

are subject to a certain shrinking, and therefore those which are to be matched exactly should always be worked under the same conditions.

THE ILLUMINATION OF THE BROOKLYN BRIDGE.

Electricity played an important part in the recent celebration in honor of the homecoming of Admiral George Dewey. Electric signs of all kinds were scattered throughout the city, and along the water front several corporations and private firms went to considerable expense to provide illuminated signs composed of incandescent lamps. The Brooklyn Bridge was naturally considered as a rare chance for illumination on a large scale. This was accomplished by erecting the words "Welcome Dewey" in incandescent lights. Each letter was thirty-six feet in height, and the entire length of the two words was 370 feet. The letter "W" alone contained about 1,100 lights and the total number of lights was 8,000. In addition, both of the lofty towers were provided with search lights, and the whole combined with the splendid fireworks made a never-to-be-forgotten scene. Our line cut shows the method of suspending the lamps between the poles. The poles were placed on the southern roadway and were lashed to the superstructure and were held in position with the aid of wires which acted as guy ropes. The lamps themselves were strung upon wires which were stretched between the poles. Before the work was completed it was found that the wind caused so much breakage that every lamp had to be anchored in position by the aid of wires which were twisted around the lamps as shown in our engraving. The current was taken under the roadway by cables and was fed to the latter by feed wires suspended between the posts at the bottom. Switches were provided on the posts to control the lighting. The effect of the gigantic letters was most imposing.

The Color of Blinds.

The remarkable and widely varying properties of the elementary colors which compose white light suggest that the employment of screens as in the blinds placed over our windows should be founded on a scientific basis, says The London Lancet. Our knowledge of the properties of each individual section of the spectrum is not exact, but this much we do know, that the rays of least refrangibility, the red rays, are without direct chemical effects, they occur at the heat end of the spectrum. On the other hand, the rays of the highest refrangibility contain the violet rays which chemically are exceedingly active. It is these rays which are concerned in photography and doubtless also in the great processes of vegetable nutrition and growth. The object of blinds is, of course, twofold—to keep a room cool and to screen out some of the light, so as to avoid the bleaching of coloring materials of the carpets and furniture. At the same time sufficient light must be admitted so that the occupant may see without difficulty. What then is the best color for this purpose? Since light exerts the peculiar action due to the actinic rays which materially and wholesomely affect the air of a dwelling room care should obviously be taken not to exclude all the rays that are so concerned. Thus ruby or orange-red material would be contraindicated. A abundance of light is inimical to the life of micro-organisms, so that a material in some shape of a compromise should be selected. The best for this purpose is probably a delicately ochre-colored fabric. This would screen part of the active light rays, and if of a fair thickness the greater part of the heat rays, while admitting sufficient active rays to allow of a wholesome effect upon the room and its surroundings.

Venetian blinds do not allow of the gradation, which is desirable, of the tone of light which may be adjusted with cloth fabric. As is well known, exclusively red light has been used as a therapeutic agent, and apparently with encouraging results, in measles.

The Human Body as a Caloric Machine.

As the efficiency of a steam engine or other machine is considered as the relation of the work performed to the energy supplied to it, it is an interesting question to consider the case of the human system, and

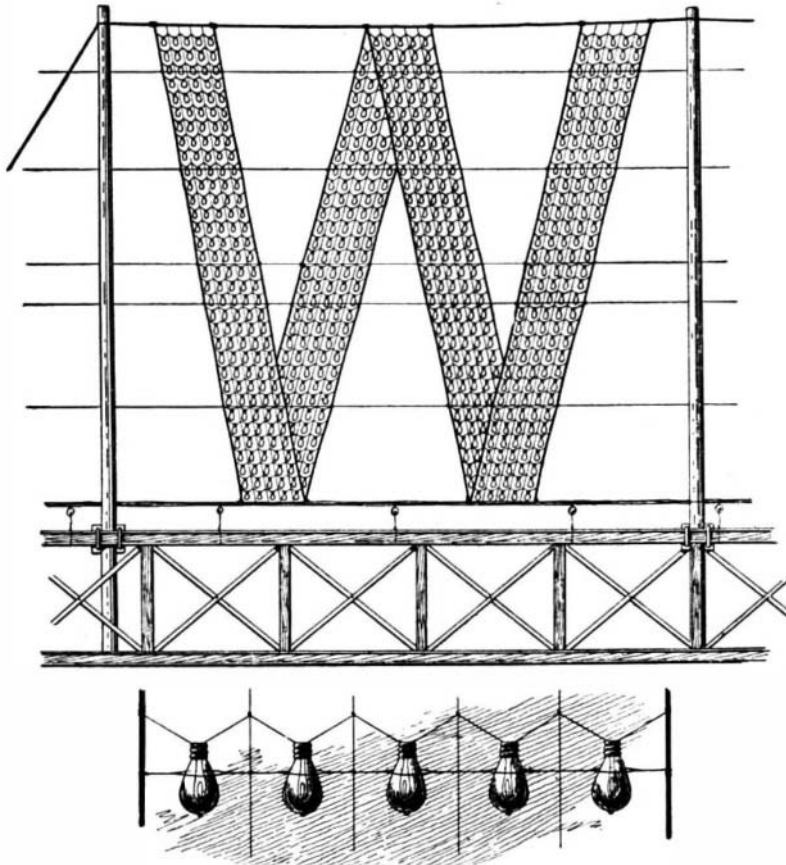
1,094,000 kilogramme-meters, this figure representing the energy developed in the system.

To find out the average work performed by the individual, we may take as an example that of the Alpine guide considered by Dupin. The mean weight of this man was 70 kilogrammes, the load which he carried 12 kilogrammes, and the duration of his work 10 hours, each hour corresponding to an ascent of 400 meters. Accordingly the total work which he performed in that time was $82 \times 400 \times 10$, or 310,000 kilogramme-meters. To estimate the efficiency at which this work was performed, it is only necessary to find the ratio between this figure and that of the energy supplied to the body, as above estimated by Rühlmann, or $1,094,000 \div 328,000$. This gives us 30 per cent as the efficiency of the human motor. Or, if we wish to admit 25 per cent as a fair average, it is seen that a man gives only 25 per cent of the total energy produced by the oxidation of the aliments, the remaining 75 per cent being expended in internal work. This efficiency, it may be observed, far surpasses that of the steam engine and other similar motors, the steam engine giving on an average only 6 per cent of the energy stored up in the combustible.

The Man Who Has a Genius for the Inopportune.

The following from The New Orleans Times-Democrat illustrates the characteristic of persons one is continually meeting.

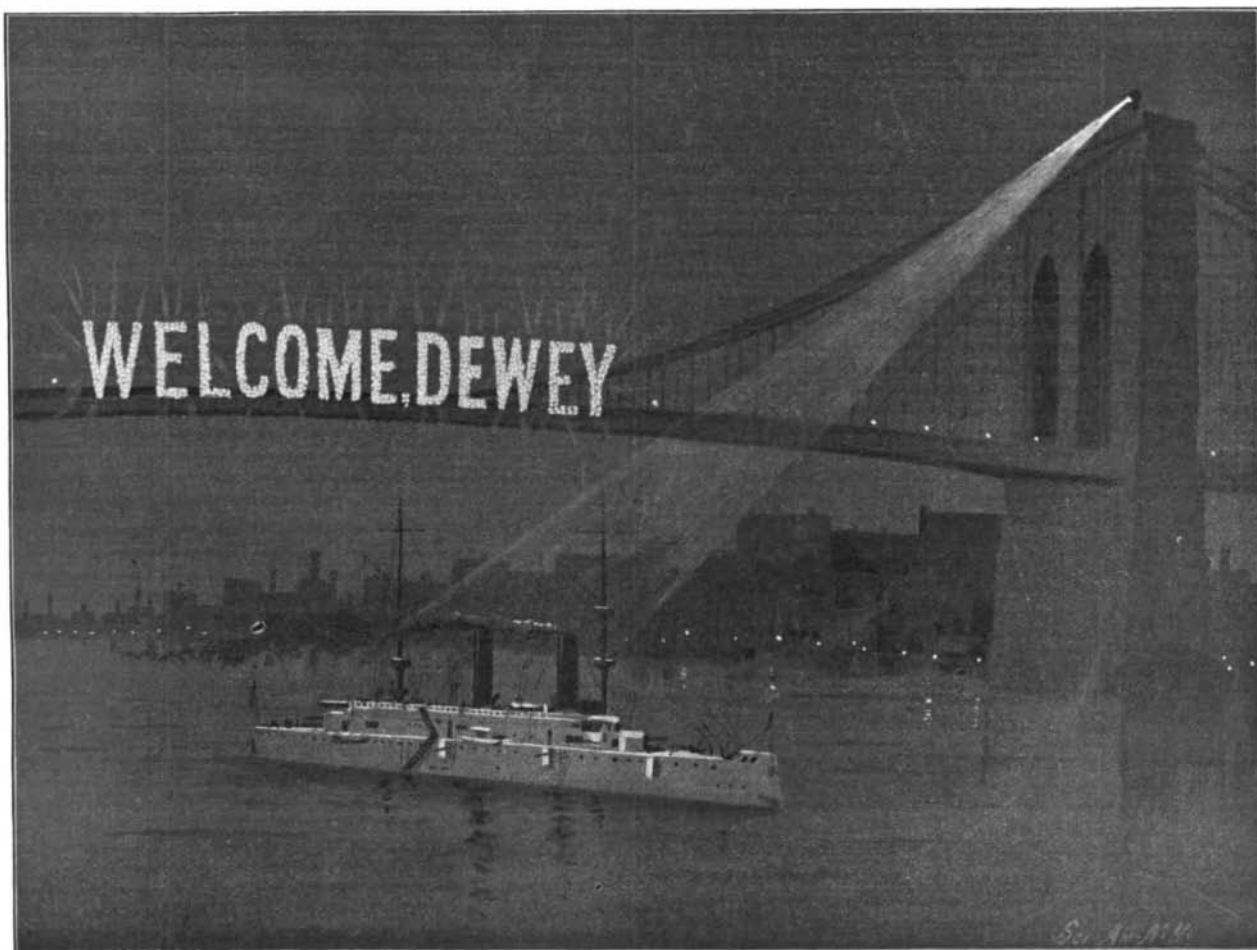
"There goes a man," said a Canal Street philosopher, "who has made a failure of life in spite of exceptional equipment for success. He is honest, affable, highly educated and industrious as a beaver. He has no bad habits, and I couldn't name a man in New Orleans who possesses a kindlier disposition, yet he is continually out of a job and is studiously avoided by everybody who knows him. The mysterious part of it is that nobody can tell you just why, and the poor fellow doesn't understand it himself. He is beginning to think that somebody has worked a rabbit's foot on him, but the secret is really this: He has a genius for the inopportune. By some malign freak of fate he always says and does the wrong thing at the wrong time. It is not lack of tact; it is destiny. For example, I like him, but he never called on me in his life that his visit wasn't highly unwelcome. He is morally certain to drop in just in time to catch one doing something foolish or discreditable, and you know how we hate the innocent chance witness of our follies. He made a mortal enemy of Col. — because he happened to walk into his office while the old man was dyeing his mustache. He chanced on a certain prominent lawyer smirking before a mirror, rehearsing an impromptu after-dinner speech, and the prominent lawyer got even by knocking him out of a valuable contract. Those are two cases out of dozens. He never gossips or rattles, but the mere fact that he has seen things he oughtn't to see and heard things he oughtn't to hear makes his very presence embarrassing to the other fellows. It's most unfortunate, and all fate. If he were introduced to a man whose grandfather had been hanged, he'd be absolutely certain to begin talking about rope inside of two minutes. As I said before, he has a genius for the inopportune. My wife loathes him because her false frizzes blew off on the street one day and landed on top of his umbrella. He had nothing whatever to do with either the frizzes or the elements, but now I can't ask him to my house. Terrible to be under such a curse, isn't it?"



DETAIL SKETCH SHOWING HOW THE LAMPS ARE CONNECTED.

to find out what is the relation between the work which an average man is capable of performing and the aliments which he absorbs. A German savant, Rühlmann, has made some important researches in this direction. He considers the body as a caloric machine, i. e., as a motor in which the energy supplied is represented by the heat developed in the combustion, or rather oxidation, of the carbon and hydrogen contained in the aliments. The combustion of 1 kilogramme of carbon develops a quantity of heat equal to 8.08 calories, and that of a kilogramme of hydrogen 34.56 calories. A man of average strength produces in the course of twelve hours the oxidation of 0.252 kilogramme of carbon and 0.0156 of hydrogen. From this it follows that the heat of alimentation equals $0.252 \times 8.08 + 0.0156 \times 34.46$, or 2573 calories, corresponding,

ways says and does the wrong thing at the wrong time. It is not lack of tact; it is destiny. For example, I like him, but he never called on me in his life that his visit wasn't highly unwelcome. He is morally certain to drop in just in time to catch one doing something foolish or discreditable, and you know how we hate the innocent chance witness of our follies. He made a mortal enemy of Col. — because he happened to walk into his office while the old man was dyeing his mustache. He chanced on a certain prominent lawyer smirking before a mirror, rehearsing an impromptu after-dinner speech, and the prominent lawyer got even by knocking him out of a valuable contract. Those are two cases out of dozens. He never gossips or rattles, but the mere fact that he has seen things he oughtn't to see and heard things he oughtn't to hear makes his very presence embarrassing to the other fellows.



THE BROOKLYN BRIDGE ILLUMINATED IN HONOR OF ADMIRAL DEWEY.

It's most unfortunate, and all fate. If he were introduced to a man whose grandfather had been hanged, he'd be absolutely certain to begin talking about rope inside of two minutes. As I said before, he has a genius for the inopportune. My wife loathes him because her false frizzes blew off on the street one day and landed on top of his umbrella. He had nothing whatever to do with either the frizzes or the elements, but now I can't ask him to my house. Terrible to be under such a curse, isn't it?"

OWING to the high price of copper, the imperial postal authorities of Germany propose to replace it for telephonic purposes with aluminum wire or iron wire coated with copper.

Railroads in Africa.

Railroads in Africa are discussed at considerable length in a monograph entitled Commercial Africa in 1899, just prepared by the Treasury Bureau of Statistics. It shows that the railways now in operation or under actual construction are nearly 10,000 miles in extent, that about two-fifths of the distance from "Cape to Cairo" has already been spanned by railway lines which are being extended from the northern and southern extremities of the continent toward the equator, where they are expected to meet early in the twentieth century. Already railroads run northwardly from Cape Colony about 1,400 miles and southward from Cairo about 1,100 miles, thus making 2,500 miles of the Cape to Cairo railroad complete, the intermediate distance being about 3,000 miles. Mr. Rhodes, whose recent visit to England and Germany in the interest of the proposed through line from the Cape to Cairo is a matter of record, and whose visit to Germany was made necessary by the fact that in order to pass from the southern chain of British territory to the northern chain, he must cross German or Belgian territory, is reported as confident that the through line will be completed by the year 1910. It may reasonably be assumed that a continuous railway line from the southern to the northern end of Africa will be in operation in the early years of the twentieth century. Toward this line, present and prospective, which is to stretch through the eastern part of the continent, lateral lines from either coast are beginning to make their way. A line has already been constructed from Natal on the southeast coast, another from Lourenco Marques in Portuguese territory and the gold and diamond fields, another from Beira, also in Portuguese territory, but considerably farther north, and destined to extend to Salisbury in Rhodesia, where it will form a junction with the Cape to Cairo road; still another is projected from Zanzibar to Lake Victoria Nyanza, to connect probably at Tabera with the transcontinental line; another line is under actual construction westward from Pangani just north of Zanzibar, both of these being in German East Africa; another line is being constructed northwestwardly from Mombasa, in British territory, toward Lake Victoria Nyanza, and is completed more than half the distance, while at the entrance to the Red Sea a road is projected westwardly into Abyssinia and is expected to pass farther toward the west and connect with the main line. At Suakin, fronting on the Red Sea, a road is projected to Berber, the present terminus of the line running southwardly from Cairo. On the west of Africa lines have begun to penetrate inward, a short line in the French Soudan running from the head of navigation on the Niger with the

ultimate purpose of connecting navigation on these two streams. In the Congo Free State, a railway connects the Upper Congo with the Lower Congo around Livingstone Falls; in Portuguese Angola, a road extends eastwardly from Loanda, the capital, a considerable distance, and others are projected from Benguela and Mossamedes with the ultimate purpose of connecting with the "Cape to Cairo" road and joining with the lines from Portuguese East Africa, which also touch that road, thus making a transcontinental line from east to west, with Portuguese territory at either terminus. Further south on the western coast, the Germans have projected a road from Walfisch Bay to Windhoek, the capital of German Southwest Africa, and this will probably be extended eastwardly until it connects with the great transcontinental line from Cape to Cairo, which is thus to form the great nerve center of the system, to be contributed to and supported by these branches connecting it with either coast. Another magnificent railway project, which was some years ago suggested by Monsieur Leroy Boileau, has been recently revived, being no less than an east and west transcontinental line through the Soudan region, connecting the Senegal and Niger countries on the west with the Nile Valley and Red Sea on the east and penetrating a densely populated and extremely productive region of which less is now known, perhaps, than of any other part of Africa.

At the north, numerous lines skirt the Mediterranean coast, especially in the French territory of Algeria and in Tunis, where the length of railway is, in round numbers, 2,250 miles, while the Egyptian railroads are, including those under construction, about 1,500 miles in length. Those of Cape Colony and Natal are nearly 3,000 miles, and those of Portuguese East Africa and the South African Republic, another thousand. Taking into consideration all of the roads now constructed or under actual construction, their total length reaches nearly 10,000 miles, while there seems every reason to believe that the great through system connecting the rapidly developing mining regions of South Africa with the north of the continent and with Europe will soon be pushed to a consummation. A large proportion of the railways thus far constructed are owned by the several colonies or states which they traverse, about 2,000 miles of the Cape Colony system belonging to the government, while nearly all that of Egypt is owned and operated by the state.

Wireless "Telephony."

Sir William H. Preece has recently been carrying on some interesting experiments on wireless telephony, so called. Four of the poles have been erected near Carnarvon on a sand bank at the southern end of Menai

Straits. Half a mile off four similar poles were erected, and half a mile further on is a high pole supporting a coil of wire, one end being anchored in deep water. Between these points he has succeeded in transmitting the sound of a succession of taps. These taps were made with the view of sending messages by the Morse code. They were heard at the receiving station by placing a special telephone to the ear. The system is more rapid than that of Marconi, but the sounds are not as distinct as they might be. As a matter of fact, it is not telephony at all, but a system of telegraphy in which a telephone is used as a receiver.

The Current Supplement.

The current SUPPLEMENT, No. 1240, is of unusual interest. It is one of the best numbers we have ever published. The first article is devoted to the "Steam Yacht 'Josephine,'" which describes and illustrates in great detail the latest and one of the most palatial yachts ever constructed. "Electrical Manipulation of Theatrical Machinery" describes the system which is also referred to in the present issue of the SCIENTIFIC AMERICAN. "The Works of the Diamond Match Company, Limited," describes the beautiful and complicated machinery used in making the boxes and the matches. "An Automobile Street Sweeper and Sprinkler for Use in Paris" is also described and illustrated. "The Lemur" is the subject of a full page engraving. A highly important paper is "Advance in Measuring and Photographing Sounds," by Prof. Benjamin F. Sharpe, M.A. This article is illustrated with engravings showing the apparatus and some of the results obtained. The first installation of this article is published in this issue. "The Literature and Legends of the Philippines" is by Margherita Arlina Hamm. "The Poisons of the Eighteenth Century" is an article giving much curious information. "Roman Roads and Milestones in Asia Minor" is a most attractive article. "International Cloud Work of the Weather Bureau" is by Prof. Frank H. Bigelow.

Contents.

(Illustrated articles are marked with an asterisk.)

Acetylene generator*.....	228	Inventions, index of.....	237
Africa, railroads in.....	236	Inventions recently patented.....	236
Automobile news.....	231	Krupp armor, Congress and.....	236
Bicycle, chainless*.....	231	Lake Chelan upheaval.....	236
Blinds, color of.....	235	Notes and queries.....	237
Body, human, as a caloric machine.....	235	Peat fuel, compressed.....	227
Books, new.....	237	Peat, paper from.....	227
Brooklyn Bridge, illumination of*.....	235	Photography, color, for amateurs.....	234
Coke fuel.....	224	San Nicolas, island of.....	236
Courthouse going to court*.....	232	Science notes.....	227
Current Supplement.....	236	Smokeless powder factory.....	227
Electrographs*.....	228	Stage mechanism, modern*.....	232
Generator, acetylene*.....	228	Trade mark.....	226
Hydrogen, solid*.....	231	University of California plans.....	231
Inopportune, genius for the.....	235	Water cooler*.....	228
		Yacht racing*.....	226, 230

RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

MARKER ATTACHMENT FOR PLANTERS.—JOHN GILMOUR, Troy Grove, Ill. The invention relates particularly to means for changing the gage or marker for corn-planters, and provides a simple system of levers which will enable the driver, without leaving his seat, to raise the runner of the marker out of the ground, to throw the gage or marker to the right or left as required, and simultaneously to raise the shovels or cultivator-wheels. The marker can also be held upright and readily dropped to the side. The check or guide-rope usually employed to manipulate the marker is discarded, and thus the necessity of passing the reins over the rope at each change of gage is obviated.

Miscellaneous Inventions.

WEIGHT AND PRESSURE INDICATOR.—EDWARD MCGARVEY, Bellefonte, Pa. By the laws of vibration, a string of ribbon under tension will have a fundamental rate of vibratory motion varying with the stretching force applied to it. The inventor has applied this principle to scale-beams to indicate the weight and pressure of loads. The device is particularly adapted for weighing coal on scales at some distance from the office in which the weight is recorded. By the use of this invention the weighing of loads on various scales may be performed at one office. The weight of an object, it should be observed, may be determined without the use of movable weights on the scale-beam.

ATTACHMENT FOR BAPS DRUMS.—CHARLES E. REED, Elmwood, Ill. The object of this invention is to provide a device to prevent a drum from creeping. The attachment consists of an adjustable body at the end portions of which are gripping-arms extending beyond the heads of the drum when the body is attached to the rim. The gripping-arms engage with the rear of the drummer's limbs, thus effectually preventing the drum from moving. These gripping-arms will not interfere in any manner with the use of the drum, and the attachment need not be removed.

CLAY-SCREENER.—EDWARD B. and HENRY A. LADER, Copley, Penn. The clay-sifter comprises a cylinder composed of a series of rings, the outer surfaces of which are engaged by three triangularly-disposed shafts having spacing-collars between the rings. The shafts are provided with rotative connections. Beneath the cylinder a shaft extends on which disks are mounted having arms entering the slots between the rings. The clay is broken up by the arms of the disks, the finer particles passing between the rings, and the gravel and hard lumps being discharged at the other end of the cylinder.

DEVICE FOR ASSISTING IN TRANSFERRING ENTRIES.—THOMAS B. PASCHALL, Searcy, Ark. This invention provides a device designed to assist in copying

figures or writing from the under side of a page of a book to the upper side, or to the upper side of any page without turning the leaf upon which the matter to be transferred is located. The invention employs mirrors so arranged that the writing on the under side of a leaf will be reflected in such a manner that the matter may be correctly read and copied. The device, it is claimed, is as convenient and time-saving as any of the folding or creased leaf balance-books.

STOCK AND DIE.—HANS O. NIENSTAEDT, Copenhagen, Denmark. The invention provides a screw-cutting stock and die, the jaws being separable from each other by the rotation of two lock-nuts, so that the return movement of the tool to its initial position can be rapidly effected. By the employment of a rotating guide-disk, the operator is spared the inconvenience of actuating several loose parts when adjusting a new guide-hole.

HOT-AIR FURNACE.—GEORGE W. MISKIMEN, Jr., Newcomerstown, Ohio. The furnace is intended for use in heating buildings, and comprises, essentially, a cylindrical shell divided into two parts by a partition and provided with a grate in one end, the whole being surrounded by an air-heating chamber having supply and delivery pipes for conducting air. The device is so constructed that the gases of combustion cannot mingle with the heated air.

DOOR-SECURER.—OLE KURE, Chehalis, Wash. To provide a device for the use of travelers in locking the doors of rooms in hotels, is the purpose of this invention. The device comprises a body having a recess extended a portion of its length, to which body plates are pivoted adapted to fold into the recess. A locking-bar is pivoted to the body and has a notch and a head portion for engaging a rearward extension of the outer plate, when the device is folded. The plate holds the body in position, and the plate and body hold the locking-bar in place with the head against the door to prevent the opening thereof.

HIGH-EXPLOSIVE SHELL.—GILBERT JARED, Prairie City, Ill. The hollow body of the shell has a coniform head. A perforated and threaded coupling-plug engages the body and head at opposing ends. These parts are connected with a perforated compression-block having its rearend cupped to form a valve-seat. A coniform valve has a hollow stem slidable through the compression-block, and a plunger-tube slides in the valve-stem and is adapted to detonate the nitroglycerin in the body, when the tube is forcibly driven back. The shell can be exploded by impact or time-fuse only after being fired from a gun.

THILL-COUPLING.—ALBERT H. FORSYTHE, Sarcocixie, Mo. This invention provides a clamp or locking device for connecting the clip with the thill or pole irons or thill or pole couplings, only two parts being needed. The clamp has no nuts and can be speedily attached to or detached from the parts to be united, and used for connections of the ordinary type without any

changes. The essential features are found in two members, one of which forms a pivot for the coupling and the other of which is resilient and carries a keeper for engagement with the pivot-member.

FOLDING SEAT.—GEORGE P. STREET, Sr., Elkton, and BENJAMIN H. COURSEY, Sharon Grove, Ky. The seat or chair comprises side frames with one of which a back and a seat have swinging connection. A spring is provided for swinging the back, and a pin on the back engages an inclined lug, on the seat to swing the seat with the back. Chairs thus constructed are of particular service in churches, theaters, and places where it is desired to clear a room of an audience quickly.

LOCK FOR GAS-KEYS.—HENRY A. STUART, Brooklyn, New York city. This lock for gas-keys and similar cocks comprises a valve-casing having stops or shoulders upon opposite sides. A plug valve or key fits the casing and is formed with a hole in which one end of a spring enters, the other end bearing yieldingly against the opposite side of the cock. The two ends are adapted to engage opposite shoulders upon the casing to hold the key closed against accidental turning.

SELF-LIGHTING DEVICE FOR GAS-BURNERS.—ERNST WIESE, Berlin, Germany. The piece of spongy platinum applied to the tops of gas-burner chimneys is soon spoiled by the products of combustion. To correct this fault the inventor provides a hole in a cap placed at a certain height above the chimney-top to allow the gas to pass through and reach the spongy platinum above the hole in order to be thereby ignited. A check-valve pivoted at the bottom of the cap to leave the hole open until the gas is turned on and lighted is arranged for closing the whole when acted upon by the rising combustion-products after ignition, so as to lead off the combustion-products along the bottom of the cap to the outside, thus preserving the spongy platinum.

SELF-ADJUSTING DRYING RACK.—JOSEPH H. BEAULIEU, Waterbury, Conn. This rack for holding photographs to be dried, comprises a frame having longitudinal bars separated to form a slot between them, upon which bars, cross-slats rest. The central slat is secured to the frame, and the other slats have holes through which guide-rods pass. The slats are held toward the center with an even pressure by means of a spring band, so that the cards are properly supported between adjacent slats.

DEVICE FOR PREVENTING SEA-SICKNESS.—CARLO CALIANO, Turin, Italy. In the opinion of this inventor, sea-sickness is a reflex phenomenon, resulting from acute stimulation of the celiac or stomachic plexus, and he has found that, properly directed pressure upon this nerve-center, will prevent or cure sea-sickness. To effect this compression he employs a belt of peculiar construction which is to be worn about the body.

WIRE-TIGHTENER.—LOUIS H. CLYBORNE, Mound City, S. D. The tightener embodies a holder adapted removably to carry a twisting bar, having near one end

two bits capable of gripping the wire and having at the other end a hook serving to engage the wire when it has been twisted around the bits and to keep the wire taut. Each holder is provided with a number of bars.

PERPETUAL CALENDAR FOR PENCIL-CASES, WALKING-STICKS, ETC.—JAMES T. DRAFER, Pingelly, Western Australia. This invention consists in the arrangement of the names of the months, days of the week, and the days of the month upon three separate cylindrical surfaces capable of being moved relatively against one another. The names and numbers are so arranged that future or past dates can readily be ascertained.

SASH AND BLIND LOCK.—EDWARD J. DREXLER, Paterson, N. J. The present invention is concerned with improvements in locking-devices for the meeting-rails of window-sashes and blinds or shutters; and the object is to provide a simple device by means of which the two sashes when closed may be effectually locked together and at the same time lock the outside blind. The essential features are found in a staple screwed in the blind and adapted to engage hook on the window-fastener.

AUTOMATIC DEAD-LATCH LOCK.—CHARLES BACKER, 1742 Lexington Avenue, Manhattan, New York city. In dead-latch locks it is customary to provide a detent which drops behind some portion of the bolt to prevent its withdrawal after the door is closed, except by a key. This invention provides a peculiar construction and arrangement of the parts of a lock of this kind, which may be set into operative engagement by the departing person, thus rendering the locking-detent automatic, locking the latch as each person goes out, and yet permitting the door to be opened with a latch-key.

ICE-CUTTER.—GEORGE A. AMES, Norwich, Vt. The ice-cutter consists principally of a sled which is drawn over the surface of the ice and which carries besides a transverse shaft upon which are mounted toothed power-wheels, a circular saw mounted in a swinging frame and connected by suitable mechanism with the power-wheels by which it is rotated. With this device it is possible to cut the ice the desired depth at one operation, thus saving much time in harvesting the ice.

DRAFT-APPLIANCE.—GEORGE N. FARNSWORTH, Grimes, Cal. The appliance is provided with a spreader-bar adapted for attachment to singletrees, with which spreader-bar stretcher-chains are connected, each having a bar upon which a roller turns. The bars are adapted for attachment to a fifth-chain ring. Should the feet of the animals pass over the chains, they will be turned out naturally, the rollers striking the misplaced feet and causing them to be lifted. Thus the present necessity of stopping the team and removing the feet of the animal is obviated.

CUPEL-COOLER FOR ASSAY-FURNACES.—WILLIAM D. LONGWOOD, Deadwood, S. D. In assaying, it