parts of Nebraska, and this is really more disastrous than the Lachnus. It is a smaller insect and attaches itself in more sheltered portions of the twigs and branches, covering itself with a flocculent material. Tlfere has been no experience on a large scale as to the best methods of ridding trees of either of these insects, so that the recommendation to use kerosene emulsion is from analogy as toits action on allied forms.

## Nitro-glycerine Precautions.

To the Editor of the Scientiflc American:
In your issue of February 4, 1893, I note a communicativn from Mr. J. T. Pettee, of Meriden, Conn., on the subject of keeping nitro-glycerine and dynamite from freezing, thereby avoiding some of the terrible calamities frequently reported, where workmen are killed by an explosion which ensues consequent upon their thawing these substances out.
While, theoretically, Mr. Pettee is right in saying
hat nitro-glycerine and dynamite should be kept
freezing, the practical application would not, in many cases, work to a successful end. If the men who use these explosives cannot thaw them out properly, it cannot be expected that they will exercise anymore intelligence in keeping them unfrozen. But it is already an incontrovertible fact that it is extremely dangerous to transport nitro-glycerine in an unfrozen state.
Therefore, the proper point to aim at is to insist that, if frozen, it must be thawed out properly. Upon this point, the laws should be most stringent, and the re sponsibility for non-compliance should be placed, not upon the ignorant workman, who is only a machine, but upon those who have the work in charge.
Apropos of the subject under discussion, I will quote below from an able series of lectures by Prof. Charles E. Munroe, of the Columbian University, Washington, D. C., formerly chemist to the Torpedo Corps, United States Navy, whose practical experience and experimentation with and analysis of every known form of explosive for a period of over twenty years make him the best authority in matters of this kind

When frozen, nitro-glycerine inay be conveniently and safely thawed by placing the vessel containing it nside another containing water not hotter than $100^{\circ}$ Fah., but these precautionsshould bestrictly observed, as most of the accidents which have occurred with nitro-glycerine and explosives of which it forms a part have resulted from foolish and criminally careless at tempts to thaw the frozen material by other means. Frozen explosives should never be put into the vessel containing the water, or hrought into contact with any heated surface, except as directed above. Nitro-glyce ine and its dynamites are extremely tricky when pure and when fresh, and if kept at normal temperatures they are not liable to undergo decomposition; but when subjected to the extreme heat of summer, followed by the excessive cold of winter, for a number of years, they are very apt to become unstable, hence danger ous, unless handled and used with extreme care.

Many foolish persons suppose that since it is reasonably safe to ignite a cartridge of unfrozen dynamite, it is equally safe to warm it upon a shovel, or in an oven, or in a tim vessel over a fire, or in various other ways, which usually lead to a verdict of accidental death, but would be more properly designated as sui cide or manslaughter. It cannot be too strongly im pressed upon the minds of those handling them that if dynamite or other nitro-glycerine preparations are gradually warmed up to a temperature approaching their exploding points, they become extremely sensitive to the least shock or blow, and once that point is reached they do not simply ignite, but they explode with great violence ; and further, that owing to the poor conductivity of the mass, a portion of it which is in contact with the source of heat may become raised to this temperature, while the rest of the mass is much below it."
The proper way to prevent the loss of life occasioned by this careless way of thawing outnitro glycerine and dynamite would be, it seems to me, to embody the subject matter above in a set of formulated rules re ceiving the sanction and pressure of the law in each and every State, whereby the verdicts of accidental death would be changed to their proper signification, suicide or manslaughter-suicide where an individua is concerned, manslaughter where a corporation is re sponsible.

Samuel Rodman, Jr.,
Late 1st Lieut., U. B. Army.
Chicago, Ill, June 1, 1893.

## The American Assoclation for the Advancement

The forty-second annual meeting of the American Association for the Advancement of Science is to be held in Madison, Wis., from August 16 to August 23, inclusive. By the courtesy of the Regents the sessions will be held in the buildings of the University of Wis consin and in the assembly chamber of the capitol Lanterns for projecting views and slides are provided in several rooms, and one room is kept for general lantern use. To it any section may adjonrn when lantern facilities are required. The outline of the programme has been published and indicates a fuil em ployment of the time of the meeting. F. W. Putnam Cambridge (office Salem), Mass., is tbe permanent secretary.

## Paint for Iron and Steel

The invention refers to a new material, called "siderosthen," for the coating of iron and steel surfaces with a view to prevent the formation of rust upon them. The compounds used for the manufacture of this paint are the tar obtained from works producing fat gas, "gouron," which is a mixture of about 85 part of refined Trinidad asphalt and 15 parts of refined asphalt oil, or, instead of the "goudron," sulpburmay be used. If "goudron" be employed, this is dissolved in the gas tar, in suitable quantities, and this mixture can then forthwith be employed for the purpose in view. If sulphur be used, 8 per cent of itis mired with the gas tar, and this mixture is then heated to about $100^{\circ} \mathrm{C}$.

## THE GREAT WHEEL AT CHICAGO

The wonderful "merry-go-round" designed by Engineer George W. G. Ferris, of Pittsburg, Pa., is now completed and forms a most remarkable and attractive object. This curious piece of mechanism carries thirty-six pendulum cars, each seating forty passengers; thus one revolution of the wheel carries 1,440 people to a height of 250 feet in the air giving to 1,40 people to a height of a feet in the air, giving to each passenger a magnificent view and a sensation of eleva-
tion akin to that of a balloon ascent. The practical working of the great machine is attended with perfect success and its construction and operation reflect the highest credit on the author.
The description of the construction of the great wheel given in the Chicago Tribune will be of interest, and we make the following abstract
The wheel is composed of two wheels of the same size, connected and held together with rods and struts, which, however, do not approach closer than twenty feet to the periphery. Each wheel has for its outline a lor its outhine a curved, hollow squareiron beam $251 / 2 \times 19$ inches. At a distance of 40 feet within this circie is another circle of a lighter beam. These beams are called crowns, a $n$ d are connected and held together by an elaborate trusswork. Within this smaller circle there are no beams, and at a distence there ap distance there appeare to be nothing. But at the center of the great wheel is an immense iron axle, 32 inches thick and 45 feet in length. Each of the twin wheels, where the axle passes through it, is provided with a large iron hub, 16 feet in diameter. Between these hubs and $t h e$ inner "crowns" there are noteonnections except spoke rods, $21 / / 2$ inches in diameter, arranged in pairs, 13 feet apartat the crown connection. At a distance they look like mere spider webs, and the wheel seems to be dangerously devoid of substantial oupport.
Théexplanation of this is that the of this is that the Ferris wheel - at
forty revolving chairy, made of wire and screwed to the floor. It weighs thirteen tons, and with its forty passengers will weigh three tons more. It is suspended from the periphery of the wheel by an iron axle six and one-half inches in diameter, which runs through the roof. It is provided with a conductor to open the doors, preserve order, and give inormation. To avoid accidents from panics and to prevent insane people from jumping out, the win dows will be covered with an iron grating.
It is being considered whether each car shall not have a telephone connection with the office on the ground. It isthought that this would be an attrac
great feet, and each foot rests on an underground concrete foundation $20 \times 20 \times 20$ feet. Cross bars of steel are laid at the bottom of the concrete, and the feet of the tower are connected with and bolted to them with iron rods.
One would naturally suppose that there would be great danger of making such a huge wheel as this opsided or untrue, so that it would not revolve uniformly. Even if the wheel itself were perfectly true, it would seem that the unequal distribution of passengers might make it eccentric in its speed. But according to L . V. Rice, the superintendent of construction, there is absolutely no danger of this kind. Not only did the wheel alone turn uniformly, but when thecars were hung, one after another, no inequality was observed. As to passengers, Mr. Rice says that the 1,400 passengers will have no more effecton the movements of the speed than if they were so many flies.
The wheel, how ever, is never left to itself, but is al ways directly and constantly controlled by a steam engine. The wheel points east and west, and the one thousand horse power rever sible engine which rans it is located under the east half of it and sunk four feet in the ground. The ma chinery is very similar to that used in the powe houses of the cable car companies, and runs with the sam hoarse roar that they do. It operates a north-and south iron shaft 12 inches in diameter, with great cog wheels ateach end, by means of which the power is applied at each side of the wheel.
The periphery of both of the great outer crownsof the great wheel is cogged, the cogs being about six inches deep and about eighteen inches apart; and the power of the engine is applied at the bottom of the wheel the wheel. Un derneath th wheel, in line with tbecrown on each side, are two sprocket wheels nine feet in dia meter, with their centers sixteen feet apart. They are connected by least inside the smaller crowns-is constituted on the wished to converse with their friends below or in an- an immense endless driving chain, which plays on principle of a bicycle wheel. The lower half is sus- other car and as a sort of reassurance to timid people. their own cogs and on the cogs of the great wheel
pended trom the axle by the spoke rods runningdgwnward, and the spper half of the wheel is supported by the low thalf. All the spoke rods running from the axle perth, when it is in any given position, might be remered, and the wheel would be as solid as it would be with them The only difference is that the $F$. wheel hangs by its axle, while a bicycle wheel rests on the groond, and the weight is applied downward on the arle;

The thinty-air carrisges of the great wheel are hung on its periphery at equal intervals. Each car is twenty-seven feet long, thirteen feet wide, and nine feet high. It has a heavy frame of iron, but is covered exteraz ${ }^{\text {an }}$ with wood. It has a door and five broad plate class windows on each side. It contains

The thought of being detained up in the clouds, as it as well. These sprocket wheels are operated by the were, by accident, and not being able to learn what it engine at the will of the engineer, who can turn is or when it will be remedied, might frighten some the wheel either way, and fast or slowly, as he may timid people out of making the trip. It is not very wish. The wheel is 250 feet in diameter, 825 feet in difficult, however, to climb by the wheel itself to any circumference, and 30 feet wide, and is elevated 15 feet car, and there will always be men on the ground who above the ground.

## can do this.

The wheel, with its cars and passengers, weighs about 1,200 tons, and therefore needs something sub stantial to hold it up. Its axis is supported, thereore, on two skeleton iron towers, pyramidal in form, one at each end of it. They are $40 \times 50$ feet at the bottom and 6 feet square at top, and about 140 feet bottom and 6 feet square at top, and about 140 feet

The great wheel is also provided with brakes. Near the north and south ends of the main shaft are two ten-feet wheels, with smooth faces, and girdled with steel bands. These bands terminate a little to one side in a large Westinghouse air brake. If therefore anything should break, and the engine fail to work bend tightened until not a wheel in the whole the stee d the other aides slanting. Esch tower has four can turn. In the construction of thisgreat wheel every
conceivable danger has been calculated and provided whom were given a ride on the great wheel. The face was thoroughly rammed with iron punner

 Wer was a matter of the greatest importance, motion of the machinery is sajd to have been almost for, although the wheel itself is all open work, the cars imperceptible. weighing twenty-five pounds each. The bricks were present an immense resisting surface. But Mr. Rice points to the two towers, with their bases fifty feet north and south of the wheel, and bolted into twenty | Tar and Asphalt for Tanks. | was used as a flux for the asphalt, in the proportion |
| :---: | :--- |
| A mixture of coal tar and Californian rock asphaltum | of from ten to twelve per cent by weight of the latter | feet of hour would have no effect. He says that all the frost and snow that could adhere to the wheel in winter would not affect it ; and that if struck by lightning it would absorb and dissipate the thunderbolt so that it would not be felt.

It is arranged to empty and refill six cars with passengers at a time, so that there will be six stops in every revolution. Accordingly six railed platforms, of varying heights, have been provided on the north side of the wheel, and six more, corresponding with these, on the south side of it. When the wheel stops, each of the six lowest cars will have a platform at each of its doors. The passengers will step out of the south doors and other passengers will step in at the north doors. Then the next six cars will be served the same way, and the next and the next all day, and perhaps all night. It is expected that the whee] will revolve only once in every twenty minutes. Passengers will remain on board during two revolutions and pay fifty cents for their fun.

The Ferris Wheel Co. was capitalized at $\$ 600,000$, and $\$ 300,000$ worth

tHE GREAT FERRIS WHEEL AT CHICAGO-ATTACHING THE CARS. hours with constant stirring. A large bucketful at a time was taken out of the kettle by two men, and spread in a thin layer over the bricks by means of shovel and broom. It required two layers put on in this way to make the requi ite thickness of three-eighths inch As much sand as would adhere to it was sprinkled over the last layer while hot. The reservoir has never leaked. It is suggested that thi way of rendering tanks water tight at small expense might be exten sively used for sewage works, etc.

A Unique Musical Bedstead.
A Bombay man has constructed a bedstead priced at 10,000 rupees, and The Ironmonger appends the description as follows: "It has at ts four corners four full-sized gau-dily-dressed Grecian damsels, those at the head holding banjos, while those on the right and left foot hold fans.
Beneath the cot is a musical box which extends the whole length of the cot, and is capable of playing twelve different charming airs. The music begins the moment the of bonds were issued and sold. The final concession for for lining a reservoir for the city water works of La least pressure has been brought to bear from the top. the erection of the wheel was not granted until Decem- Grande, Oregon. The reservoir is of oval shape, part which is created by one sleeping or sitting, and ceases ber, and all the work has been contracted for and in excavation in heavy clayey soil and part in em- the moment the individual rises. While the music done since then, the iron having been in the pig in bankment made from the excavated material, with is in progress the lady banjoists at the head manipuJanuary, while the scaffolding was not begun until inner slopes of three to one. The depth of water is late the strings with their fingers and move their March 20. By the terms of the concession, the com- ten feet; thearea of surface, 20,880 square feet; and the heads, while the two Grecian damsels at the bottom pany pays to the Exposition one-half of all its receipts capacity, 1,000,000 gallons. The lining consists of one fan the sleeper to sleep. There is a button at the foot after they have amounted to the cost of the wheel. On layer of brick on edge, covered by three-eighths inch of of the cot which, after a little pressure, brings about the day the wheel was first started, June 21, 5,000 the bitumen mixture. After the earth had been ex- a cessation of the music, if such be the desire of the guests were present at the inaugural ceremonies, all of cavated and the embankment made, the whole sur- occupant."


## Natural History Notes.

Fecundity of Some of the Sea Fishes.-In the "Annual Report of the Fishery Board of Scotland," Mr. Wemyss Fulton states that more than a hundred examples have been observed that go to show the great fecundity ofsea fishes. Thenumber of the eggs of thirtynine species has already been estimated. This number varies considerably, according to the size and age of the individual. Of all the fishes, the ling (Molva vul garis) produces the greatest number of eggs, say from twenty to thirty million.
The gurnard (Trigla lyra) produces but a few hundred, that are taken care of by the male, which places them in a pocket situated near his abdomen.
The cod (Morrhua vulgaris) produces all the way from two to eight million eggs; the haddock (Gadus aglefinus) about two or three hundred thousand, and even a million; and the coal fish (Gadus virens) from four to eight million. In the herring (Clupea harengus) the number amounts to from twenty to fifty gus) the number amounts to from twenty to fifty mean exceeded thirty thousand. Hitherto such fecundity as this has not been admitted for this fish.
The turbot (Rhombus maximus) also is very fecund. It produces from three to ten million eggs.
Less productive is the dab (Pleuronectes limanda) which produces from thirty to sixty thousand eggs.
Proportionally to its size, the plaice (Pleuronectes flesus) produces more than all others, the number of its
eggs being five hundred thousand or a million and a eggs
The sole (Solea vulgaris) is very productive, but, as with a large number of other species, the quantity of its eggs has not yet been estimated.
The Silk of Spiders.-In the Revue des Sciences Naturelles Appliquees for March, 1892, there is a paper by Rev. P. Camboue on the silk of spiders. After giving a history of the attempts to obtain and use the silk of spiders, he gives some interesting experiments of his own, made on a large orb-weaving spider of Madagas-
car (Nephila madagascariensis, Vinson). He finds that the spider furnishes the most silk after she has laid her eggs. From one spider there was obtained in twenty-seven days nearly four thousand meters of silk. The silk was of a golden yellow color. He gives the plan of an apparatus for winding the silk, which, however, as he says, is imperfect. Nothing, however, was
done as to the raising and keeping of the spiders in done as to the raising and keeping of the spiders in
large numbers, undoubtedly the most serious question. -Insect Life.
A Fish-Eating Rodent.-A very interesting new mammal has recently been received at the British Museum in the form of a fish-eating rat from the mountain streams of Central Peru. The animal is of about the size of a common house rat, but has a flat-
tened head, strong and numerous whisker bristles, and tened head, strong and numerous whisker bristles, and
very small eyes and ears, characters which give it a striking resemblance in its physiognomy to some of the aquatic genera of the Insectivora and Carnivora, such as Potamogale, Myogale, Lutra, or Cynogale. Itsswimming powers are evidently very great, as is shown, among other things, by its broad, webbed and strongly ciliated hind feet, far better developed for this purpose than are those of the ordinary swimming Muridm, such as the English water vole, whose simple vegetarian diet does not necessitate the development of any exceptional swimming powers. In color, like the common water shrew, it has a dark upper side with a whitish belly, and has a markedly bicolor black and white tail.
The chief interest of the new form centers in the fact of its being wholly a fish-eater, andin itshaving in connection therewith its incisor teeth modified for catching a slippery, active prey by the development of their outer corners into long sharp points, and its intestines altered by the reduction almost to nil of its cæcum, an organ in vegetarian Muridæ always of great size and capacity. The stomach of the single specimen obtained contains fish scales, recognized by Mr. Boulenger as those of Tetragonopterus alosa, a fish whose average as those of Tetragonopteru.

This animal represents quite a new departure in rodent life history, for although it is now perfectly well known that the North American musquash (Fiber zibethicus) occasionally feeds on fish caught by itself, yet there is no other rodent which, as in the case of Ichthyomys stolzmanni, as it is proposed to term the new form, wholly lives on fish, to the exclusion of a vegetable diet.

Variation in Species of Plants.-Dr. E. Sickenberger, professor of chemistry, botany, and materia medica at Cairo, in a letter to a correspondent, states that he has several times had the opportunity of substantiating the facts that, in Egypt, seeds of Gignut (?), a variety of Cannabis sativa from Europe, produce the true $C$. satind yarn by the third generation; the black mustard, Brassica nigra, is transformed in the second generation into the endemic B. bracteolata, Fisch. et generation into the endemic B. bracteolata, Fisch. et
Mey ; and the thick-rooted celery assumes in the first year the much foliated form with a thin root stock, like the summer spontaneous form in Egypt.
Local Names of Common Insects.-Several times in
solicited correspondence with regard to local names for our commoner insects, and a number of our correspondents have responded.
The most interesting information on this head has lately come to us from Mr. Alvah A. Eaton, who sends quite a list of names current between Newburyport, Mass., and Portsmouth, N. H. Some of them are entirely new, and are probably quite local. The walking stick (Diapheromera) is there known as "scorpion." The term "huckleberry bug" is used indiscriminately for a species of red mite and for soldier bugs, just as "red bug" is applied in the South to mites and the cotton stainer. May beetles and the like are called dor bugy, an old English name for this class of Scarabæids. "Crackamire" and "needle ichneumon" are the names given the long, slender. ichneumon flies. The large Locustidæ, or long-horn grasshoppers, are very appropriately called "cradlers," from the resemblauce of the ovipositor of the fernale to a grain cradle; but most singular of all is the application of the name of locust to the large Bombycid moths, such as the Cecropia Luna, and Polyphemus, and of lady-bird for the Luna, and Polyphemus, and
Sesid or humming bird moths.
A New York correspondent writes that the carpet beetle, Anthrenus scrophularix, universally but incor rectly called "buffalo moth," is known in certain towns along the Hudson as "Russian months."
The different names that have been proposed for the Acanthia lectularia, the insect which "has no wings at all," but which makesits presence felt notwithstanding, will fill several pages. Around Boston these tor ments are called "chintzes" and "chinches," and from Baltimore we get the name " mahogany flats," but in New Fork they speak of them as "red coats."

Ant Communities.-Sir John Lubbock, in a recent ecture on the "Habits of Ants," said that the question naturally arose whether ants were moral and account able beings. They had their desires, their passionseven their caprices. The young were absolutely help less. Their communities were sometimes so numerou that, perhaps, London and Pekin were almost the only cities which could compare with them. Moreover their nests were no mere collections of independent infocks of, nor en temporary associations, like the laboring with the utmost harmony for the common good. The remarkable analogies which to our human societies they presented in so many ways rendered them peculiarly interesting to us, and one could not
but long to know more of their character, how the world appeared to them, and to what extent they were conscious and reasonable beings. Various observers ment and affection. He had never, in the whole course of his observations, noticed a quarrel between two ants belonging to the same nest. Within the limits of the community all was harmony. On the other hand, it must be confessed that ants not belonging to the same nest were al ways enemies, even if belonging to the same species. Sir John went on to give details of a number of interesting experiments and observations.which he contended, might be held to prove the possession by the ant of an almost human intelligence. One result which he deduced was, that even in the largest nests the ants all recognized their companions. He had in variably found that if a strange ant, even of the same species, was introduced into a nest, sh.? was sure to be attacked and driven out. He had aiß : ade some ex periments on the power possessed by atats of remem-
bering their friends, and he found that a bering their friends, and
The Natural Enemy of the Spider.-The ichn : imon fly of Ceylon is the natural enemy of the spider. The insect is green in color, and in form resembles a wasp with a marvelously thin waist. It makes its حest of well-worked clay, and then goes out on a hunting axpedition. Its victims are invariably spiders of various kinds, but all are subject to the same mode of treatment. A scientific sting injects some poison which effectually paralyzes the luckless spider, which is then carried off to the nest and there fastened with a dab of moist clay.
Another and another victim is brought totbis chamber of horrors. Then the prescient mother ichneumon fly proceeds to deposit her eggs, one in the body of each spider, which can just move its legs in a vague, aimless manner, but can offer no resistance. This done, the fly returns to her work as a mason. She prepares more clay and builds up the entrance to this ghastly cell. Then she commences a new cell, which she fur nishes in like manner, and closes; then she adds yet
another cell, and so proceeds until her store of eggs are all provided for, and her task in life being accomplished she dies, leaving her evil brood to hatch at leisure. In due time these horrid little maggots come to life and find themselves cradled in a larder of fresh meat. Each poor spider is still alive, and his juices afford nutriment for the ichneumon grub, until it is ready to pass into
its chrysalis stage, thence to emerge as a winged fly, fully prepared to carry out the traditions of its ancestors with regard to spiders and fulfill the purpose for which they have been created, according to ichneumon

The Smallest Insect Known.-The editor of Insect Life, in answer to a correspondent, says that, so far as known, the smallest true insect that has ever been described is Alaptus excisus, Westw., a minute parasitic Hymenopteron, which occurs in England. Its length is seventeen-hundredths of a millimeter, or from six to seven thousandths of an inch, and it is of slender form. This little species is probably parasitic in the eggs of some bark louse. It is quite likely that there exist other species still smaller, but if so they have escaped the eye of the entomologist up to the present time.
The Edible Qualities of Ants.-It has long been known that the formic acid present in ants in such quantity is normally of such strength that it is not disagreeable to the palate. As a boy, Mr. Howard, the entomologist, tried the experiment of crushing ants with sugar and water as a substitute for lemonade, and recollects that it was drunk with relish by his companions. A correspondent of Insect Iife has written recently that one of her hired men is in the habit of eating large black ants found in rotten wood. She also states that her father, after eating a large section of railroad restaurant pie in the dark, and noticing an agreeable acid flavor, found that the remainder was swarming with specimens of the little red ant (Monomorium pharaonis), and that he must have eaten some hundreds of individuals. He was satisfied with his experience, which he did not repeat voluntarily, but he vouchea for the edibility of this species. What the original ingredients of the pie were is not stated, but the effect of the combination was to make it about as the effect of the
sour as rhubarb.

## Kyphosie Bicyclistarum.

One evil traceable to bicycling is the confirmed stoop which has already declared itself in many wheelmen, a result so common in the less strongly built bicyclists of the Continent as to have found its way into classification as the "kyphosis bicyclistarum."
The dorsal curvature posteriorly, which used to be rare in boys under 14 years of age, is, now that the bicycle is so largely used, very frequently met with, particularly among those young bicyclists whose spinal column is developing more rapidly than the ligaments and muscles, and in whose case, therefore, the equiibrium between those parts is more or less disturbed. Were it merely an unsightly deformity, the stoop in question ought to be combated in every way; but confirmed dorsal curvature posteriorly has consequences of its own quite mischievous enough to call for immediate counteraction. The displacement, embarrassed functional activity, and arrested or diseased development of these organs, which kyphosis inevitably induces, are all too serious to warrant the slightest neglect in remedying them.
Exercise of a kind to accustom the spinal column to an action directly antagonistic to the inclination forward of the bicyclists attitude is what is needed. The use of the Indian clubs or such similar means of incurvating the spine anteriorly, throwing out the chest and maintaining the head erect, should be practiced with that object. All the undoubted advantages of bicycling may thus be retained, without that cultivation of the stoop which tends to take a cubit from the stature of its inveterate exponents and to impose a hunchbacked development on what it would then be a figure of speech to call the rising generation.-Lancet

## The Great Seal Controversy.

Sir Charles Russell finished his long argument in the Behring Sea case recently. In concluding he said that this was the first occasion upon which a nation had claimed property in a free-swimming ani mal. The contention, he declared, was untenable, its advancement was derogatory to the principle of free dom of the seas, and it was extravagant and unfound ed pretension that international law sanctioned the seizure and condemnation of the vessels of a friendly power. In his peroration he dwelt upon the importance of the arbitration submitted to by the two great powers, one representing Old World civilization, great in extent of dominion and greater in long-enduring traditions of liberty; the other a young but stalwart member of the family of nations, great also in territory and almost boundless in the resources, genius and enterprise of its people, and possessing enormous powers for good in the future of the human race. Their presence as friendly litigants, he said, was a fact of great moral significance, and their submission to arbitration was a victory for peace, as the award would be if it left the principles of international law untouched. Sir Charles was followed by ex-Attorney-General Web-
ster, who insisted that the questions of rights and regulations were distinctly demarkated by treaty.-Brad street's.

The tide tables for the Atlantic coast of the United States, together with 207 stations on the Atlantic coast of British America, for the year 1894, published by the United States Coast and eodetic Survey, are now ready for issue, and copies can be obtained at the agencies of the survey in this city, or by addressing the office at Washington. Price 25 cents.

## To Europe in Four Days.

Mr. J. H. Biles, the designer of the steamers Paris and New York, expresses in the North American Revievo the belief that within ten years a vessel can "leave New York at noon and arrive at Southampton at noon on the fourth day out." To do this, however, will require the enormous speed of thirty knots an hour.
For the attainment of this speed, Mr. Biles relies on no factors wholly untried, but on the adoption for ocean voyages of some that are now familiar but costly. The first is the further increase of mechanism in proportion to the total tonnage, by carrying a smaller weight of cargo and a larger weight of machinery. Could our fastest ships replace their cargo by motive power, they could add, says this accredited but highly sanguine critic, from one and a half to two knots an bour to their speed. Or if, instead of carrying 1,000 to 1,500 tons of cargo, an now, their capability was made less by 500 tons, replacing this by additional motive power, they would add a knot an hour to their speed. But it has not hitherto been deemed commercially wise so to sacrifice cargo to passengers and speed.
ment, which is especially looked for in America, will certainly bring higher speed.
Then there is fuel. Improved combustion by forced draught and other devices may be counted upon, but should oil be substituted for coal, the weight carried will be reduced one half, and this saving alone will give "a knot and a half more speed." The oil costs more, and this cost would increase when the supply diminished with the enormous quantities used by steamships; and it would also be necessary to accustom passengers to the ideathat the oil is safe as a fuel. Bigger ships will also be faster. Length is most important for this purpose, and some forms of vessels can actually be made to go faster with the same engine power by adding to their length, though this is not true of our best Atlantic liners. Yet even with the latter an addition of fifty feet would require only four per cent more engine power to attain the same speed, and would yield ten per cent more money-earning capability. As to draught, an increase from the usual twenty-six feet to thirty feet would add one and a
quarter knots more, with a gain of eight hours on the
double felt covering, and to 103 kilos. in the case of a cork covering. For an average daily consumption of 1,164 kilos., the cooling of the boiler represented about 24 per cent and 8.1 per cent of the consumption of coal.

The Mont Contly Light Known.
Perhaps the most costly artificial light ever produced as an incident of scientific research, the Journal of Gas Lighting says, is that of the diamond burning n oxygen, as exhibited by M. Moissan in the course of his investigations into the different peculiarities of the diamondiferous forms of carbon. The action of oxygen upon the diamond has long been known; but hitherto no precise data concerning the temperature of combustion has been obtained. In order to ascertain the missing information, M. Moissan has employed a modification of the Le Chatelier pyrometer, placed along with the diamond in a wide porcelain tube closed at the end by glass plates througb which the combus tion in oxygen could be observed. It was first found in this way that, when the temperature is slowly raised

H. M. FIRST CLASS BATTLE SHIP VICTORIA, RECENTLY LOST OFF TRIPOLL.-[See page 2.]

We shall not stop to consider the reduction of the voyage by running to Halifax instead of to New York.
$\Delta$ second and a great source of gain, then, is in the lightening of the engines and other paraphernalia of power through the use of a lighter metal, such, for example, as nickel steel. This now costs much more than mild steel, but is 40 to 50 per cent stronger; italso costs no more now than that steel did in 1875. If this metal can replace steel in our best vessels, it will add, according to Mr. Biles, a knot an hour.
The process of getting more work out of the same weight of machinery also goes on gradually, while as to boilers there is hope of a far more important advance. Even now some types do three times as much work per ton as others, but could a light boiler be found that would do as good work, this problem of gain would be solved. If the locomotive type of boiler, which is one of the lightest of tubular boilers, or those having the fire inside the tubes and the water outside, give on long voyages two-thirds of their relative superiority on trial or as used in torpedo boats, another gain of over a knot an hour will result. There are also the tubulous boilers, with the water inside the tubes and the fire outside, whose performance, says Mr. Biles, "in relation to weight is much better than any of the tubular type:" and their develop-
run across. But, of course, in this matter, harbor and dock facilities must be considered.
In fine, should nickel steel be cheap enough for use in engines and should a light boiler be secured for long voyages, the speed may be increased by two knots, while oil as fuel would carry the gain to three and a half, which would reduce the time record between Bandy Hook and Queenstown from five days fifteen hours to four days sixteen hours. Increase the length of the vessel to 1,000 feet, its width to 100 , and its draught to 80 , and it will make 30 knots an hour, and " be capable of crossing the Atlantic in a little over four days."-N: Y. Sun.

Boller Covering and the Consumption of Coal. Some experiments on the influence of boiler coverings on the consumption of fuel have just been concluded on the railways of southwest Russia. It was found that cooling was more rapid while working than when stationary, save when a double covering of felt was used. The heat lost in twenty-four hours by a boiler with 30 square meters of surface containing water at a temperature of $144^{\circ}$, and exposed to an exterior temperature of $8 \cdot 6^{\circ}$, corresponded to 183 kilos. of coal if the boiler were uncovered, to 153 kilos. if there coal if the boiler were uncovered, to 153 kilos. if there
were a thin metal covering, to 180 kilog, if there were a
under these conditions, the combustion of the diamond proceeds slowly, without the production of light. But if the temperature is raised to forty degrees or fifty degrees above the point at which this slow combustion commences, a sudden incandescence occurs, and the diamond appears surrounded by a brilliant flame. Various deeply colored specimens of diamonds burnt with production of incandescence and flame at temper. atures of from 690 degrees to 720 degrees C.; but transparent Brazilian diamonds did not attain the stage of slow combustion without incandescence until the temperature of 760 degrees to 770 degrees C. was reached. Specimens of exceedingly hard bort commenced to combine with oxygen at 790 degrees C., and bornt brilliantly at from 840 degrees to 875 degrees C. When Cape diamonds were heated to a temperature of 1,200 degrees C. in a current of hydrogen, they remained unchanged; but if the stones had previously been cut, they frequently lost their brilliancy and transparency. It is a curious fact that metallic iron at its melting point combines with the diamond in a most energetic manner, and crystals of graphite are deposited in the mixture as it cools. Hence the experiment forms a striking mode of converting the allotropic form of carbon, which crystallizes in the cubic system, into that which erystallizes in the hexagonal system.

## REGENTLY PATENTED INVENTIONS.

## Rallway Appliances.

Car Brake.-Albert H. Kirker, Avalon, Aa. This brake is provided with two differentital
brake levers adapted to be connected with a pair of brake levers adapted to be connected with a pair of
brake beame, a bar pivotally connecting the levera with brake beams, a bar pivotally connecting the levers with
cich other near the beama, and a link connecting the frie ende of the levers with each other. This Improved Orake is of dimple and durable construction and appli-
cable to all kinde of cara, the connected differential brake cable to all kindo of cars, the connected differential brake
levers affording meana for applying the brake aboes on heavy cars with great power.
Car Coupling.-William B. Yates, Bucoda, Washington. In this coupling the drawbar has Buccois, Wasingto. mand
a maction and a
eide section boited together and arranged at their front ende to form jawe betreen which
the drawhead is horizontally pivoted and provided with a depending integral link. The construction is eimple, and is deeigned to obviate all danger of injuring the fingers or bands of trainmen, and to facilitate the coupling
together of cars of different height, while it permits of together of cars of different height, while it permits of
convenient coupling with an ordinary drawhead as well as with another of the same kind.

## miscellaneous.

Pipe Joint.-Charles C. Merrill, Riverride, Cal. The pipe sections are made with a gcrew-
tiresded socketed connection and annular internal receasees where the endoo the sections abut, a split ring being embedded with a sultable cement in the receas
formed by the two recesees, with it inner face fush with the inner surfaces of the pipees. The joint is especially deeigned to uee with vitrified clas pipes and similar deaignea to uee with vitritied clay pipes and similar
pipes and tubee, emploged for conveying liquide under high preseure.
Calipers. - Johann C. Reimann, Union, N. J. The body of this device, to which the arms are pivotally connected, has ecalee arranged upon
the arc of a circle, and reading in oppooite directione indicators connected with the arms opposite directione, each scale. The device is eimple and durable and is more especially adapted for une in measuring a horse for a collar. The calipers are so made that they may be
whien not in nee and readily carried in the pocket.
Coin Detector.-Edgar H. Cook, Brooklyn, N. Y. This is an improvement adapted for application to coin-operated or nickelin-the-slot ma-
chinee, for guarding the mouth of the coin chute, and chines, for guarding the mouth of the coin chute, and
detecting and rejecting all coins of the wrong size, and detecting and rejecting all coins of the wrong size, and
all rubbish, auch as washers, buttons, etc. The invention ail rubbigh, fuch as waberes, buttona, etc. The invenion
covers vartous novel featurea and combinations of parte wherebb the appropriate coin may be conveniently depooited in the chote, but deaigned to $m$
impoosible to depooii any other article.
Hose Coupling.-Philip H. Dencer, Sprague, Washington. This fa a coupling that will not Sprague, for quickly and conveniently uniting gections of
 tions Bia ting npon one side a loose hinge joint and on the
other side meane for drawing together and locking the Other side means for drawing together and locking ine
two gectiona. There is a lip or hhonlderon one ection, and a lever hinged to the other section has an elbow adapted to bear againgt this lip to draw the eections to
gether, there being also means for locking the lever in gether, there being
Hand Punch.-Wilson Carey, Forest Hill, Cal. In this panch one arm tervinates in a aleeve bolt in the elleeve extending over the inner ends of the punches to force out emall pieces of leather or other mapurches to force out main pieces of heather or other material removed my ming holee in leather, cloth, rubber, etc., and its construction insures equal pressure on all por-
tions of the end of the punch, avoiding the atateral atrain common to pnnches in which both jaws have a awinging motion.
Cigar Box-Osear Kunzell, Dusseldorf, Germany. This box is divided into a series of
parallel compartments open at both ende, fabric memparalile compartments open at both ende, fabric mem-
branees adapted to be punctured closing both ends of the branes adapted to be punctured closing both ends of the
series of compartmenta, so that the finger masy be pushed
 its compartment and through the opposite membrane. The membrane is preferably of soft paper, the latter Por protection covered with thin
before any articlea are taken out.
Game Apparatus.-Edgar L. Willlame, Peoria, ,II. This apparatus comprisee a board held group of holees neap the center and holes near the ende, open.arch wiciketes eccared to the board extending over
the holes. Transeree lines !divide the board into comthe holes. Transverse lines !divide the board into com-
partmente, and counters or chuckere are enapped from partments, and counters or chuckers are anapped from
one end of the board, the player endeavoring to enap the One end of the board, the player endeavoring to enap the
counter through one of the wickets and into one of the counter through one of the wickete and holes
holes, the counting varying for different hole
Bowling Alley Attachment. James B. Winn, Winchester, Maes. This is a device for
checking the apeed of balla returned through the trough checking the epped of balls returned through the trough
of the alles, thus preventing injurious percusion of the tilting bar, longitudinally inclined above the trough in position to receive the impact of a ball at one end, and hariug to other end connected by a llonk with a abockabsorbing device.
Animal Trap. - James alexander, Lakeview, Idaho. This is a simple, cheap, and very
atrong trap, in which the npper sidee of the jawe are enirely free when the trap io set, and the trip plate liee very low in the trap, being pivoted in such a way that
it cannot be readily broken. The trap is adapted to it cannot be readily broken. The trap ie adapted to
catch animals of almost any kind, the ize of the opencatch animals of almost any kind, the eize of the open-
ing through the trip plate being adjustable to expose ing through the trip plate being
more or lese of the bait, as deiired.
Electric Cut-out.-Patrick J. Barrett, Boston, Kases. This is a finse box of simple constraction, espectially applicable to incandeacent lamp
cIrcnite, bnt also enitable for other asees, and deaigned to carcnits, bnt also enitsble for other reese, and designed to carry a number of fuible conductors in anch way that
one will be brought into poestion to close the circuitafter
lisble to occar when the current is anddenly increased
beyonda calcolated limit. The invention providea for two forme of a device in which a drum carrying the fuible wire may be revolved or the fusible wires may
be held in a etationary position and the contact brush for be held in a atationary position and
engaging them may be revolved.
Recorder or Telemeter.-John T Todd, Newman, Inl. This ie a machine for automatically
recording for any atated time the tate or variations of recording for any atated time the atate or variations of changing agent, in any locality, machine, or apparatue The recording reciver has a eeries of type wheels, the force-recording wheel being actuated by electro-mag
nets actuated from a tranamitter according to the riee or nets actuated from a tranamiter accorang to the ribe or
fall of the temperature or height of water, or pound of pressure, etc., additional type wheels being used for ch $t$ more agente or forces, and the arrangement nch that a complete record may be made for any deirired ents under observation.
Music Leaf Support.-Adolph J. Lehmann, Liverpool, England. This device compriees ends are connected by a solid portion with a pivot aperture, and from which a wight depends, forming a coun terbalanced aupport to be engaged by the leaves while
being turned. The device is very simple, and may be readily carried in the pocket, or the counterbalanced boo Eyeglasses. - Adolphus J. Landry, Boaton, Mase. This invention provides a novel con
 ject to the control of a apring, whereby the lenese are
made readily or automaticilly adjuatable toward or from each other in a straight line. The conatruction affords great facility of adjuatment, the framee being gatrong and durable, and holding the glasees very teadily.
Pen or Pencil Holder. - Chafles
 or fountain penes, being adapted to be eecured in a pocket
to oold the pen kafely when not in use and protect its to hold the pen safely when not in ues and protectits
point from injury. It consista of a tubular elastic eheath, poin trom injury. It consista of a tubular elasstic sheath,
tapered and closed at the lower end and open at the up tapered and closed at the lower end and open at the up-
per end, in connection with a device for attaching the per end, in connectio
Pipe Hanger.-John H. Hunter and Friedrich Cajar, New York City. A Eingle rod or wire ie
bent to form end claspa and an intermediate loop or coil bent to form end clapps and an intermediate loop or col
adapted to receive a pipe, the material forming the end adapted to receive a pipe, the material forming the end
claspe being bent outward from the coil and returned on itelf, and having eyee at its terminale to afford a broad facilitste the euppension of metal or other pipes fron veame, the hanger being inexpenaive and elastically ad justable in its limbe that engage the parts of the beam rom which the pipe is to be hung.
Lamp Chimney attachment.-Kin-
 at their enda and croeeing under or over and bracing on
and another, and terminating at their center in a downwardl. projecting hollow and open acrew. The device forms convenient rest or aupport and guide for heating differ-
ent bodies or veesels by the lamp fame, eapecially for eating curling irona.
Watch Case Spring.-Victor Nivois, Brooklyn, N. Y. This improvement combines in one
piece a duat band, lift apring, and release apring, the
 single piece of metal, and when formed may be quickl case, avoiding the nas of a number of apringe, and the expense and time of attaching a lift apring to an encir cling band or spring for a center.
Sefage Treating apparatus.James J. Powere, Brooklyn, N. Y. A tank is made in
duplicate, each half provided with ways for the peesege of sewage, and in combinatio with the sluicees are wires and Bcreens for hoding back ne eoilid matter, and dip boardi for retaining oily matter
and other floatiog eubetancea. Apparatue is aleo pro vided for introducing chemicala) to purify the eewage be Pore it is discharged, there being a receptacle for
treated sewage, and an automatic discharge siphon.
Glass Carrying Vehicle. - Robert M. Roberts, Anderson, Ind. This is an improved ap paratus for conveying glasg cylinders from the point
where they are blown to the place where they are where they are blown to the place where they are
to be further operated upon. The main wheel is provided with a cushion which will not be cut by glase, and the cylinder-earrying belts are ao arranged and aupported that the cylinders cannot be jarred and broken. The main frame if aleo вo ouppended as to be epringy and easy, to
ders carried.
Tree Support. - William H. Cook Riveride, Cal. This aupport comprisee a pcle, adapted
to be fastened by atrapas to the tronk or branchea of a to be fastened by atraps to the tronk or branches of a
tree, or to be eet in the ground, $a$ frame and aliding sleeve being held adjuatably on the pole, a flange of the sleeve being adapted to be engaged by a cable, wire or
rod. The device is simple and easily applied, and is de signed to eecuruly prop up and support theavily laden birys Escape. - Charles Dobbs, Ne vada, Texas. The folding ladder type of ecape ha
been improved by this inventor, who has deaigned conatruction comprising a seriee of like sections, eacl composed of two side bare laterally boged on like edges
at their ends, the sections having transereree runge and at their ends, the ections having traneverbe runge and
being looeely connected at their ends by pivoted link plates. The parts fold together compactly, and the it is dropped the parto unfoll by bravity and fall in to po sition for use. The construetion is sioch that the ladder is held away from the wall, and a duplicate ladder may be attached when neceesery
Tobacco Pliers.-Milton B. Hatcher, Agosta, Qa. This if an implement to facilitate the re-
moval of plag or elab tobacco from the box. It has two
crossed and pivoted handle members, a depending nembera, while near the near the end of one of the between the jaws is pivoted a curved toe having teeth to engage the rack. By inserting the sharp end of the toe
between the end of a plug or slab and the side of the between the end of a plug or slab and the side of the
box, a powerful purchase is obtained when the handles box, a powerful purchase is o
Grain Purifier. - Frank M. Schell, Perry, Kansas. To facilitate the cleaning and polishing of wheat, corn, rye, oats, barley, and other grain, is the ith is a fan box arranged in a cylinder, there being a lower
ind nishing chamber provided with a screen or sieve and a volving brush, while a pipe connecte the acreenjing ox of the finishing chamber with one of the fan suction ted A ylelding aurface concave and head are oper ed in the cyllnder above the fan box to thoroughly eparate the grain, hulling white caps, mashing boft
graing, etc., and put the graln in condition to be ef-

Hoisting Apparatus.-Noble H. Gil ore, Greenville, Mich. An arrangement of draught equallzing pulleye below and as an attachment of the upper pulley block of a compound puiley ayatem is pro ided by this invention. It comprises equalizing pul
leys journaled in a frame permanently attached to the tya journaled in a frame permanen cone upper pulley block, in connectlon with a
rame chain which runs on the several sheaves of the aystem, the improvement being designed to obviate the greater riction, draught and wear incident to the ordinary compound pulley ayatem.
Window Cornice and Curtain Sup-ort.--Jeremiah M. Hoffman, Cressona, Pa. This imach end of the cornice body on the ingide of a window the devices to be operated in unieon, and the cornice body being readily connected to windows of different widthe Combined with the cornice supports there are aloo ad justable curtain-holding brackets and lambrequin sup ports, he construction being such that the devices can djusted bj anyone, without the emploviet screw nalle, or toole of any kiad.
Coke Oven.-George W. Nixon, Chatanooga, Tenn. This is a traveling oven, arranged to the coking has progressed to a certain degree, the oven the coking has progressed to a certain degree, the oven
on its own wheele over a suitably arranged rack to the top of afurnace, where the atill burning contents are dlacharged, the same general construction being followed where the contents are to be dumped into a
atock pile. The oven has a dome-shaped top, lined with atock pile. The oven has a dome-shaped top, lined with
frie brick, a layer of which material is also applied to the fire brick, a layer of which material ie also applied to the
base, the dome being hinged to the rear edge of the base, o that the two may be opened to diecharge the coked ontents.
Gas Stove.-Anton Weiskittel, Balti more, Md. This invention provides a cock or fitting
consieting of a pipe section having a controlling valve with a handle projecting to obe side and a laterally pro jecting section on the opposite side, a vertical section being jointed ftting forishe the controlling valve and ignitor tube and valve, the
manipulatlon of neither the controlling valve nor the ig nitor or its valve interfering with the mannpulations of

Boot or Shoe.-William Wass, PhilaBelphia, Pa. This is an improvement in boot or shoe ared to and lugs on its lower aurface, while the other and oute late has a locking button adapted to enter the recese, a inding screw connecting the two plates. This protect are quickly and easily applied.

## Designs.

Penholder.-Dent L. Lydick, Quaker City, Ohio. This holder aimulates an oar bearing on on
side of the blade an illustration of the three ships of Co mbas on the sea.
Flower Bed Support for Graves. feorge W. Burne, Troy, N. Y. This dcrign represente open book, while at the foot is a smaller flgure of an angel
Nors.-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
Hicks' Builders' Guide. Comprising an easy, practical system of estimat contractors and builders. By I. P Hicks. New York: David Williams.
1893. Pp. 160 . Price $\$ 1$.
The subject of house building, framing especially, the subject of this work, with special view to the eatima tion of material and labor uaed in atructures. The 日ysidently recommended to the trade.
History of the Master Builders' Ex
CHANGE OF THE CITY OF Philader
PHIA. By Clem. H. Congdon. Illus
trations by William W. Morgan
Philadelphia: Sunshine Publishing Company. 1893. Pp. ix, 493.
While the subject of this work would seem to be a
very local one, and while its text is ccrtalnly of rather re very local one, and while its text is ccrtannly of rather re sricted interest, the fact that the work is illustrated by very besuuiful half tones of the different habitations of
men, as shown at the Paris exposition of 1889 , gives it an men, as ehown at the Pari日 exposition of 1889 , gives it an
interest of its own. The subject of trade achoolareceive considerable space, which enbject, of course, is one of

The Manufacture of Liquors and Preserves. By J. De Brevans, boratory of Paris. New York : Munn $\&$ Co. 16mo. Pp. vi, 200. 65 illus-
trations and 18 tables. Cloth. 1893. Price $\$ 3$.
A practical work on the manufacture of liqnors which by its price would be within the reach of all has long chemist who has devoted much time and etudy to the preparation of liquers and preserves. The great value of the work consiste in the formulas, which number ove 300, and are so arranged that, if the manufacturer has no diatilling plant of his own, he can still make many of the liquors from the essences. The manufactare of Frenc ligueurs from essences is very prontable and does no require large capital. The raw materials, the plant of the distiller, etc., are described according to the beat modern practice. Thable tables and a very full index Table of contents sent free on application.
Jahrbuch fur Photographie und Re Productionstechnik. By Dr. Jose
Maria Eder. Halle'an der Saale, Ger Maria Eder. Halle an der Saale, Ger-
many : Wilhelm Knapp. 1893 . 145 woodcuts, zine plates and 34 artistic tables. 586 pages.
The seventh yearly volume of the above entitled work has recently been issued, and it contains 84 original conrelating to photography. A retrospect of the progrees of photography during the years 1891 and 1892 by the well known author, Dr. Eder, together with a list of the sev-
eral patents which have been granted on photography in eral patents which have been granted on photography in Austria and Germany during the year 1882, conclude self by the addition of the beautiful plates covering the
e Bekampfung der Sturzwellen Durch OEl. By Joseph Grossman,
Engineer. Vienna: Carl Gerold's Sonn. 185a. 140 pages.
The book gives a ahort history of the use of oil on the tronbled waters of the ges, and cites in the beginning
Aristotle, Plutarch, and Plinius, to whom this property of onl was, apparently, known. The author treats in of oll was, apparentiy, known. The author treats, in a
very intelligent manner, the value of the use of oll on
boasd of marine vessels to quiet the sea, alaothe oilamoat board of marine vessels to q
serviceable for the purpose.
Any of the above books may be purchased through this offlce. Send for new book catalogue just pub.
lished. MUNN \& Co., 361 Broadway, New York.

## SCIENTIFIC AMERICAN

BUILDING EDITION.
JUNE, 1893.-(No. 92.)
table of Contents.
Elegant plate in colors, showing the residence of Joseph P. Beach at Pine Orchard, Conn., erected at a cost of $\$ 1,200$ complete. Floor plans and two perspective elevations. Mesers. Munn \& Co., architects, New York
Plate in colors showing the handsome residence of
Seward $W$. Jones, at Nitale Seward W. Jones, at Newton Highlands, Mass,
erected at a cost of $\$ 9,000$ complete. Perspective view and fioor plane. Meassrs. Rand \& Taylor architects, Boeton, Mase. An attractive design, ton, Mass. Two perspective views and floor plans.
A model deaign. Messrs. Shepley, Rutan \& A model design. Meesrs. She
Coolidge, architects, Boston, Mase.
A Colonial residence dwelling at Montclair, N. J., erected ata cost or 85,500 complete. Floor plane, two perspective view, etc. Messrs. Munn
architects, New York. An excellent deeign.
5. Engravinga and floor plans of a dwelling at Elm
tion, Pa., erected at a cost of $\$ 5,200$. dwelling erected near Longwood, Mass. A modern
deeign. Mr. Autin W. Pease, architect, Boston, Mass. Floor plane and perspective elevation. Cost about $\$ 2,200$.
The First Congregational Church at Plainfield, N. J.,
erected and furnished complete at a costof $\$ 15,000$ erected and furnished complete at a costof $\$ 15,000$.
Mr. Oscar S. Teale, architect, New York City, Per Mr. Occar S. Teale, arch
8. A residencc at Beardsley Park, Bridgeport, Conn. A very picturesque design, perspective elevation and
floor plane. Cost $\$ 5,500$ complete. Mr. A. H. Beers, architect, Bridgeport, Conn.
. Views showing the exterior of the twelve story Boyce Building, at Chicago, put up in thirty-nine daye. The Fifth Avenue Theater, Nas $\$ 30,000$.
The Fifth Avenue Theater, New York.- Views of the auditorium, the Broadway lobby, the Twenty-
eighth Street foyer. Mr. Francia eighth street Yoyer.
 -An improved apring door hinge, illustrated.-To
eatimate brick work.-Foul water main.-An improved woodworking machine, illustrated.-An improved scaffold truss, illustrated.-Sawdust bnildlng bricks.-Some beautiful arch work, illue-
trated.-Mineral wool in buildlngg.-Wood mantele, illuatrated.--Sound titles for real eatate.-Durability of cedar.-Tinfrom tin scrap.-Improved ateam ity of cedar.-Tiniter,
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Stow Mp. Co., Binghamton, N. Y. See adv., page 270. Screw machines, milling machines, and drill presses.
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Miner sent for examination shoold be dietinctly
marked or labeled.
(5151) C. W. S.-The care of a gravity cell is very simple. Two things are necessary; one is to markation of the copper solution and the zinc sulphate abont half way between the zinc and copper solutions of
the battery. This you can do hyregulating the resistance the battery. This you can do hyregulating the resistance
of the circuit. If yon flind your cells running down ton of the circoit. If yon find your celle running down to
rapidly, connect them up in seriea of two or three in arallel; if on the other hand, level of the blue inquid riee into close proximity with the zinc, it indicates too much to decrease the resistance of the esternal circuit.
(5152) J. J. M. says : Some time ago I sew a man who made it his bnainese writing names and asing the vapors of fluoric acid, but this man used a fluid with pen and brush. Would you kindly let me know under queries of your valuable paper what kind of a solu tion he probably ueed? A. 1. The preparation may be made by mixing sulphate of barium and fluoride of ammonium in the proportion of three parts of the former oo one part of the latter, with sufficient sulphuric acid to decompose the ammoninm and bring the mixture to the
consistency of rich milk. The mixture should be made in a receptacle of lead, and kept in a bottle of the mame ma receptacle of lead, and kept in a bottle of the same
mutta percha. 2 . Since fluoric preparations have been produced at reasonable prices the decoraionjof glase by their means has ateadily made ite way Etched glass is now to be found everywhere, and glase etching runs glass cutting very hard. It is very easy to underatand that well etched objects appear actually more beautiful than those which have been cut, The cost of production is cheaper, and since M. Hock, a Viennese of glass etching, the difflculties attending this kind of ork fuoric preparations yield a matt surface. The most beautifol ornamentation is obtained when certain parte of the glass surface are rendered matt by means of
flouride of ammoniom which has been slightly acidifled by meane of acetic acid. The matt appearance is not always the same with different kinds of glass, but varie
much in beauty. This effect is governed by the composl
tion of the glass, lead glasees being easily acted upon and furnishing a very fine matt surface. 3. Where it is de but shining like ice, as in the case of window glass, this may be attained in a aimple manner by placing the glase with in a proats. Then very dilute fuoric covering it upon it. The groate act as a shield and produceupon the glass raised points.-"Cyclopedia of Receipts, Notes (5153) J
(5153) J. M. says : Will you please ad vise a subscriber how to finish an oak front to a dwell
ing that is exposed to the weather, where the finish will stand any reasonable length of time and not come off, bleach out and fade: All fronts to dwellings and stores in this part of the State that I have noticed do not stand the weather. Also please advise how to make a glue that
will hold a joint that is exposed to the weather. A. An oak front should be thoroughly oiled with raw lineeed oil as soon as finished, andrubbed down with woolen cloths. In a few days, or as soon as the raw oil has atrack in and dry enough, apply a coat of boiled linseed oil, and
when dry a second coat. A good weather glue is made by boiling the glue with akimmed milk, in the proportion of half a pound of dry glue to a quart of ekimmed milk. Swell the glue in the milk before boiling.
(5154) P. McL. writes: I am about to erect two batteries of boilers, four boilers ineach battery.
Size of first battery 26 feet long by 38 inches diameter, two 15 inch flues in each boiler. Size of second battery
32 feet long by 42 inches diameter, two 15 inch fuea in 32 feet long by 42 inches diameter, two 15 inch flues in
each boiler. Will you please through your Notes and Queries inform me the distance grate bars should be below shell of boiler, aloo distance from bridge wall to shell of boilera, depth of combostion chamber, and atyle of back wall, whether staight wall or shoold it be racked
off in front? Boilers to burn Pittsharg coal and can use ofi in front? Boilers to burn Pitsharg coal and can use
all steam they can make. Also please give me beight and diameter for iron smoke stack for each battery? A. The grate for soft coal should be 3 feet below boilers both batteries. Bridge wall, one foot below the bollers. Size of grate for each boiler of the firat battery should be
40 inchea wide, $41 / 3$ feet long. Size of grate for each boile of second battery should be 44 inches wide, 5 feet long Bridge wall should be vertical for 9 inches above the
grate, then racked off or beveled to the top at about $45^{\circ}$ grate, then racked off or beveled to the top at about $45^{\circ}$.
Iron emoke stack of first battery 38 inchesdiameter feet in height. For second battery 44 inches diameter feet in height.
(5155) F. W. M. asks : Is there any need to nee? A. No flux is used in casting brees to nee? A. No flux is used in casting brase. A
little powdered charcoal is puton the surface in the cru

## cible to prevent oxidizing

(5156) J. J. P.-We do not think a fan blower is adapted to organ blowing, on account of the vibration of the column of air
sounds produced by the pipes.
(5157) C. H. asks: 1. I have just made wo storage batteries, 4 piates, each $4 \times 5$ inches, coat with red lead mixed with sulphuric acid and water
I want to charge them from a 50 volt, 16 candle powe socket. Is the voltage too high: A. By introducing your battery, together with some resistance, into your 50 volt circuit, y ou cancharge it. 2. How can I rednce the voltage from the socket low enough to charge the cells
to the begt advantage 9 . Use a wire rheostat ora bank $\begin{array}{ll}\text { of lamps for resistance. } & \text { 8. How many gravity batterie }\end{array}$ will it take to charge the storage batteries so as to burn a the gravity celle during the day time to charge them? he gravity celle during the day time to charge them The proposed lamp is rather small; you might use 2 or 8 cella with a larger lamp and run it for a much longer time.
(51
(5158) W. M. writes : I have constructed a pair of receivers of the Bell telephone pattern, merely
as an experiment. When I tried them I found that the as an experiment. When I tried them I found that the
sounda were very low and indistinct. Can yon tell me sound were very low and indistinc. Can yon the me
what the cauge of this is? A. Possibly you may have placed the diaphragm at too great a diatance from the pole of the magnet, or you may have used a weak on yonr spools, or the wire may be short-circuited.
(5159) B. M. C. V. asks : 1. What is the fule to know the charging time of a given accumulator? Has the nomber of plates anything to do with it, or the A. Charge your batteries until the positive plates look like wet slate nearly black; when partly diecharged they become dark red, chocolate or plum color. It requires about 7 or 8 hours to charge a battery. 2. I have an accumulator for medical use, composed of four вeparate ccumulators to be charged, connected in parallel with 2 Bunsens 20 cells for 8 hours. I want to know how many hours it will take to charge them with 4 telegraph celle ? A. Four gravity cells to each cell of storage battery will 3. I have two large Bunsene (2 gallone) with two zinc plates each ; one of the plates in each cell is nearly detroyed by little use. The connectionsare properly made the 2 zincs in each cell and one of them with the carbon of the neighboring cell; the platesare thoroughly amalgamated,the screws firmly attached, nevertheless the browe ing is very strong in both the mentioned plates. Can ou help !me with your advice in preventing such a roublef I ose for charging 1 part atrong sulphuric acid 12 of water by volume. A. The only way to prevent cell when the battery is not in use. 4. How can I know the amperage and ampere hours of a given accumulator? A. You can determine this only by trial, or addressing the maker, if it is one which is on the market
Repiles to Enquirites.
The following replies relate to enquiries publighed in
he SCIENTIFIC Amrartan, and to the numbers therein The fol
the Scre
given.

Boring Glass.-In the May 6, 1893, number of the Scientific Ambrican, a correapondent,
M., telle of a very good way to drlil glass plate. Bis methodia a good one, but if a eaturated solution of camphor in tarpentine be used as a lubricant, the drlll will
cotmore rapidly.-C. R. Joisis, M.D.

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"The patent itself is for the mechanical structure of an electric telephone to
be used to produce the electrical action on which the first patent rests. The third claim is for the use in such instruments claim is or the use in such instruments
of a diaphragm, made of a plate of iron or steel, or other material capable of inductive action; the fifth, of a permanent magnet constructed as described, with a coil upon the end or ends nearest the plate; the sixth, of a sounding box as described; the seventh, of a speaking or hearing tube as described for conveying the sounds: and the eighth, of a permanent magnet and plate combined. The
claim is not for these several things in and of themselves, but for an electric telephone in the construction of which these things or any of them are used."
This Company also owns Letters Pa-
tent No. 463.569 , granted to Emile Berliner, November 17, 1891, for a Combined Telegraph and Telephone; and controls Letters Patent No. 474,231, granted to Thomas A. Edison, May 3, 1892, for a Speaking Telegraph, which cover funda-
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