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THE EAST RIVER BRIDGE.

For the first time in the history of the world a bridge now spans the East River. The cities of New York and Brooklyn are connected; and although the connection is but a slender one, still it is perfectly possible for any venturesome mortal to make the transit from shore to shore with safety. The completion of the foot bridge marks the beginning of the era of active work on the superstructure of the great fabric. We have already explained how the heavy wire ropes, on which the ten cradles are suspended, were brought over from anchorage to anchorage. The cradles on the main span are nearly 48 feet long; and they are suspended at such a deflection that the main strands, while being made, will be within easy reach of the men who are to regulate the wires. They are constructed of oak, and the center of the floors is made in part of iron rods, so as to admit of the free passage of the wind, and thus reduce oscillation. In order to give access to these cradles, the temporary foot bridge, above referred to, and of which an excellent idea can be obtained from the engravings presented herewith, has been recently constructed.

Two designs were made for this part of the work: one providing for a bridge in a low position at the level of the floor of the main bridge; the other 60 feet above, at the level of the cradles and strands. Both positions have their advantages and disadvantages. From the low foot bridge, the regulation of the strands in the cables can be more easily accomplished; but access to the cables could only be had by means of long vertical rope ladders, difficult and dangerous to climb. The intermediate cradles would have been almost inaccessible. Provision for safety against storms could perhaps be equally well made in both cases. The important consideration, however, which led to the adoption of the *high* position, was the accommodation of the shipping, as the low foot bridge would have at once formed a barrier above the water, while the high one is *fully* 210 feet over the river. This distance will be maintained for a year or *more*, when the lowering of the cable strands will slightly curtail it.

THE FOOT BRIDGE OVER THE EAST RIVER, NEW YORK.

The construction of the foot bridge is clearly shown in Figs. 2, 3, and 4. It is made of oak slats 3 by 1½ inches, laid directly on the cables, with two inch spaces between the slats for the free passage of the wind. The slats are held in place by longitudinal strips, 3 by 1½ inches, to which they are fastened by round clinch nails. These strips are secured to the cables by U-shaped stirrups, plate washers, and nuts. The floor was laid in sections of from 12 to 16 feet in length at a time.

Chief Engineer Roebling does not hesitate to express his belief that this frail structure may be disabled more than once by violent gales before the main cables are completed. Its principal security against the wind is a pair of inverted storm cables, assisted by a number of underfloor stays in the main span. In the land span, the guys lead directly to the anchorages in the ground. The ropes are all secured together laterally. It is of but little moment how much the cradles may sway about in the middle of the span; but all great waves must be checked before they reach the towers, where alone the ropes can be injured. This is done by the underfloor stays and by securely fastening the ropes to the masonry. The inverted parabolic storm cables serve rather to prevent the foot bridge being carried away bodily.

We are indebted for our information to the report of Engineer Roebling, and to the courtesy of Assistant Engineer W. H. Paine.

Fig. 2

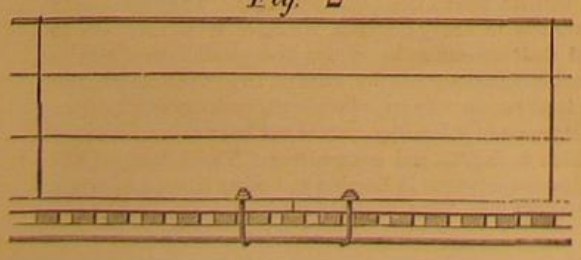


Fig. 3

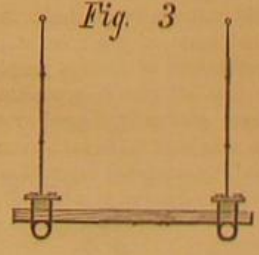
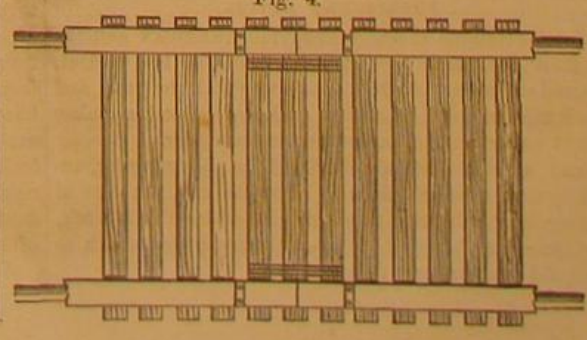


Fig. 4.



GERMAN STEEL IRON.—Messrs. Asbeck, Ostbaus & Co., a German firm, are manufacturing a substance which they term steel iron in five different varieties, so that they can furnish steel upon iron, iron between two layers of steel, steel between two layers of iron, steel core and iron skins, iron core and steel skins, and other combinations.

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NEW YORK, SATURDAY, MARCH 10, 1877.

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(Illustrated articles are marked with an asterisk.)

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No. 62,
For the Week ending March 10, 1877.

PUBLISHERS' NOTICE.

New subscriptions to the SCIENTIFIC AMERICAN and the SCIENTIFIC AMERICAN SUPPLEMENT will, for the present, be entered upon our books to commence with the year, and the back numbers will be sent to each new subscriber unless a request to the contrary accompanies the order.

Instead of a notice being printed on the wrapper, announcing that a subscription is about to end, the time of expiration is now denoted in the printed address each week, so that the subscriber may see when the period for which he has prepaid is about to expire.

LEMURIA, THE LOST PARADISE.

In our review of Mr. Alfred Wallace's new conclusions relative to the geographical distribution of animals, we noted his very important statement that the study of the present habitations of both animals and plants may add greatly to our knowledge of the past history of our globe. In fact, the chief deduction which Mr. Wallace draws from his extended investigations is that such study may reveal to us, in a manner which no other evidence can, which are the oldest features of the earth's surface, which the newest, and which have sunk beneath the ocean and thus been blotted out for ever. It will be seen, therefore, that in the study of organic life we are brought face to face with one of Nature's own records. As in the rocks she writes of the birth of new continents and new islands, and of the time when, and the conditions under which, these mighty additions to the earth's surface were made: so in the habits of organized creatures she conceals the history of her destructive work. By the aid of such knowledge as to past organic mutations as the geological record supplies us with, we can determine the probable birthplace and subsequent migrations of the more important genera and families; and in this way, while reaching a conception of that grand series of co-ordinated changes in the earth and its inhabitants, whose final result is seen in the forms and geographical distribution of existing animals, at the same time we embark on a quest of lost lands.

It is a remarkable fact that traditions substantially agreeing with the Biblical account of the Deluge exist among every known people on the earth. Among the Hindoos, Greeks, Chinese, Mexicans, Peruvians, Feejee Islanders, the legends are closely similar; and it is but recently that, from the clay tablets of the Chaldeans, the late Mr. George Smith deciphered still another account of a great flood. It is besides true that, among a great many peoples, there are traditions of countries which no longer exist. Even on old Venetian maps the lost island of Atlantis, lying west of the Azores, prominently figures. The Greek geographers mention the island; and its sea kings, tradition says, invaded Europe and Africa, but were defeated by the Greeks and their allies. Whether that land was a myth, or whether it was America, is an open question (in view of Dr. Schliemann's discoveries, it is perilous to pronounce any ancient legend baseless); but this aside, the story goes that the Atlantides became so desperately wicked that a deluge swallowed up their island. Biblical critics, or at least the majority of them, have long since recognized the fact that, unless the supposition of a series of the most stupendous miracles be made, the theory of the Deluge covering the entire earth must be set aside; and, in lieu thereof, the view is preferred that the flood covered only the small area forming the basin of the Euphrates and Tigris rivers, which then was the sole region occupied by the human race. If, however, we couple the two traditions, namely, deluges and lost lands, there will appear a probability that all relate to similar phenomena, which are the subsidence or overflowing of islands or portions of continents by the sea. Therefore it might be a more scientific view of the Flood to ascribe it to this well understood natural action than to venture so violent an hypothesis, even on the Mosaic account, as that, 1656 years after his creation, man was still confined to the little region in Mesopotamia.

In the whole range of deductions reached by the study of the distribution of animals, there is none more striking than that which proves that a vast continent once existed extending from the island of Madagascar to Ceylon and Sumatra. Examination of the fauna of Africa and of Madagascar shows that in Africa, especially in the east, there is an abundance of large ungulates and felines (elephants, lions, etc.), all of types now or recently found in India and Western Asia. Again, the fauna of Madagascar is wanting in all the larger and higher African forms, and has a wonderful resemblance to that of Malaya and South America. We are, therefore, sure that Madagascar must have been separated from Africa before the assemblage of large animals, above referred to, had entered. There is proof that, during early tertiary times, a continuous sea, from the Bay of Bengal to the British Isles, completely cut off all land communication between Central and Southern Africa on one side and the great continent of the eastern hemisphere on the other; so that Southern Africa and Madagascar were then united, and the latter island helped to form the great continent over which the tribe of lemurs were distributed. There is geological evidence, in Ceylon and South India, all going to show that those physical divisions were bounded on the north by a considerable extent of sea, and hence probably formed part of a great southern continent. If we suppose that this hypothetical land occupied the whole area now inhabited by lemuroid animals, we must extend it to Burmah, South China, and the Celebes.

Having established the possibility of the existence of this last continent, Lemuria, we need follow geology in the person of Mr. Wallace no longer, but pass to Herr Peschel's views of the great importance of this hypothesis to the history of our race. Peschel, in his chapter on the first home of humanity, states that all oceanic islands, when first discovered by European navigators, were uninhabited; and from this and other considerations, he concludes that the first human beings were inhabitants of a continent. Then, by examining into the resemblances of various peoples, he logically reaches the view that all our race, starting from a common habitat, may have gradually ranged over all continents and peopled them. He next takes each grand division of the earth in turn, and, by studying its zoological forms and their changes, he seeks to determine which division was the probable cradle of humanity. The basis of his inquiry is the fact that the more highly integrated creatures are the newer, the less perfectly integrated, the older; and measured by this standard, Australia and South America are speedily eliminated from the question. North America has remained primitive in the second highest order of mammalia. Our continent has no tailless ape; and it is where the highest animals appear—the chimpanzee, the gorilla, and the orang—that we must also look for man. Searching through the Old World, the lowlands of Siberia are geologically too recent; while if Europe had been the starting point, we should have found fossil men, as we have fossil apes. In Southern Asia, British India has been studied geologically with great minuteness; and judging from the types of mammals found, our primordial parents cannot be localized there.

The inquiry is now narrowed down to Lemuria, a continent, Peschel asserts, required by anthropology; for we can then conceive that the inferior populations of Australia and India, the Papuans of the East Indian Islands, and lastly the negroes, would thus be enabled to reach their present abode by dry land. Such a region would also be climatically suitable; for it lies in the zone in which we now find the anthropomorphous apes. The selection of this locality, Peschel points out, is far more orthodox than it at the first glance might appear; for we here find ourselves in the neighborhood of the four enigmatic rivers of the Scriptural Eden—in the vicinity of the Nile, the Euphrates, the Tigris, and the Indus. By the gradual submergence of Lemuria, the expulsion from Paradise would also be inexorably accomplished. To this may be added that ecclesiastical writers, such as Lactantius, the venerable Bede, Hrabanus Maurus, Kosmos Indicopleustes, and also the anonymous geographer of Ravenna, placed the Scriptural Paradise in Southeastern Asia, and some explicitly state that it was on a detached continent, and that the ingenious maps of the middle ages exhibit the first parental pair on a land surrounded by sea, lying beyond India, This explains how Columbus, after the discovery of South America, taking it for an insular continent lying southeast of the mouth of the Ganges, wrote home to Spain: "There are great indications suggesting the proximity of the earthly Paradise, for not only does it correspond in mathematical position with the opinions of holy and learned theologians, but all other signs concur to make it probable."

Herr Peschel's hypothesis need not disquiet those who prefer to believe that Paradise was nearer to the eastern lands of the Scriptures. Its value, its author states, is that "it challenges a geological investigation of Madagascar, Ceylon, and the island of Rodrique, as well as deep sea soundings in the Indian Ocean, to ascertain whether vestiges exist of the higher points of vanished Lemuria."

CITY ARCHITECTURE.

There is a widely extended discussion now going on as to the merits of the better class of houses built in these days. Dr. Richardson attacks them on sanitary grounds, and his condemnation is as sweeping and as unreasonable as that of Mr. Ruskin; and the only remedy which these gentlemen propose for the people of Great Britain is to sweep away every dwelling from one end of the island to the other. Such exaggerated statements come naturally from the lips of Mr. Ruskin, whose æstheticism does good by inculcating a taste for correctness and purity in style and for genuineness and thoroughness in work; but Dr. Richardson has more utilitarian aims, and such wild propositions serve only to repel people from the consideration of the many sensible suggestions which he has made. Although it may be theoretically true that a kitchen should be at the top of the house, it is not necessary to destroy a dwelling that has one at the bottom; and the people who live in modern houses are not so contemptible, either physically or morally, that their homes should be demolished at the instance of these architectural reformers on account of their unfitness for habitation. Architects and hygeists would do much more for their contemporaries, and for art and science too, if they would show us how to make the best of what we have; to ventilate thoroughly our basement kitchens rather than to tear down our houses; to lead our sewer gases away from our houses rather than to pull down one side of the structure to build a gas shaft; in short, to improve the homes we must live in rather than to dream about those we might have if the world were created to-day, and everybody began existence with unbounded wealth.

Of the comfort and wholesomeness of the better class of American houses it is impossible too speak too highly. The ventilation is generally well provided for, and the heating is equable, and the temperature moderate; dryness in the cellars is an object which our architects spend much pains to achieve, and usually ample light is admitted into the front and back rooms of our houses. But our readers will at once see that we speak of the houses found in the better quarters of our large cities; and our tenement houses in crowded neighborhoods, and many of the flimsy frame structures in rural districts, are scarcely capable of improvement without razing the entire structure. The evils in the first are due to heavy taxation, which compels landlords to crowd their tenants on to the smallest possible area, and to the inability of tenants to pay rents for large apartments. But there is no reason why large buildings, each accommodating a great number of families, should not have every necessary provision for health and convenience. The houses of the building corporations in London and other European cities, which have been built especially to solve the problem of

health and comfort in crowded neighborhoods, have a lower death rate than many districts where the inhabitants are wealthy and the number of people to the acre small; and this alone shows that the exceptionally great mortality in New York and other large cities is not due solely to density of population.

But the chief faults in city architecture are to be found in the smaller and cheaper houses. Although many of these are well provided with modern contrivances for saving labor and adding to the convenience of their inmates, they are characterized by two bad practices, namely, disregard of hygienic laws and flimsiness of construction. The excellent system of heating by furnaces placed in the basement is vitiated by making the heaters too small, so that they are overdriven in cold weather, and the air passing through them becomes too dry, thus rendering the lower rooms of the house unhealthy; and it has been shown by the experiments of General Morin, Director of the Conservatoire des Arts et Métiers in Paris, that air currents in contact with red hot iron become absolutely poisonous. It is safer, says Mr. James C. Bayles in an excellent paper on city architecture in the *International Review*, to keep the temperature of the surfaces of a heating furnace below 500° Fah. Again, by faulty construction, many of these furnaces carry carbonic oxide and sulphurous gases into the apartments.

Ventilation is a subject on which much has been written, and yet it is little understood. That provided by the open fireplace is nearly perfect; and difficulties on this subject are found mainly in small houses heated by hot air. Draughts of air in such houses are frequently kept out with weather strips, and air is only admitted by chance opening of doors. The plumber's work is another defective element in these houses; and the dread zymotic diseases which arise from sewer gases bear terrible witness to the truth of this statement. These diseases cause nearly 30 per cent of the total mortality of New York city. And the difference between good and bad plumbing, says Mr. Bayles, is so slight as to escape the notice of any but a trained expert, and here the responsibility of the architect becomes of the utmost importance.

The want of solidity in the building of cheap houses is the cause of the destructiveness of fires in this country. Mr. Bayles averages our annual losses by fire at $100,000,000. Structures in which cheapness was the only consideration of the architect are in many places so numerous that solitary buildings considered fireproof are destroyed by the fierceness of the conflagration which rages round them. That this can readily be remedied is shown by the example of many European builders, whose cement floors and well plastered woodwork are uninflammable, and in whose houses fire seldom spreads beyond the room in which it originates.

THE WORKING OF PATENTS IN CANADA.

A section in the patent law of Canada requires that the manufacture of the invention or discovery must be commenced within the realm within two years from the date of the patent, or the latter becomes void. Another clause in the same section declares that a patent shall be void if, after the expiration of twelve months from the granting of a patent, the patentee or assignee causes to be imported into Canada the invention for which the patent is granted. A clause was subsequently added, however, granting the Commissioner the privilege of extending the time for introducing an invention beyond the two years if application is made to the Commissioner not less than three months previous to such expiration, and if ample evidence is adduced that it has been beyond the patentee's control to comply with the two years' requirements.

Some parties who took patents two years ago have supposed that it was sufficient to hold the patent by importing into the country various parts of the entire machine, and putting them together in a Canadian manufactory. The able Commissioner, Mr. Taché, decides that such importation does not accord with the spirit or intent of the law; but in a case which recently came before the Commission, he rules "that the respondent having refused no one the use of his inventions, and that the importation, assented to by him to be made, being inconsiderable, having inflicted no injury on Canadian manufactures and having been so countenanced, not in defiance of the law, but evidently as a means to create a demand for the said inventions, which the patentee intended to manufacture, and did, in fact, offer to manufacture in Canada, he has not forfeited his patents."

It is evident from this decision of the Commissioner that he intends to construe the laws in a spirit of liberality towards the foreign patentee when it can be done without prejudice to the interests of Canadian manufactures.

THE BLUE GLASS DECEPTION.

An open letter addressed to us by General Pleasonton, of blue glass notoriety, has appeared in the columns of an evening journal of this city. The missive relates to our recent criticisms on the writer's alleged discoveries. It is altogether too lengthy for reproduction here, nor is such publication otherwise necessary, inasmuch as it clearly shows that its author has not perused our articles with any degree of attention, or else that he totally misapprehends the nature of the facts and arguments we have advanced.

The main point of General Pleasonton's letter is an objection to our use of the word "deception," a term which we employed, advisedly, since we believe that General Pleasonton deceives both himself and the public, a view which we can hold without casting the slightest imputation on the gentleman's personal integrity. General Pleasonton, then, in support of his theories, triumphantly claims that they must be well founded, because "the highest *scientific* authority in the country"—to wit, the Commissioner of Patents—has granted a patent on their application. That the above official is *ex officio* the greatest of American scientists will be amusing news to our readers. It raises the question as to who is the highest scientific authority now, the Commissioner who signed General Pleasonton's patent or the present incumbent, or which one of the numerous gentlemen who have adorned that office for brief periods in the past. Besides, to claim that, because something is patented, it is necessarily scientifically sound and of major importance, betrays but a small acquaintance with inventions in general. The Patent Office does not indorse any device. The patent is simply granted on *prima facie* evidence that the idea is new and useful; and in endeavoring to extend the benefit of the protection to inventors, the examiners favor the latter, or should do so, in the highest degree, acting favorably whenever there is a possibility of the existence of even a germ of some future better conception. As it is, the Patent Office rejects very many more applications than it ought to; and on the other hand, it is constantly erring, often egregiously, in granting absurd claims. Because the Commissioner of Patents, in allowing General Pleasonton's patent, made a very sorry blunder (which, by the way, we are inclined to think is chargeable to the examiner, *as of course* the Commissioner knows nothing of the immense majority of patents to the documents of which his signature is appended in advance), certainly the General cannot convince sensible people that his abnormal theories obtained any indorsement.

The remainder of General Pleasonton's letter is but a reaffirmation of his interpretation of his alleged results; and the assertion that blue glass alone does not produce the beneficial effects claimed, but that they are wholly due to "associated light." Associated light in his grapery came through one eighth blue glass and seven eighths clear glass. Sunlight through blue violet glass, spectroscopically examined, as we previously explained—and a distinguished physician of this city has since corroborated our statement by further experiment—is nothing but sunlight diminished in intensity. Therefore General Pleasonton's claim now is based on pure sunlight, one eighth of which is diminished 90 per cent: in other words, sunlight weakened $\frac{1}{10}$ in intensity, according to Mr. Gaffield's data, elsewhere noted. As General Pleasonton devotes a considerable part of his letter to informing us on what we based our own criticisms—a favor on his part quite unnecessary, as well as wholly mistaken in its premises; and as a still larger part is given up to mere assertion, mingled with curious misunderstandings of our very plain statements, we think that no further notice of his epistle is required. For the benefit of sundry blue-glass-crazed contemporaries, we would add, however, that we see no necessity of repeating the large number of experiments—some dating back two centuries—which very positively disposed of the whole subject, even if by not doing so we earn the imputation of closet theorists. Our long experience in dealing with circle squarers, perpetual motionists, Keely motor people, and now blue glass adherents, besides all the other deceptions rife in the mechanical and scientific world, enables us to bear such animadversion with unruffled equanimity.

POINTED LIGHTNING RODS.

The important question as to the proper form of lightning rods occupied the minds of many savants some 75 years ago, and filled part of the scientific journals of that period. It has lately been renewed, and, as formerly, there are defenders and antagonists of the pointed rods. It is argued by the latter that the object of a lightning rod is not to attract the thunderclouds to the building to be protected, and induce discharges there; and it is claimed that long, upward-projecting lightning rods do this very thing, and that, although they are a protection in one sense, giving a ready path to the discharges, they become a source of danger by attracting the electrically charged clouds, and making discharges more frequent. Let us test this reasoning by the well known laws of electricity.

The amount of electric attraction depends on the extent of the attracting surfaces, and on their distance. If a series of clouds, say of a square mile in extent, floats over the earth's surface, these clouds being charged with positive electricity, they will induce, in that part of the earth's surface within the attractive influence, negative electricity. This charge will increase as the distance decreases, as the clouds follow the direction of the attraction; until at last, when the distance becomes small enough, an explosive discharge takes place, the stroke of lightning consisting in the simultaneous discharge of positive electricity from the cloud to the earth, and of negative electricity from the earth to the cloud. The manifestation of light and heat is the simple result of the neutralization of the two electricities, and will be greater in proportion as their quantity and intensity were greater.

Looking at the subject exclusively from this point of view, all that appears necessary is to provide a ready path to the electric discharge, such as a rod made of good conducting material, of sufficient capacity to be uninjured by the strongest current, and well connected with the ground, so as to establish at the moment of discharge a perfect communication between the cloud and the earth, which, previous to the stroke of lightning, were charged with opposite kinds of electricity. If we consider the function of elevated points on lighting rods we find that Benjamin Franklin was correct when he recognized the gradual absorption or discharge of electricity as the main duty of lightning rods. Projecting points do not attract the thunderclouds; but elevated portions of the ground, as well as trees and houses, when in conducting communication with the earth, *become* charged by induction, and then exert attraction, whether there are pointed rods in the vicinity or not. The latter will, by their property of silent gradual discharge, serve to diminish the electric tension; and in place of being a source of attraction they will diminish this attraction, and take from the impending discharge a great deal of its violence.

We must, therefore, come to *the conclusion* that elevated points are desirable as upper terminals of lightning rods; and experience fully verifies this conclusion by practical results. One of the oldest instances took place in the tower of the cathedral of Siena, in Tuscany, which had been very frequently damaged by lightning. In 1776, a lightning rod was erected; but the people objected, and some of the priests called it an impious contrivance, invented by a heretic; but when it was found that the tower was rarely struck, and that once during a heavy thunderstorm the stroke followed the lightning rod without doing the least damage, the heretical contrivance came into proper esteem. The starlike terminations of some lightning rods are injurious. Faraday has proved that a single point discharges and absorbs electricity faster than a bifurcated or trifurcated terminal; if more points are added, still slower becomes the discharge, by their mutual interference; until at last, when the top is surrounded with an infinite number of points, a *ball is the result*, and the silent discharge ceases altogether.

But the upper pointed terminal is not the main part of the lightning rod; because it may be omitted altogether, although it is better to attach it. The main part is the ground connection; and as this is out of sight, it is often shamefully neglected. Much ignorance prevails in this respect also; hence it frequently happens that the electric current leaves the rod, to enter the house and pass off by the gas, water, or sewer pipes; and in its course it sometimes causes considerable damage. A connection with a water course, a well (not a cistern), or at least with the moist ground, is not imperatively necessary. If the soil is silicious and naturally dry, it is best to drive some pointed iron bars into the ground in such places as they are most likely to reach moisture, and connect all their upper ends with the conducting rod. The rule that requires a conducting surface equal to that of the roof to be protected, to be buried in the ground, given by some would-be authorities, has no foundation either in theory or practice. It is not the electric charge of a roof which has to be disposed of, but that of a cloud over it; and the latter has sometimes an extent of several square miles. All reported failures of lightning rods may be traced to defective connections, especially ground connections. Rods that are faulty from the outset are often made useless by subsequent neglect: as we found some years ago at the village of Gilboa, Schoharie county, N. Y. The church was situated on a hill, and quite exposed; the under end of the lightning rod, which in its upper end was connected with the spire, was pulled out of the ground, and lay on a pile of firewood in the rear of the church. If this church had been struck and burnt down, it might have been pointed out as an example of the utter uselessness of lightning rods.

Excitement the Stimulus of Business.

There are a numerous class of men who live almost entirely upon excitements. In a calm dispassionate flow of life and business they are stupid and powerless; but stir up the placid sea until it surges with violence, and they are then ready for a mission—armed and equipped for the toil of life. Such minds are the martyrs of this age of enlightenment—the life they lead is a consuming one, and vitality is spent with a prodigality more than heroic. The requirements of business are making this method of living more imperative, and without it success is beyond a reach. Half a century since the rivalries now experienced in all departments of human industry were then unknown. A new order of mind and new energies are called into requisition. The business man of the last generation would hardly be recognized by the prevailing caste. Flesh and blood are capable of enduring many hardships, but the delicate nervous organization, its accompaniment, breaks down at length under the incessant tension. Disregarding the friendly premonitions of temporary illness, the exhausted mind holds on its work by the necessary and agreeable stimulus of fresh excitements, until a sudden reaction crushes its vigor, and then comes on the weakness, satiety, and sorrow of hopeless infirmity.

It is not without a shade of melancholy that we notice in almost every daily journal the record of a faltering in the ranks of business men. This successful merchant or manufacturer has impaired his health by overwork, which means too much nervous excitement, and he starts for Europe in the hope of building up his health on a broken foundation. Another professional man is aroused from his dream of ambition with the frightful conviction that phthisis has fastened its deadly grasp upon his vitals and the grim images of weakness and decay henceforward fill his vision. There has been an alarming increase of disease within a few years having its origin in the causes we have named, and the effect of it should be to produce greater moderation. What if the profits are less? They can be continued longer and life made happier.

There is no necessity for this waste of life—it is a sheer delusion, the effect of a foolish ambition. Better accept the heritage of poverty or a moderate success than the infallible necessity of an early disease.—*Hunt's Merchants' Magazine.*

CURIOSITIES OF GLASSMAKING.

The manufacture of glass dates back to the remotest antiquity. In the Metropolitan Museum of Art, in this city, are glass bottles and vases exhumed from the ancient tombs of Cyprus, which were probably manufactured forty centuries ago; and in some of the tombs of Egypt are abundant representations of Theban glassblowers (Fig. 1) at their work. It is a well authenticated fact that whole streets in ancient Tyre were occupied by glass factories; and for some centuries glass is said to have constituted almost the only, or at least the prominent, article of trade of that great commercial city. It was during the reign of Nero, so far as we can discover, that the first perfectly clear glass, resembling crystal, was manufactured. Pliny states that the Roman emperor gave a sum equivalent to two hundred and fifty thousand dollars of our money for two cups of ordinary size, and that rich articles of glass were in such general use among the wealthy Romans as almost to supersede articles of gold and silver.

Fig. 1.

Fig. 4.

The Strasburgh vase, Fig. 4, was found, in 1825, in a burial casket disinterred near the fortifications of Strasburgh. It is made of white glass, enveloped in a curious network of red glass. About the rim are portions of the name MAXIMIANVS AVGVSTVS, a Roman emperor who died at Marseilles A.D. 310.

Fig. 2.

Fig. 5.

The history of glassmaking is attainable in so many standard works that it is not deemed necessary to trace it here to any extent beyond what is needful for the description of the most famous productions of ancient and mediæval glass makers, which are represented in the accompanying engravings. The Portland vase, represented in Fig. 2, was found, about the middle of the sixteenth century, inclosed in a sepulchral chamber under the Monte del Garno, near Rome. It was ornamented with white opaque figures, in bas-relief, on a dark blue transparent ground. It is supposed that the whole of the groundwork below the handles was originally covered with white enamel, out of which the figures were sculptured, in the style of a cameo, with most astonishing skill and labor. The vase was purchased by the Duchess of Portland (whence its name) at a price exceeding $9,000. Several copies of it were made by Wedgewood. While on exhibition in London, the original was accidentally thrown over by a visitor's cane striking it, and was broken in fragments. The pieces, however, were afterwards fitted together with remarkable accuracy, but of course the value of the object was greatly lessened.

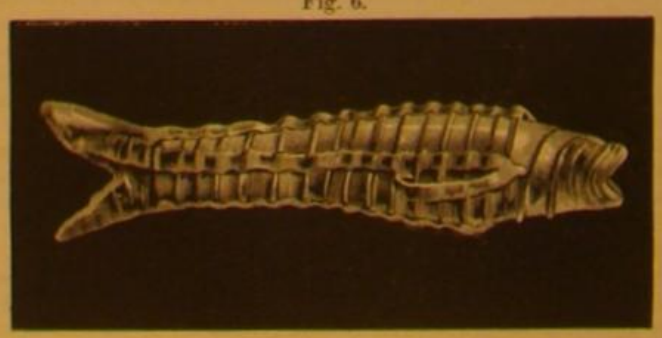
Fig. 3.

Next in order of importance is the Naples vase, Fig. 3, which was exhumed at Pompeii in 1839. It is about 12 inches high, and 8 inches wide, and is of the same style of manufacture as the Portland vase. The figures and foliage which form the design are representative of the harvest season, and

Fig. 5 represents ancient Greek glassware. The forms are probably the prototypes of many of the commonest designs now in use. A vessel of glass in the form of a fish is shown in Fig. 6. This is attributed to the first Christians. The Greek name for this fish commences with the letters *X* and *ρ* of the Greek alphabet, which characters (ch and r) are also the first two in the word "Christ." For this reason the two Greek letters in monogram were adopted as the Christian symbol, and the vessels holding oil used in the sacrament of baptism were made in the shape of a fish.

A very curious vase, found in France, and probably made by the Romans during their occupation of Gaul, is represented in Fig. 7. It is a cup of yellow moulded glass, and originally was in two pieces. On the sides are raised figures of gladiators, each figure having a name inscribed above it. Similar vessels, decorated in like manner, have been found in England; and it is believed that they constituted the prizes offered in gladiatorial combats.

Fig. 6.



The cup of transparent glass depicted in Fig. 8 is of uncertain origin, although the fabrication is very remarkable. It was found in France in 1862, and is of a dark green color, the inscription being raised in white enamel. It probably dates from the sixth century.

The romance of glass making centers about Venice, which city for a long period held the monopoly of supplying all Europe. So useful were the glassmakers at one period in Venice, and so considerable was the revenue accruing to the Republic from their manufacture, that, to encourage the men engaged in it to remain at Murano, the island where the factories were located, the Senate made them all burgesses of Venice, and allowed nobles to marry their daughters. An old writer, describing the Venetian industry, says: "The gentlemen of the great glass houses work only twelve hours, but that without resting, as in the little ones, and always standing and naked. The work passes through three hands. First, the gentlemen apprentices gather the glass, and prepare the same. It is then handed to the second gentlemen, who are more advanced in the art. Then the master gentleman takes it, and makes it perfect by blowing it. In the little glass houses, where they make coach glasses, drinking glasses, crystals, dishes, cups, bottles, and suchlike sort of vessels, the gentlemen labor but six hours altogether, and then more come in and take their places. And thus they work night and day."

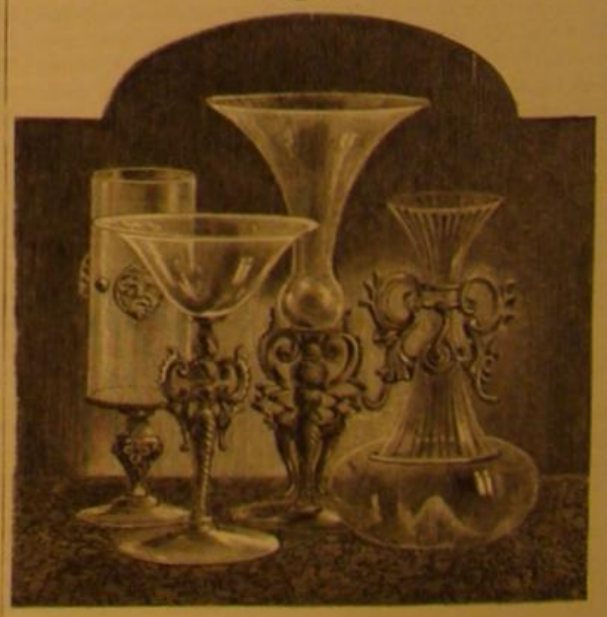
Fig. 7.

Specimens of Venetian glass are represented in Fig. 9. These are yet made in Murano, where there are whole streets of furnaces. They say there "that should any one transfer a furnace from Murano to Venice, or to any of the assembled islands, or to any other part of the earth, to use the same materials, the same workmen, the same fuel, and the selfsame ingredients every way, yet they cannot make crystal glass in that perfection for beauty and luster as at Murano. Some impute it to the circumambient air, which is purified and attenuated by the concurrence of so many fires that are in these furnaces day and night perpetually, for they are like the vestal fires, never going out." The interior of one of these old glass factories, reproduced from a wood engraving of the sixteenth century, is represented in Fig. 10.

Among the workers at the Murano furnaces originated the quaint old notion of the salamander, the fireproof monster. It was believed that at certain times this wonderful being issued from his abode in the furnace fire, and, as opportunity offered, carried back some victim to his fiery bed. The absence of workmen, who sometimes departed secretly for foreign lands, was always accounted for by the hypothesis that, in some unguarded moment, they had fallen a prey to the salamander. Visitors, too, whose courage could sustain them, were directed to look through the by-hole to the interior of the furnace, and no one failed to discover the monster coiled in his glowing bed, and glaring with fiery eyes upon the intruder. Some gallant knights in full armor, it is said, dared a combat with the fiery dragon, but always returned defeated: the important fact being, doubtless, then unknown or overlooked that

Fig. 8.

Fig. 9.



steel armor, being a rapid conductor of heat, would be likely to tempt a more ready approach of the fabled monster.

A belief was long prevalent that glass drinking vessels, made under certain astronomical influences, would certainly fly to pieces if any poisonous liquid were placed in them; and sales of Venetian glass vessels of this kind were made at enormous prices. Another idea existed that vessels of a certain form, made in a peculiar state of the atmosphere and after midnight, would allow a pure diamond to pass directly through their bottoms. Various articles, such as colored

goblets, were thought to add to the flavor of wine, and to detract materially from its intoxicating quality.

In 1486, Emperor Nicholas, of Austria, established near Vienna glass works for making glass after the Venetian system; and from that time forward the industry greatly increased in Austria and Bohemia. In the seventeenth century the Bohemian workmen began to make a new product, called the "Wilkomm," Fig 11, in white or green glass, painted in enamel with armorial bearings, figures of birds and animals, etc. This was the beginning of the famous

Fig. 10.

Bohemian glass manufacture. The fabrication of the Wilkomm ceased early in the eighteenth century, but attempts are now being made to revive it.

The growth of the Bohemian glass industry was much encouraged by the Empress Maria Theresa, who gave privileges to all glassmakers who immigrated to the Austrian dominions; and the vast deposits of pure quartz in the Böhmerwald and the Riesengeberge became the principal seats of the trade. As the trade grew, the Bohemian artists gradually freed themselves from Venetian influence as to form and decoration; and although their designs were somewhat heavy, the colors and decorations were varied and artistic. The use of a cutting wheel for engraving glass was a great aid to the art, and was a German innovation. The products of Bohemian glassmakers were prohibited from introduction into France up till 1860, and specimens became of exceptional value in that country, and possessed the usual pleasant flavor of forbidden fruit.

Fig. 11.

Artificial Ivory.

We find in our French contemporaries two new processes for the manufacture of this material. The first consists in dissolving two parts of pure india rubber in thirty-six parts of chloroform, and saturating the solution with pure ammoniacal gas. The chloroform is then distilled at a temperature of 165° Fah.; and the residue, mixed with phosphate of lime or carbonate of zinc, is pressed into moulds and dried. When phosphate of lime is used, the product is said to possess in a remarkable degree the peculiar composition of natural ivory.

The second process involves the use of *papier maché* and gelatin combined. Billiard balls of this substance cost about one third the price of genuine ivory balls, and are claimed to be quite as hard and as elastic as the latter. They may be thrown from high elevations upon pavements without injury, and will withstand heavy blows with the hammer. The composition is known as Paris marble, and may be used for raised ornamentation of ceilings, or prepared so as to imitate fine varieties of marble.

Planing Mill Machinery.

We quote from a third article from the pen of Mr. F. H. Morse, published in the *Northwestern Lumberman*, the following remarks (see pages 115 and 135 of our current volume for the previous extracts):

It is pretty generally conceded by experienced mechanics that there is no machine in use the bearings of which require more attention than those of the planing machine. The very high rate of speed at which the spindles are necessarily run, the sudden and severe strains they often receive, and the fine dust which collects upon every part, absorbing the lubricants and impeding their free operation, renders it vitally important that constant care should be exercised to keep them in proper order, that they may run without heating and produce smooth work.

Spindles should be made of rolled or cast steel, cut from the bars and properly shaped in the lathe, but should never be put into the fire. Steel is superior for this purpose in many important particulars, though until quite recently wrought iron was almost exclusively used. Steel is much more homogeneous than iron, and for this reason may be turned more nearly to a cylindrical form, a condition which has much to do with the production of bearings that will remain cool under high speeds. A spindle that lacks uniformity as to hardness may by grinding—though not by filing or turning—be made so nearly round as to answer well for moderate speeds; but when put in motion at a rapid rate, the ends of the fingers applied to its surface will reveal the irregularity in its shape, proving that it is totally unfit to be used for quick running machinery. Good steel is not only more easily reduced to the proper shape, but on account of its superior stiffness the spindles may be made about one third smaller than where a weaker metal is used, thus greatly diminishing the friction and also their liability to heat the bearings. Its greater strength is another point in its favor. According to Templeton, the difference between wrought iron and cast steel as regards their torsional and cohesive properties is as follows, the table showing the results obtained from experiments with one inch round and square bars, in pounds avoirdupois:

	TORSION.		COHESION.	
	ROUND BAR.	SQUARE BAR.	ROUND BAR.	SQUARE BAR.
Wrought iron	12,063	15,360	43,881	55,872
Cast steel	29,111	26,880	105,454	134,256

From this exhibit we find that the torsional strength of the steel is nearly 75 per cent greater than iron, and its cohesive strength nearly 140 per cent greater.

The bearings for spindles should as a rule be of brass; but with the exception of one or two firms, manufacturers use only Babbitt metal, which, on account of its cheapness and the ease with which it may be replaced when worn out, will doubtless always be in favor. As nearly the same rules that govern the use of one are applicable to the other, we confine our remarks chiefly to those made of the last named material.

The length of bearings is a matter of much more importance than their diameter, and our best builders now make them of ample size in this direction. How to mould a bearing properly is something which every operator should thoroughly understand, and it will not be out of place perhaps to give some hints as to the best way of performing the operation.

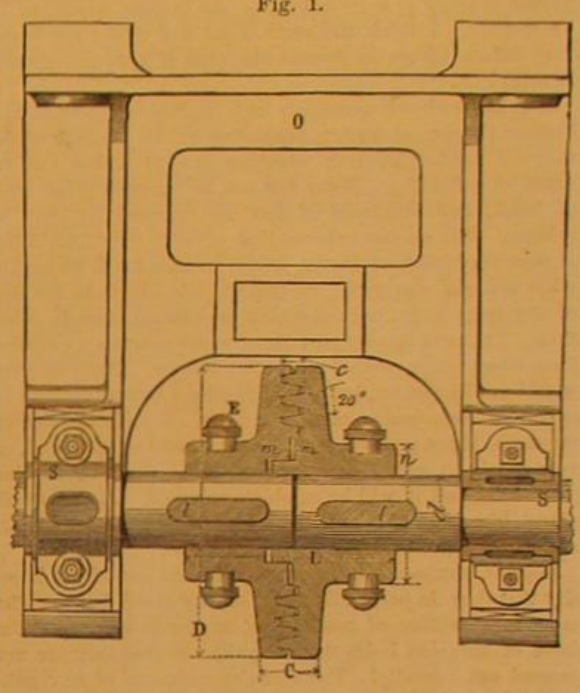
While almost any mechanic can mould a bearing in some style, there are but few who can do the job properly, that is, so that it will not heat, and enable the machine to produce good work. It is often, and in fact most always, the case that, when a planing machine is started up, just after the cylinder bearings have been newly fitted, smooth work cannot be turned out, while it is just the time when it would naturally be expected that the machine was in the best of order; instead, it makes the surface of the lumber uneven, or wavy, as it is termed in planing mill parlance. The usual remedy—if remedy it may be called—is to let them wear down, operators seemingly entertaining the impression that they will be all right after a few days' wear. This practice is decidedly erroneous and goes to show that the mechanic does not understand this branch of his business as well as he should. A new bearing can be kept just as cool, and need cause no more irregular work to be turned out, than one which has been in operation a week or a month.

The method of moulding cylinder bearings most commonly practised is to place the cutting cylinder as nearly as possible in its proper position (that is, parallel with the bed of the machine) and pour the lower section of the bearing first; then, after the requisite amount of packing or lining is put on, the upper half is bolted down, and then poured. By this process one side of the shaft or spindle is surrounded with hot metal while the other remains comparatively cold, and every mechanic of ordinary intelligence knows the result of such treatment; it must certainly spring the shaft and probably ruin it. Some mechanics say that when the other side comes to be poured it will spring back into its former shape, but this idea is too fallacious to need contradiction. If a bearing made by the above described method is examined carefully, it will be found that the spindle bears only upon the ends of the journal. Bearings for slow moving shafts can be moulded *in almost* any way, and yet be made to answer the purpose; but for machinery which must be run at an extremely high rate of speed too much care cannot be exercised in their construction.

A NEW FRICTION CLUTCH FOR SHAFTING.

We extract from the Belgian *Bulletin du Musée* the annexed engravings of a novel shafting connection, the construction of which is quite simple. On a bracket, O, Fig. 1, are the two journals, S, through which pass the ends of

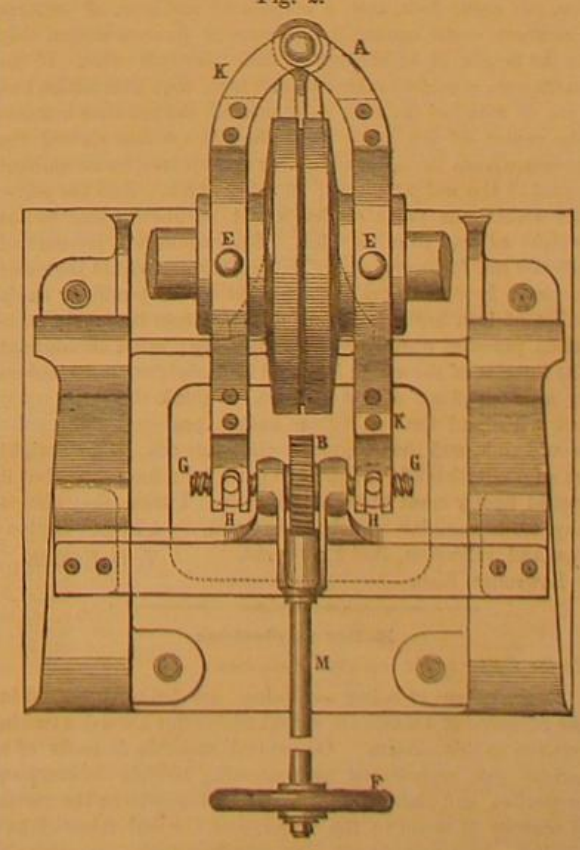
Fig. 1.



the shafts to be coupled. To these extremities, the acting parts, *m*, of the clutch are attached, and on each face of the latter are rings, V-shaped in cross section, which, when the faces are approximated, interlock. One part of the clutch has a tongue, *l*, which enters a groove in the opposite part and thus serves as a guide. It will be seen that, when the two parts are brought closely together, the friction between the opposing rings will cause the motion of one shaft to be transmitted to the other.

The movement of the clutch into or out of action is effected by the hand wheel, F, and shaft, M, Fig. 2, which

Fig. 2.



turns a screw engaging with a helicoidal wheel, B. On the axis of the latter are cut two screws, G, oppositely threaded, on which travel nuts, H. On the nuts are lugs which enter the crotched ends of the levers, K. These levers are attached by bolts, E, to the parts of the clutch, and are connected together above at A, at which point there is a supporting arm. By this device moving shafts may easily be coupled without stopping them.

Communications.

On the Shape of the Earth.

To the Editor of the Scientific American:

In your paper of February 3d, you published an extract from a lecture by Professor Roscoe, in which the opinions of Mallet and Sir William Thomson are quoted to show that the center of the earth is not necessarily in a state of fusion, as I think several eminent geologists, and especially Sir Charles Lyell, always held. But it has been taught for many years that the shape of the earth, being an oblate spheroid, was very strong evidence, if not positive proof, that it had once been in a melted state. This doctrine has become a dogma in the seminaries of learning, and in the textbooks; and it has been entertained by many of the most profound natural philosophers for more than a hundred years. I have seen it in the writings of Professor Tyndall and Professor Draper, also in Humboldt's "Cosmos."

Notwithstanding this array of authority, is it not well to inquire whether the conclusion is correct? I do not propose to discuss the origin of the earth, or to argue that its interior is not now in a state of fusion. But I hold that its shape proves nothing as to its origin, or the present condition of its interior. I think the earth could not retain any shape very different from the present one, even if it were composed of solid iron.

It is known by all architects and engineers that there is a limit to the size of arches, depending on the strength of the material used. An arch spanning several inches can be made of soft putty. Many feet can be spanned by an arch of brick, and hundreds of feet are spanned by steel in bridges. But no one believes that an arch over Lake Erie, or over the Straits of Dover, would sustain itself, no matter what material was used. So that there is a limit to the size of any large body, beyond which gravitation exceeds cohesion. The most minute particle of water assumes a globular form when not in contact with other matter. Putty or jelly would act like water, but would require a larger quantity to overcome the cohesion of the particles. A body the size of the earth, if not revolving on its axis, would be spherical, or very nearly so, even if composed of steel. But let it revolve on its axis, and it will be an oblate spheroid. A very small planet, like some of the smaller asteroids, or a meteoric rock, might retain permanently any given shape.

Liquids, confined in tubes, press with the same force laterally that they do perpendicularly, at any given depth. The same must be true of particles of matter in solids; but the force of cohesion holds them together so that they are not pressed out laterally. The cohesive strength of any substance being known, it is easy to calculate the height to which a perpendicular column of that substance could be raised before the particles would be forced asunder at the base. The tenacity of cast iron is sometimes estimated at 20,000 lbs. per square inch, but it varies greatly. This is when the force is applied by stretching a suspension, and the particles are strained apart. But the cohesion among the particles would be much greater where the force is applied by compression. I have not statistics to enable me to say what it is; but assuming the cohesion of cast iron to be twice as great under pressure applied in a given direction as it is when the force is applied by stretching, that is 40,000 lbs. per square inch, and assuming the weight of iron to be 450 lbs. per cubic foot, then a column of cast iron, of uniform thickness, could sustain the pressure of its own weight only to the height of 12,822 feet—a little over two miles. If the earth were a perfect sphere of cast iron, with gravitation and rate of rotation the same as at present, the pressure towards the center of the earth from the poles would exceed the pressure from the same area, near the equator, by an amount equal to the weight of iron 13 miles thick. And the pressure within the polar circles would be about equal to the weight of iron 10 miles thick. This would be a pressure of 165,000 lbs. for every square inch of surface within the polar circles. It would exceed the weight of sixty million cubic miles of iron around each pole. The strain from this enormous pressure would not be evenly distributed throughout the interior of the earth; it would be mainly concentrated on or near the plane of the equator. I think the earth could not withstand the strain from such a pressure. The poles would sink, and the equator would bulge out. There might be an oscillation of the different parts for a long time, but it would finally come to an equilibrium. I think that almost any mathematician will be convinced, by a little examination and reflection, that I am right.

T. R. FISHER.

Lawrence, Kan.

Boiler Explosions.

To the Editor of the Scientific American:

As the causes of boiler explosions are being discussed in the SCIENTIFIC AMERICAN, permit me to offer a word or two in relation to this subject. Occasional mention is made of a certain gas, represented as possessing terrible destructive properties, and claimed or believed by many to be the result of scarcity of water in the boiler, and the real cause of explosion. I have never yet seen any description or analysis of this gas, or been able to obtain any information that would afford a clue to its existence. It is true and well known that water is composed of two gases, oxygen, a supporter of combustion, and hydrogen, a combustible. It is further known that, when these elements are properly mixed, they are capable upon ignition of exerting an immense degree of force. It is well understood, also, that, when the vapor of water is passed through an iron tube heated to redness, hydrogen is generated. It may not be strange that, with a limited knowledge of the laws that govern the changes among these bodies, some such idea as the above should have originated. But if we review carefully the process by which water is produced, and the method required for its decomposition, we can discover no ground whatever for the theory in question. When a jet of mixture of eight parts of oxygen (by weight) and one part hydrogen is ignited, we have a flame which developes the greatest heat known—namely, that of the compound blowpipe. In this flame, even gold is instantly fused and converted into smoke. Now, under this intense heat these gases combine, the sole product of the combustion being a vapor which is condensed to a liquid on cooling, showing that water is formed under the most intense heat we can produce.

It is well known that, if a clean iron tube be heated in a furnace, and, while it is glowing, a current of steam is passed through it, and thence into a tube of cold water by means of a small pipe, bubbles of gas will rise, and may be collected by inverting a glass jar filled with water over the mouth of the pipe, the gas ascending through the water. The gas thus obtained will not burn by itself, but will extinguish a lighted taper the instant it is introduced. It resists every effort to change its properties; in short, we know it to be hydrogen, a fixed gas, and one of the component parts of the water we have decomposed. Had the separation of these gases been due to heat alone, oxygen would have been produced also, and the introduction of a lighted taper would certainly have produced an explosion; but we can find no trace whatever of oxygen in the jar. On examining the interior of the iron tube, it is found that a rough scale has been formed on the surface, which is easily pulverized, having the appearance of rust. This substance is proved by analysis to consist of iron and oxygen, showing that the heated iron has absorbed the oxygen of the water. This change is due to the fact that, although oxygen has a strong attraction for hydrogen, it still has a more powerful affinity for iron; hence, it parts with its old associate to unite with the new. Heat has facilitated this change, which would have occurred in time without it. If we substitute a glass tube for the iron one in the latter experiment, it may be heated to near its point of fusion for hours, and a very moderate current of steam passed through; but we look in vain for the formation of gas of any kind, there being little or no affinity between the glass and the constituents of water. The steam will therefore pass through unchanged to the tube of water, where it will all be condensed again, notwithstanding the high temperature to which it has been subjected. When water gets low in a boiler, it falls gradually by evaporation, consequently the surface of the boiler must be overheated gradually. Now the quantity of hydrogen that would be produced in a given time depends entirely upon the quantity of oxygen that is absorbed by the heated iron.

This operation is always an exceedingly slow one, owing to the solidity of the material that must be atomized, and the gas is evolved in minute bubbles. Hydrogen being many times lighter than steam, it would be the first to pass out of the boiler. But should the gas accumulate in quantity, we have seen that it cannot burn or explode without a supporter of combustion. Steam is not a supporter of combustion. Even at a red heat, a mixture of hydrogen and steam cannot become ignited. Heat alone will not decompose water, and there is no way to account for the presence of free oxygen to a boiler sufficient to cause explosion.

Exeter, N. H. GEORGE B. BRAYTON.

Color Blindness among Railway Employees.

In a recent article on the subject of color blindness, we pointed out how this infirmity, when affecting railroad employees, might become a source of public danger, inasmuch as it frequently prevents the person affected distinguishing the difference between a red and green signal light. From actual examination of railroad men in Europe, it would appear that cases of color blindness are by no means rare, but, on the contrary, are somewhat frequent. Among the employees of a Russian line in Finland, Dr. Kzohn recently found 43 persons to whom the red and green lights appeared precisely alike. In Sweden and Hungary similar experiments have also recently been conducted. On one Swedish line, ten per cent of the employees confounded red, green, and white lights. In Hungary, on the other hand, but one person out of 400 was found totally color blind, while three per cent of the remainder were more or less affected.

Bicarbonate of Iron.

We have lately received from correspondents in Arkansas samples of water so saturated with bicarbonate of iron as to completely obstruct, by precipitation, the pipes and valves of steam engines in which an attempt has been made to use the water. We are in possession of specimens of this deposited carbonate fully an inch in thickness, and remarkably free from foreign salts. It might find employment in the production of medicinal preparations and ferruginous salts used in the arts.

Discovery of a New Comet.

Professor Henry, of the Smithsonian Institute, announces that a new comet was discovered by Professor Borelly of Paris on February 8, in right ascension, 17 h. 13 m.; declination, 1° 37′. Its south daily motion is + 1 m. 44 s. in right ascension, and + 3° 7′ in declination. It has a brilliant, round nucleus. In this locality the new comet should be looked for during two hours before sunrise.

ASTRONOMICAL NOTES.

OBSERVATORY OF VASSAR COLLEGE.

The computations and some of the observations in the following notes are from students in the astronomical department. The times of risings and settings of planets are approximate, but sufficiently accurate to enable an ordinary observer to find the object mentioned. M. M.

Positions of Planets for March, 1877.

Mercury.

The planets Mercury, Venus, and Saturn rise so nearly with the sun in March that they cannot be readily found. Mercury rises at 5h. 42m. A. M. on the 1st, and sets at 3h. 32m. P. M. On the 31st, Mercury rises at 5h. 43m. A. M. and sets at 3h. 46m. P. M.

Venus.

On March 1, Venus rises at 6h. 2m. A. M., and sets at 4h. 19m. P. M. On the 31st, Venus rises at 5h. 34m. A. M., and sets at 5h. 29m. P. M. Venus and Saturn are in conjunction on the 16th, but they rise so nearly with the sun that they can scarcely be seen.

Mars.

Mars rises on March 1 at 2h. 53m. A. M., and can easily be found by its neighborhood to Jupiter, being a little south of that planet. On the 31st, Mars rises at 2h. 16m. A. M., and sets at 11h. 21m. A. M. The more rapid motion of Mars easterly among the stars has carried it far from Jupiter, and on the 31st they are about 18° apart.

Jupiter.

Jupiter is far south in declination; but as it rises at 2h. 51m. A. M. of the 1st, it can be seen for three hours before sunrise. On the 31st, Jupiter rises at 1h. 6m. A. M.

Saturn.

Saturn, like Mercury and Venus, is so nearly in the line of the sun's path as scarcely to be seen in March. It rises on the 1st at 6h. 46m. A. M., and sets at 5h. 40m. P. M. On the 31st, Saturn rises at 4h. 56m. A. M., and sets at 4h. 0m. P. M.

Uranus.

Uranus, which is so distant from us that its diameter is only about four seconds of arc, can, with an ordinary telescope, be seen, unlike a star, to show a disk. With a powerful telescope, Uranus looks like a very small full moon, whiter than the moon in color. At this time (February 17) one of its satellites can be seen.

Uranus rises on the 1st at 4h. 3m. P. M., and sets at 5h. 53m. the next morning. On the 31st, Uranus rises at 2h. P. M., and sets 3h. 52m. of the next morning. On the 31st, Uranus comes to the meridian a few minutes before 9 P. M., and is then 7° west of Regulus, and nearly 3° north.

Neptune.

Neptune cannot be seen in March with good telescopes.

Sun Spots.

The report is from January 18 to February 17 inclusive. On January 18 and 19, the large spot and the larger group of spots, mentioned in the last report, were still visible: the group, consisting of three irregularly shaped spots surrounded by a chain of small ones, being now near the center and the single spot, on the western limb. On January 23, when the next photograph was taken, the single spot had disappeared, and the group was far advanced on the western limb. On January 24 it was observed very near the edge, and, before the next observation, on the 27th, it passed off. The picture of this date shows the sun's disk free from spots. The photograph of February 1 shows a very small spot on the eastern limb which could not be found after that date. On February 7 a large spot appeared some considerable distance from the equator, on the eastern limb. Probably this is the same spot which traversed the disk between the dates of January 4 and 21, but was somewhat diminished in size. The photographs of January 8, 9, 10, and 13 show a regular motion of the spot. On February 14 a very small spot accompanied the large one, but it has not since been found. On February 17 the large spot was seen very near the western edge.

The Oldest Piece of Iron.

The oldest pieces of iron (wrought iron) now known are probably the sickle blade found by Belzoni under the base of a sphinx in Karnac, near Thebes; the blade found by Colonel Vyse, imbedded in the masonry of the Great Pyramid; the portion of a cross-cut saw exhumed at Nimroud by Mr. Layard —all of which are now in the British Museum. A wrought bar of Damascus steel was presented by King Porus to Alexander the Great; and the razor steel of China for many centuries has surpassed all European steel in temper and durability of edge. The Hindoos appear to have made wrought iron directly from the ore, without passing it through the furnace, from time immemorial; and elaborately wrought masses of iron are still found in India which date from the early centuries of the Christian era.

Remedial Agents.

Sickness being a tiresome, monotonous, dreary system of endurance, it is not strange that chronic patients demand from time to time some medicinal plaything which shall give the combined charm of novelty and renewed hope. This accounts, suggests the *Daily Graphic*, for the successive eras of water cure, friction, Swedish movement, quassia wood drinking cups, steam baths, galvanism, grape cure, milk cure, sun cure, cundurango, warm blood baths, extreme vegetarianism, will cure, and finally blue glass. All of these have doubtless some specific remedial quality, and all in time will probably contribute their quota to the grand coming system of eclecticism.

STRAIGHTENING WROUGHT METAL PLATES.

No. I.

The straightening of iron plates is an operation to properly perform which requires a great deal of judgment and careful manipulation. Every blow delivered should be directed to a definite end, for one misdirected blow entails the delivery of many others to correct its evil influence; and hence, if several of such misdirected blows are given, the plate will have upon it a great many more hammer marks, or "hammer sinks" as they are sometimes termed, than are necessary. As a result, not only will the painter (in fine work) be given extra trouble in stopping the hollows to make a smooth surface, but the following evil will result: Every blow struck by the hammer compresses and proportionately stiffens the small surface upon which it is delivered, and creates a local tension upon the surrounding metal. The misdirected blows then cause a tension acting in opposition to the effect of the

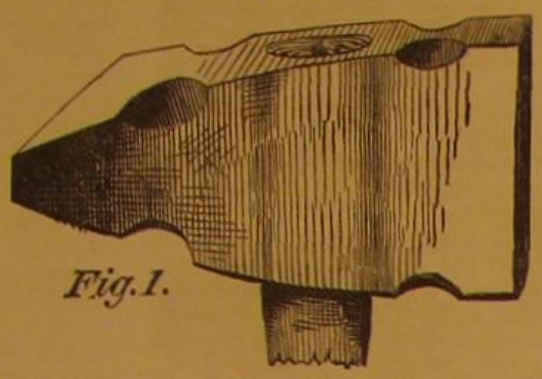


Fig. 1.

properly delivered ones; and though the whole plate may be stiffened by the gross amount of blows, yet there will be created local tensions in various parts of the plate, rendering it very likely to spring or buckle out of truth again. If, for example, we take a plate of iron and hammer it indiscriminately all over its surface, we shall find it very difficult to straighten it afterwards, not only on account of the foregoing reasons, but for the additional and most important one that the effect of the straightening blows will be less, on account of the hammered surface of the plate offering increased resistance to the effects of each blow; and after the plate is straightened, there will exist in it conflicting strains, an equilibrium of which holds the plate straight, but the weakening of any of which will cause the preponderance of the others to throw the plate out of straight; for the effects of the blows cannot be permanent unless the whole body of the iron is acted upon to an equal extent by the hammer. Suppose, for example, that we take a flat plate, and deliver upon it a series of blows round about its center. The effect will be to make it hollow on one side and rounding on the other, the effect of the blows being, not only to indent the plate in the spots where they fell, but to carry the whole body of the

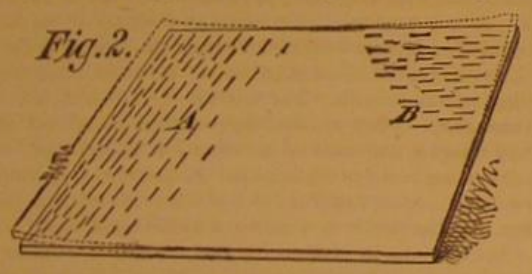
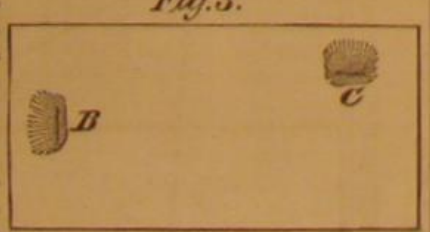


Fig. 2.

middle out of true; because, the area of the iron being increased by the stretching effect of the blows, the center leaves the straight line to accommodate the increased area. Thus, if we mark off a square foot in the middle of a plate, and hammer it so as to stretch it and increase its area ¼ inch each way, the form of the plate must alter to suit this added area, and the form of a dish or curve is the only one it can assume. If, however, the outside metal is also stretched to the necessary degree, the plate may be made flat. The skillful workman takes advantage of the stretching of the plate; and so soon as he has ascertained where the plate is out of true, he sets to work to stretch it so as to draw the crooked placed straight, taking care that the shape and weight of the hammer and the weight of the blows delivered shall bear a proper relation to the thickness of the plate and the material of which it is composed. If it is of consequence that the finished work shall bear no marks of the hammering, as in the case of engravers' plates a flat-faced hammer is employed; but for other work, the shapes, as well as the weights, of the hammers vary. The hammer shown in Fig. 1 is called a "long crossface:" "long" because it is intended to be used in both hands as a sledge, and is provided with a long handle (being used for heavy work) and "crossface" because the length of the face on one end stands crosswise with the length of the face at the other. This hammer causes the metal to rise or lift in front of it, the direction in which the rise takes place depending upon the direction in which the length of the hammer face strikes the plate. Suppose, for example, that we strike the blows shown at the

Fig. 3.



end, A, of the plate shown in Fig. 2, and that we then turn the hammer upside down and strike the blows denoted by the marks at B in the same figure (this the workman can perform, by reversing the hammer, without changing his position); the result will be to curl up the plate as denoted by the dotted lines.

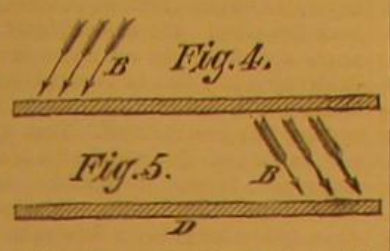
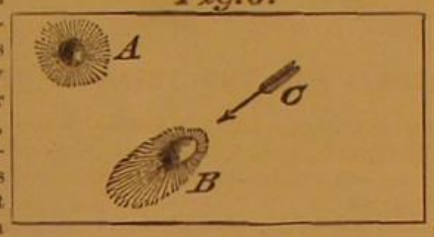


Fig. 4.

Fig. 5.

This effect is produced by two causes, the first of which is the shape of the hammer face, and the second is the direction in which the blows fall. Fig. 3 represents an iron plate with one each of the blows, respectively shown in Fig. 2, at B and C, delivered upon it. Then, the indentation of the plate being denoted by the full line, the tension caused to the surrounding iron will be indicated by the dotted lines. It will be noted that these dotted lines are in each case longer on one side of the mark than on the other, and the reason is that the effect is greater on that side, or rather in that direction, because the hammer does not fall vertically upon the plate, but somewhat aslant. If the plate shown in Fig. 2 be turned up on edge so as to appear as in Fig. 4, the direction in which the hammer would travel when striking the blows at B (in Fig. 2) is denoted by the arrows, B, in Fig. 4. While if we turn up the same plate so that its edge, D, in Fig. 2, will appear as the edge, D, in Fig. 5, the direction of the blows shown at C, in Fig. 2, will be denoted by the arrows, B, in Fig. 5; so that both the shape of the hammer face and the direction of the blow conjointly act to draw or bend the plate in the required direction. If we take a ball-faced hammer, the effect will be produced as shown in Fig. 6, in which the circle, A, represents the mark left by a ball-face or pene hammer, and the diverging dotted lines show the effect of the blow upon the surrounding iron. B represents a blow delivered by the same hammer, which, while falling, traveled also in the direction of the arrow, C, the direction effects of the blow being denoted by the dotted lines.

Fig. 6.



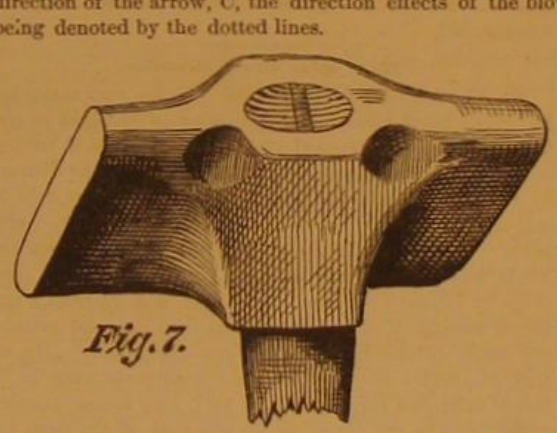


Fig. 7.

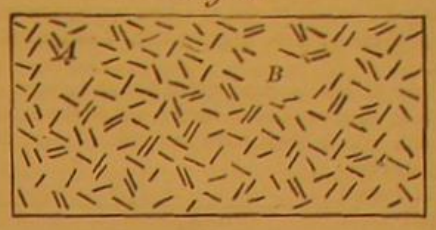
We next come to the twist hammer, shown in Fig. 7 in perspective, and in Fig. 7′ in front view. This is a hand hammer with the two faces standing parallel to each other, but diagonal to the body of the hammer; so that, by turning the handle in the hand, the direction of the hammer marks will be reversed. Suppose, for example, that in Fig. 8 the outlines represent a plate; the lines slanting one way, as at A, will represent hammer marks made with one face, and those slanting the other way, as at B, are marks made by the other face of the hammer, the direction or line in which the hammer fell being the same in both cases. By very little moving of the position of the hammer handle, then, and by turning the hammer as required, the workman can place the hammer marks in any necessary direction, as shown by the remaining marks in Fig. 8, without requiring to change his position. In referring to the hammer marks, as above, it is not to be supposed that the hammer indents the work, producing "hammer sinks:" the term marks being intended to represent the surface of the metal which received the direct impact from the hammer face.

Fig. 7′.

In addition to the shape of the hammer and the direction of the blows, there is to be considered the weight of the hammer and the velocity at which it travels; and in this connection the following remarks may be made: The effect of a quick blow is to cause indentations or hammer sinks, because the speed of the hammer is of as much importance as its weight. A heavy body traveling slowly may represent the same amount of stored-up energy as that of a lighter one traveling at a greater velocity; but the effect of the impact with another body will be quite different. Thus, to use a familiar example, a tallow candle fired from a gun will pass through an inch board, making a hole clear through the board; so likewise the effect of a light hammer and a quick blow will be productive of indentations. Quick blows, therefore, are never employed, the weight of the hammer being proportioned to the size of the work.

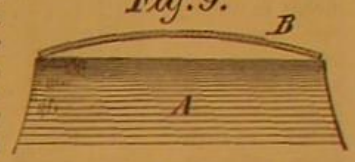
We next come to the straightening block, that is, the iron block upon which the iron plates are to rest (as shown upon

Fig. 8.



an anvil) while being straightened. The size of this block should be about 12 x 18 inches, and say 12 inches deep, which is large enough for the largest work, as will be perceived from the following considerations: It is necessary that the plate should be solid on the block, directly beneath the part of its surface which is being hammered, otherwise the effect of the blows will be entirely altered. If, for instance, A, in Fig. 9, represents the straightening block, and B, a plate resting thereon, then the blows struck upon the plate anywhere save over the very edges of the anvil will have but little effect, because of the spring and rebound of the plate; and the effect of the blow will be distributed over a large area of the metal, tending to spring it rather than give it a permanent set. If the blow is a quick one, it may indeed indent the plate without having any straightening effect. On the other hand, by stretching the skin on the upper side of the plate, it will actually, under a succession of blows, become more bent. In fact, to use a straightening block, so large in proportion to the size of the plate that the latter cannot be adjusted so that the part of the plate struck lies solid on the block, renders all the principles above explained almost valueless, and is a process of pounding, in a promiscuous way, productive of hammer marks, and altogether fatal to the production of true work. In the method of manipulation here explained, every blow delivered is given with the object of liberating the strains which may exist in the plate, holding it out of flat, or of drawing the plate so as to bring into line with the general surface those parts which are not in line with the main body of the plate. J. R.

Fig. 9.



Cologne Water as an Anæsthetic.

Dr. Hugues reports in the *Nice Médical* several cases of anæsthesia produced by the inhalation of the odor of Cologne water. A young person suffering with tuberculous meningitis was, during a period of excitation when injections of morphine and chloral had not produced the desired effect, brought into a sound sleep within seven minutes after a handkerchief saturated with the Cologne had been placed over the nostrils. The sleep lasted about an hour, and the pulse remained at 75. There was no period of excitement, and the anæsthesia, without being complete, was very marked. Dr. Hugues has tried no new experiments of his own on the subject, but propounds the theory that a kind of hypnotic action takes place on the olfactory nerves analogous to that produced by brilliant objects (when intensely regarded) on the optic nerves. The journal whence we extract the above thinks that the anæsthesia is more likely produced by the essences entering into the Cologne, or possibly it may be due to their combination. In any event, the matter seems to be worth some further investigation.

Health of Employments.

The following instructive table was prepared by direction of the Massachusetts Legislature, by which it appears that the average age of

	Years.		Years.
Gentlemen is	68	Masons	48
Judges	65	Traders	46
Farmers	64	Tailors	44
Bank Officers	64	Jewelers	44
Coopers	58	Manufacturers	43
Public Officers	57	Bakers	43
Clergymen	56	Painters	43
Shipwrights	55	Shoemakers	43
Hatters	54	Mechanics	43
Lawyers	54	Editors	40
Ropemakers	54	Musicians	39
Blacksmiths	51	Printers	38
Merchants	51	Machinists	36
Calico Printers	51	Teachers	34
Physicians	51	Clerks	34
Butchers	50	Operatives	32
Carpenters	49		

Reaching the North Pole.

Mr. J. H. Stevens, of Dayton, Ohio, writes to us to suggest the use of balloons, to be carried as far north as possible in sledges containing compressed gas, the gas being then utilized to inflate the balloons, which are then to be started with wire ropes attached. He thinks that a series of balloons could be started from the highest latitude, say 81° N., so as to pass over any intervening ice, and that communication could be kept up between the sledges or the ships and the balloons till the object was achieved. The details of the plan, which he gives with great minuteness, are too long for insertion in our columns.

THE TRIAL OF THE HUNDRED-TON GUN.

The 100-ton gun, built by Sir William Armstrong for the Italian Government, was, as we have already noted, transported to Spezzia, Italy, and there was fired fifty times, this being the proof test called for by the contract with the maker. The results of the trials show that, with a projectile weighing 1,997·6 lbs., and charges of powder varying between 299·6 and 373·5, the pressures at the bottom of the bore ranged between 16 and 21·4 tons per square inch. The velocities obtained were between 1,337·6 and 1,504 feet per second.

The four targets, against which the shots were directed, varied both in general construction and in the nature of the plates with which they were covered. Target No. 1 was composed of two plates of forged soft steel from the Creuzot foundry. Their dimensions were 32·8 inches long by 56·5 broad by 21·8 inches thick. They were backed by two layers of wood measuring 25·1 inches in thickness, and supported by a heavy iron framework that rested at an acute angle on the earth. In target No. 2, there was the same general construction, with the exception, however, that the plates were of forged iron, partly of English and partly of French manufacture. Target No. 3 had two plates of iron, separated by wood on its upper half. The outer plate was 11·8 inches, and the inner one 9·9 inches, in thickness. The lower half of the target had an outer plate of 9·9 inches backed by a hard cast iron plate 14·8 inches thick. The wooden portions were the same as those already described. Target No. 4 closely resembled No. 3, so that it will be seen that all were constructed with a thickness of 21·8 inches of metal, besides sufficient wooden backing to aggregate a total thickness of about 51 inches.

Fig. 1.

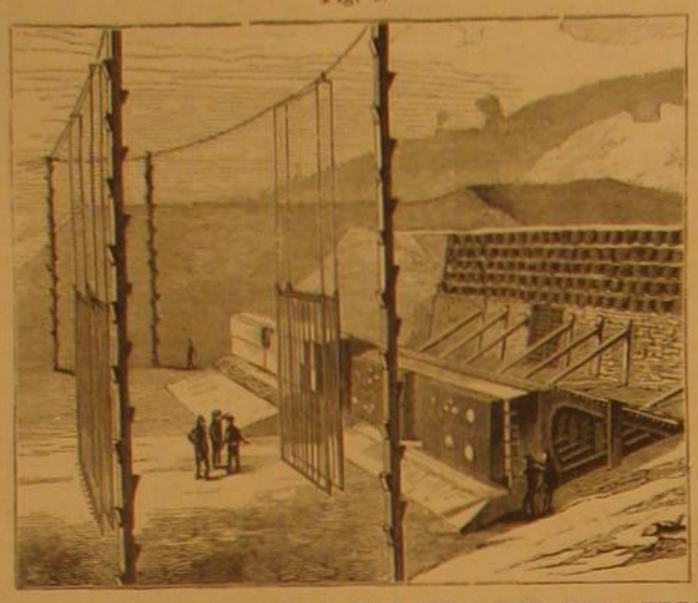
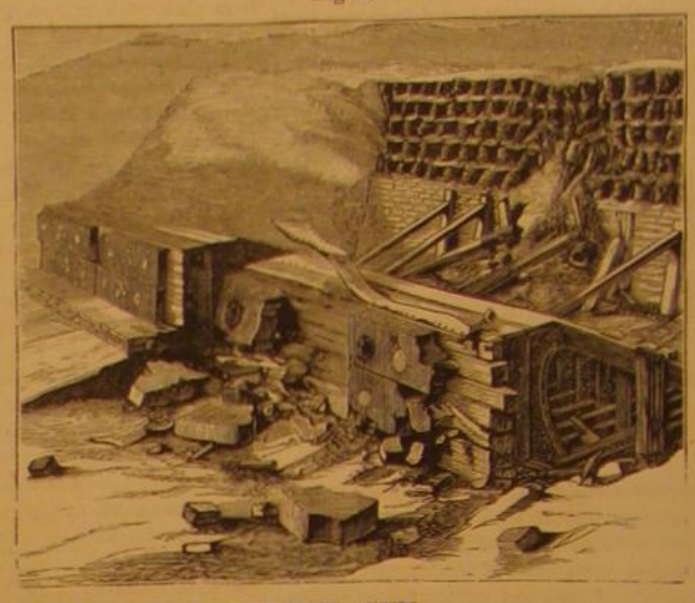


Fig. 2.



THE TARGETS FOR THE TRIAL OF THE HUNDRED-TON GUN.

The firing ground was located in a ravine near the coast, where a butt was erected of sandbags and gabions filled with earth. The cost of targets and earthwork was about $125,000, each armor plate being worth about $4,000. The effects of the shot—to enter into the detailed consideration of which here would occupy too much space—fully realized all anticipation. The terrible destructiveness of the enormous projectile is, besides, well exhibited in the annexed engravings representing one of the targets before (Fig. 1) and after (Fig. 2) being struck. Although the projectile failed to traverse entirely the steel plate, it was considered to have dealt the armor a shock which would have irremediably damaged the same had the plating been upon a vessel.

As might be expected, the tidings of these results have created considerable excitement in England, as they show that such vessels as the Inflexible, hitherto deemed impregnable to modern artillery, are no longer so. The British Admiralty has already ordered the construction of several plates 24 inches thick, or some three inches thicker than those used at Spezzia. Plans for a still larger gun are also under consideration; and the London *Times* announces the speedy construction of a 200-ton Fraser gun, capable of throwing a 3,995 lb. shot.

A SELF-SETTING RAT TRAP.

The annexed engraving represents a very ingenious rat trap, simply constructed in a manner calculated to allay the

suspicions of the wisest rat, as, after catching its victims, it displays them so that they serve as decoys for others. It consists of a drum-shaped cage of wire divided by a horizontal partition into two compartments. In the head there is a square hole into which is secured, by buttons, a frame carrying a number of downwardly projecting wires. In bearings in this frame is also a shaft, having upon it two diverging rows of wires, which form a swinging gate, suspended centrally between the wires of the inlet. This gate the rat can easily push aside, so as to gain access to the interior; but he cannot return, because the gate at once swings back into place. The bait is placed in the upper compartment, and thither the rat makes his way. As soon as it dawns upon him that he is caged, he loses his presence of mind; and in his desire to depart, he dives into the first opening that presents itself. That opening is in the partition, and it leads him into the lower compartment. He cannot return, because the aperture encloses another frame, which is surrounded by converging sharp wires. There he stays, and by his presence deludes his friends into the belief that everything is all right, and that they can step right in and carry off the bait. When they try to do it, they join him. After a sufficient number of rats are collected, they may be removed by taking out the wire frames. Their subsequent disposal may be left to the consideration of a Scotch terrier.

Patented through the Scientific American Patent Agency, December 5, 1876. For further particulars relative to sale of State and county rights, etc., address the proprietors and manufacturers, J. T. Wilhide & Brother, York Road, Carroll county, Md.

More Blue Glass Skeptics.

Mr. Thomas Gaffield, of Boston, who for very many years has given much attention to the action of sunlight on glass, and the action of colored glass upon transmitted sunlight, makes the following statements, which would be damaging to the nonsensical blue glass theory of Pleasonton if that statement had any foundation to rest upon. Mr. Gaffield says: "The poorest kinds of colorless glass, and even those kinds which have been changed to a yellowish or purple tinge by exposure of years to sunlight, will transmit a much larger amount of the chemical rays than the most actinic of the really colored glasses, the blue and violet." He adds that, in a series of photometrical experiments made by Professor Stimpson and himself in 1867, they found purple or violet glass to cut off about 90 per cent. of the light rays; and he estimates that the same glass transmits from 20 to 30 per cent. less chemical influence than any colorless glass.

It has been suggested to us, by a skeptic in patent blue glass science, that it is difficult to perceive how the blue violet rays, which were already in the sunlight before it was filtered by the glass, can be augmented in their influence by such filtration. If they are thus augmented, as is claimed, then it logically follows that the present compound of sunlight is a very inferior production, in which certain ingredients serve to diminish the value of the others, and that the Creator has blundered badly in its manufacture.

Hard Times for Ironworkers in Germany.

In Krupp's works there were 12,100 hands employed in the spring of 1875; in September, 1876, there were 9,000. The wages for 12 hours were $1; now they are 80 cents. In the works of Horde in 1875, 2,800 men were employed, who worked six double shifts every week; in 1876 there were 1,500 men working five double shifts. The Gute-Hoffnung-Hutte, at Oberhausen, employed in March, 1873, 7,175; in October, 1874, 5,876; in January, 1876, 4,142 hands. In the Bochum Steel works 4,600 men were employed in 1873, while in the first two months of 1876 the number was 2,250.

Remarkable Glassware.

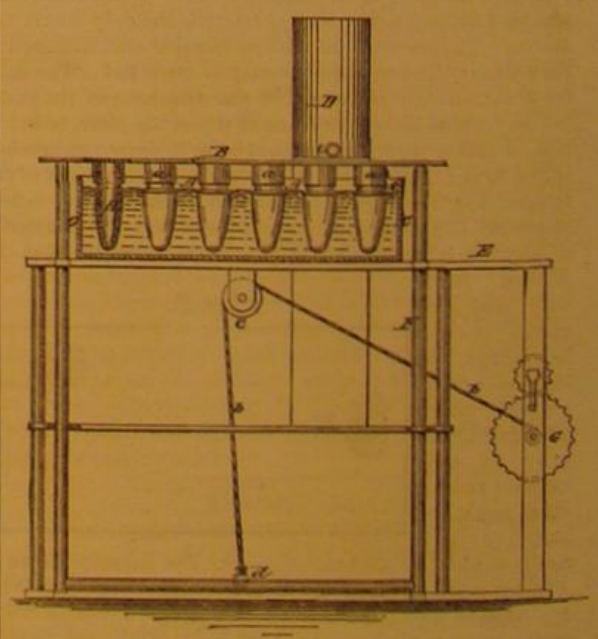
A number of prominent citizens of New York and Brooklyn, including William Cullen Bryant, Erastus Brooks, Chief Engineer Nevins, Secretary Edward A. Kollmeyer, of the Brooklyn Fire Department, and others, paid a visit on Tuesday to the La Bastie Glass Works of South Brooklyn to witness the manufacture of glassware under the process patented by M. de la Bastie, of Paris, in 1875. This process seems to differ from the manufacture of other glassware only in the component parts of material used, as oxide of lead, soda ash, acid, broken glass, sand, etc. After the ware has passed from the workmen's hands it undergoes the annealing process by being thrown into a bath of tallow. The visitors were conducted through the works and the process of manufacture was explained. They were then conducted into the storeroom, where lamp chimneys, tumblers, plates, globes, etc., were subjected to a test by throwing them carelessly around the floor, driving nails into boards with a lamp chimney, and pitching the plates 15 or 20 feet on a hard floor. One small plate was thrown into the air about 25 feet and allowed to fall upon a brick floor, without breaking. Lamp chimneys were placed on lamps and heated, and cold water was sprinkled upon them, but these severe tests did not affect the ware in the least. The works employ about 150 persons, mostly boys and girls, and turn out about 1,000 dozen lamp chimneys daily.—*Tribune.*

NEW MANUFACTURE OF RUBBER ARTICLES.

Mr. Charles E. Longden, of Naugatuck, Conn., has patented through the Scientific American Patent Agency (January 2, 1877), a new process and apparatus for forming rubber articles, which consists in dissolving the india rubber in naphtha or other suitable solvent, and dipping the moulds or forms upon which the articles are vulcanized into the solution of rubber a number of times, allowing sufficient time after each dipping for the naphtha to evaporate more or less. When the mould or form becomes sufficiently coated with rubber, the articles are allowed to dry on the mould, and are afterwards vulcanized in the ordinary way.

The apparatus used is represented in the annexed engraving, C being the vat for containing a solution of rubber or other vulcanizable substance. F is a movable frame, that is capable of sliding vertically through the table, E. A support, B, rests upon the frame, F, and has the socket, *a*, attached to its under side. In the socket, *a*, the moulds, A, are placed, so that the moulds project downwards into the rubber solution. The frame, F, is raised or lowered by means of the windlass, G, which is arranged in the frame of the table. A cord, *b*, running from the said windlass over the pulley, *c*, attached to the under surface of the table, is connected with a crossbar, *d*, in the lower part of the frame, F. D is a reservoir for containing a supply of the rubber solution, which is delivered through the pipe, *e*, to the vat, C, as the rubber solution in the vat becomes exhausted by dipping the moulds. The moulds or forms, A, are made from glass. They are first dipped, then raised out of the said solution and allowed to stand for a short time; and if the coating is not of the required thickness, the operation is repeated. After removal the forms are placed in a vulcanizer, and the rubber is vulcanized in the usual way.

The advantages claimed for this method of working rubber are that articles are seamless, and have a finished exterior and interior surface. They can also be made much more rapidly than by the ordinary process. The glass form permits of readily removing the rubber after it is vulcanized, and it gives the surface of the rubber, which is in contact with the glass during the process of vulcanizing, a



smooth and finished appearance. A further advantage consists in dispensing with moulds for the outside of the article.

CRAB ORCHARD SALTS contain lime, magnesia, potash, soda, sulphuric acid, and a trace of hydrochloric, carbonic, and silicic acids.

INDUSTRIAL BARBARIANS.

Dr. Harmand, a French traveler who has recently explored a large portion of Cambodia, in Further India, describes in his narrative a curious tribe of people known as the Kouys. The name *Kouy* itself is an interrogatory, meaning, in the native language, "What is it?" A curious, though of course accidental, coincidence will be noted between the sound of the name and the Latin interrogation *Quis?* Of this tribe there are several sub-tribes, known, strangely enough, by the names of the peculiar industries which form their respective specialties. Thus there are the palm-sugar Kouys, the elephant-hunting Kouys, the paddy-gathering Kouys, and many others, besides the iron-making Kouys, whose primitive foundry is illustrated herewith. There is an odd analogy of this industrial division of the barbarous people to the separation of the Dutch and English into guilds, each pursuing its peculiar craft.

In the native smelting furnace there is a rectangular hearth upon which the ore is piled in layers, alternating with charcoal. To serve as tweers, twenty-six clay tubes, spread in a fan-shape, are inserted in the walls and led under the charge. Outside the masonry these tubes are prolonged by bamboo pipes in like number, which connect with the bellows. These last consist of deer skins fastened tightly down at their edges. To the middle, a rope is attached and led to a bent lever. By raising this lever, the workman pulls up the middle of the hide, thus drawing in the air through the furnaces. The draft produced in one direction is now forced back through the charge in the opposite way by the smith pressing the deer skin down with his foot. As shown, there are two bellows which, working alternately, keep up a constant blast. There are no valves, and the air of course enters and leaves by the same orifices. So hot a fire is produced by these primitive means that the workmen are compelled to use bamboo screens to shield them from the heat. On each side of the furnace are apertures, whence the scoriæ constantly escape. The furnace is kept in operation but for one day; for by the end of that time it is completely burned out, so that next morning the barbarian ironmaster begins his day's work by building a new plant. The iron produced is said to be of fair quality.

A KOUY SMELTING FURNACE.

Prices of Wool.

The average prices for domestic fleece wool in the United States from 1824 to 1861 were for fine 53 3-10 cents, for medium 42 4-10 cents, and for coarse 34 5-10 cents per pound. The average for the four years, from 1861 to 1866, during the war, were: for fine 75 6-10 cents, for medium 74 cents, and for course 70 7-10 cents. In 1864 and 1865 fine and medium wool sold for $1.15 a pound, and even coarse wool sometimes sold for $1 a pound. The average prices for eleven years, from 1866 to 1876 inclusive, were: for fine 55 cents, for medium 53 cents, and for coarse 48 cents. The prices in October, 1876, were: for fine 45 cents, medium 40 cents, coarse 33 cents a pound; and the average for the year was for fine 44½ cents, for medium 44 cents, and for coarse 36½ cents.—*Philadelphia Ledger.*

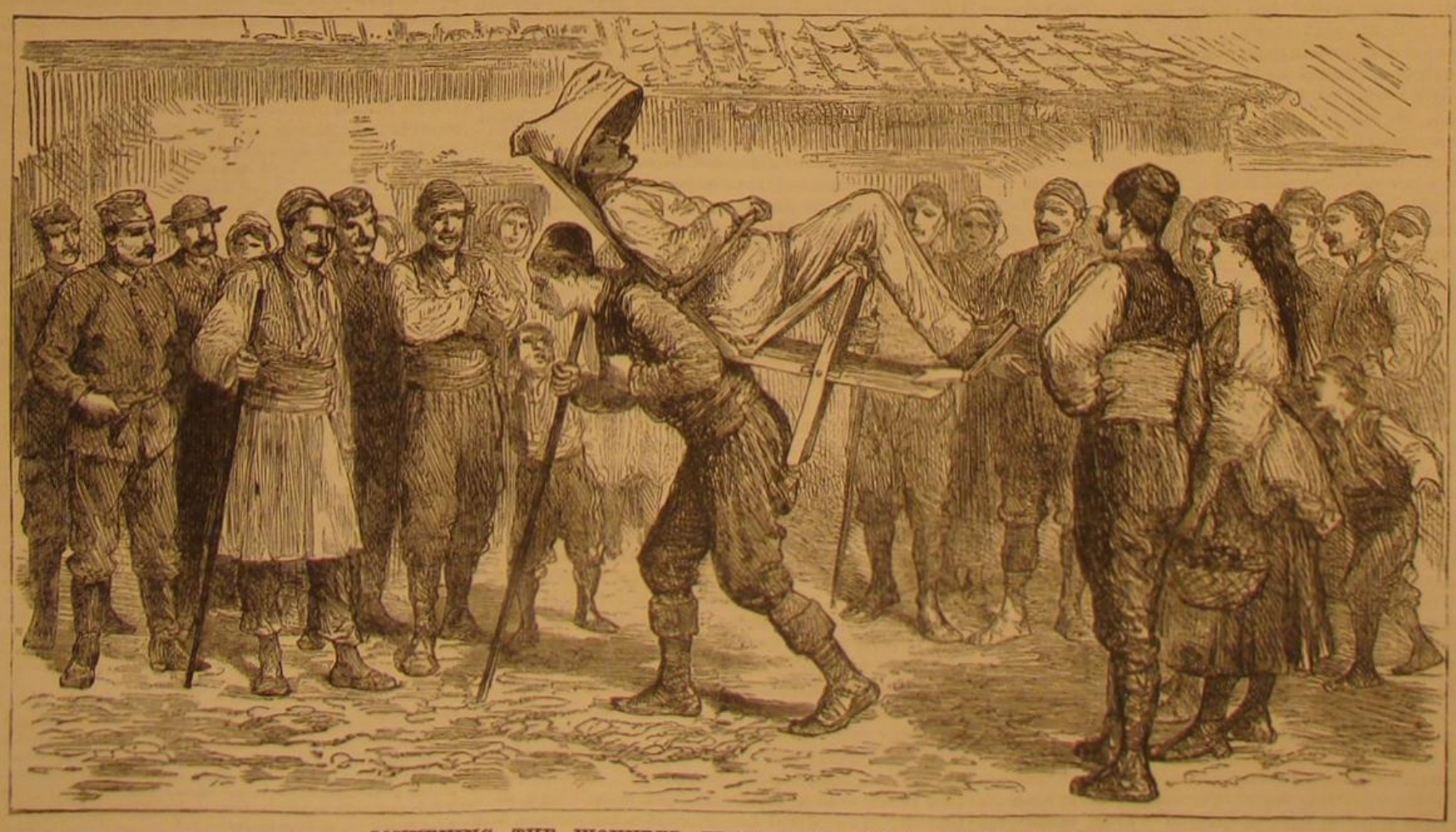
A NEW AMBULANCE.

Our illustration clearly shows the construction of what seems to be a very convenient device by which a wounded or otherwise invalid person may be carried on the back of a comrade or porter. It will be seen that the weight of the burden is equally distributed over the back of the carrier, so that the whole is borne without undue fatigue. The invention has been used in Turkey during the recent civil war, and was found to be handy and easily constructed. It is, moreover, light and portable when not in use; and it might be employed in place of the common stretcher in cases of accident, as it affords a very easy reclining position, and keeps the sufferer with his head and limbs in their natural relative positions.

Japanese Fans.

The *Hiogo News* gives the following interesting information regarding the manufacture of Japanese fans. Every one has doubtless remarked the exceeding neatness displayed in their workmanship, and also has probably wondered how such carefully made articles even as *the commoner* kinds of paper fan can be imported to this country and sold at retail for five cents each.

Like many other manufactures, the principle of division of labor is carried out a long way by this branch of industry. The bamboo ribs of the fans are made by private people in their own houses, and combination of the various notches cut in the lower part is left to one of the finishing workmen, who forms the various patterns of the handles according to plans prepared by the designer. In like manner the designer gives out to the engravers the patterns that his experience thinks will be salable for the season next ensuing; and when the different blocks have been cut, it still rests with him to say what colors are to be used for each part of the design, and what different sheets are to be used for the opposite sides of each fan. In fact, according to our informant, this official holds, if not the best paid, at any rate the most important position on the staff-in-ordinary. When the printed sheets which are to form the two sides of the fans have been handed over to the workman, in company with the sets of bamboo slips which are to form the ribs, his first job is to fold the two sheets which are to form the fan, so that they will retain the crease. This is done by putting them between two pieces of heavily oiled paper, which are properly creased. The four are then folded up together and placed under pressure. When sufficient time has elapsed, the sheets are taken out and the moulds used again, the released sheets being packed up for at least twenty-four hours in their folds. The next process is to take the ribs (which are temporarily arranged in order on a wire) and set them into their places on one of the sheets after it has been spread out on a block and pasted. A dash of paste then gives the woodwork adhesive powers, and



CONVEYING THE WOUNDED FROM A TURKISH BATTLE FIELD.

[For the Scientific American.]

A DAY'S ICE YACHTING ON THE HUDSON.

By invitation of Commodore Irving Grinnell, of the New Hamburgh Ice Yacht Club, the writer spent Monday, February 19, in the interesting sport of ice yachting on the Hudson, at New Hamburgh, 65 miles up the river. Mr. Grinnell and the writer prepared for the cold by donning warm overcoats and gloves, and protecting the feet and lower part of the legs from the wind by placing thick knit stocking legs over the junction of pants and shoes and under the indispensable "arctics." When ready, they proceeded from the house down to the river through the grounds, noting before starting that the thermometer was in the vicinity of the freezing point. There was a slight breeze, which soon freshened up, and the ice was in good condition, the morning's sun having as yet had but little effect on it. A safe course could be had for about two and a half miles from just above the New Hamburgh dock, up the river. With some misgivings, the writer lay down on the narrow deck of the Flyaway; and with the commodore at the helm the yacht was soon flying across the river. Flying expresses it; the sensation is like nothing else, and it is very pleasing, though at first one feels like holding on very tight, naturally expecting to be shot out on the glossy surface every time the direction of the craft is reversed. This turning around, with the speed abating but a little, is a queer sensation. The yacht is steered so as to spin around inside of her own length, or a little over, the skates scraping sideways along the ice, and the adhesion being such that she does not, as would naturally be expected, slide sideways for some distance over the ice before getting on her course again, but makes a perfectly circular track around. There were some eight or ten yachts sailing to and fro, tacking here and there on the ice; and occasionally two or three coming up the river together for a friendly trial, made fine pictures with the ice-bound river stretching down, the Tanzkammer bluff to the left, with the grand old Storm King in the distance.

The craft Flyaway has an extreme length of 25 feet from the end of her boom to the tip of her bowsprit; she is built very narrow, in more of a boat form than most ice yachts, the side timbers running past the mast and curving in to the bowsprit as in form of a sailboat; she is sloop rigged, and carries 342 square feet of canvas. When, from the number of times the yacht had been up and down the river, zigzagging here and there, the writer judged that he had been fully an hour on the ice, his watch recorded but 15 minutes. It is fast living; more impressions are received, and more events take place in a given space of time, than under any other conditions. One minute the boat was at New Hamburgh, and in another, before the observation was noted, she was a mile up the river. Time is constant, but distance loses its ordinary relations to it.

Strange to say, from the slight jarring produced by the runners on the ice way, those who are new to the sport feel a sensation much like that felt on the approach of seasickness; and it has even happened that persons have been veritably seasick. The rearing, which frequently occurs, does its share in causing this feeling, as does the quick spinning around before described. This rearing usually happens with a strong wind, and generally when the yacht is on a curve just after going about, and results in the windward runner rising some two or three or even four feet above the surface of the ice, the rest of the frame, and consequently the deck, rising in proportion, so that the uninitiated voyager naturally expects a capsize, the yacht running for a few seconds entirely on the leeward and rudder skates. The voyagers sailed with the wind abeam or from the west, the river's course at New Hamburgh running about a point east of north; and the boat usually made a tack and a half in a mile of straight course, keeping, as is always the case in ice yacht sailing, the sails flat aft, and steering so that the pennant at the masthead flew in a line with the gaff. When put directly before the wind to slow up, the pennant still flew aft, until the yacht's speed dropped down to that of the wind, the canvas shivering as if in the eye of the latter. At this diminished speed the yacht can be easily stopped by being spun around and brought head on to the wind. This is the method most generally adopted in heavy winds, instead of luffing up in the usual way from a beam wind. The vessel is anchored by placing the rudder at right angles to the keel, and lowering the jib.

In ordinary sailing, a vessel would be at her greatest speed before the wind; while in ice yachting it is just the contrary. Curiously, when sailing at a great speed with the wind abeam, or three quarters free, the yacht travels so much faster than the wind that the latter seems to blow from ahead. In beating to the windward, an ice yacht is pointed more closely, and her speed is about the same as that of the wind. An ice yacht attains her greatest speed when running in a direction somewhat similar to that in which the wind is blowing, making long legs to the leeward, or, as ice yachtsmen say, she "beats to the leeward." The resultant wind strikes her on the bows; and on changing from one leg to another, instead of "jibing," she goes into stays, with the wind, as before stated, apparently ahead.

A ice boat makes a good deal of noise, though it is not noticed much by the sailors. However, when standing on the ice and watching them, the "roar" of the skates can be heard over a mile away. The Flyaway, with Mr. Grinnell and the writer on board, participated in the morning in a scrub race with seven other yachts; but no fast time was made, the wind being fickle. The winning yacht made the six miles sailed in some 20 minutes. About midday, the Flyaway was headed for the shore; and it seemed to the writer as if she were going to run into the stone embankments of the railroad; but by a dexterous turn she was spun half around and stopped.

Mr. Grinnell and the writer then embarked on board the Whiff, the beautifully finished yacht which attracted so much attention at the Centennial Exhibition. The wind being somewhat more steady, some fine spurts were made; and with a ten mile breeze, the swift craft made successively, ½ mile in 45 seconds, 1 mile in 70 seconds, and finally 1 mile in 69 seconds, the latter being at the rate of 52½ miles per hour. The Whiff in the afternoon won a 12 mile race, to which about six miles should be added for tacking, in thirty-three minutes, there being two other contestants, the winner coming in a minute ahead.

As results of this day's yachting, the writer found that his face was burnt somewhat by the wind, that the muscles of the upper part of the body were somewhat sore from the straining in holding on to the yacht, and that, as he dropped off to sleep, ice was all around him, and he seemed to hear the crunch of the skates, and to be spinning around *ad infinitum*.

[Those of our readers who desire to construct ice boats on the most approved plans will find the full working drawings of the Whiff in SCIENTIFIC AMERICAN SUPPLEMENT, No. 63. Every detail, including runners, framing, rudder, sails, and rigging, is given to scale, with full particulars. We believe that no publication of the actual plans for building fast ice boats was ever made until those given last year, in our SUPPLEMENT No. 1, appeared. The two sets of plans (SUPPLEMENTS No. 1 and No. 63) cover the subject very fully; and as a result, the adoption and general use in all cold climates of the American forms of ice yachts may be expected. From Norway, Sweden, Russia, Germany, and Canada, many copies of these ice boat plans have already been ordered.—EDS.]

NEW YORK ACADEMY OF SCIENCES.

The chemical section of the Academy held their regular monthly meeting at the School of Mines, Columbia College, on Monday evening, February 12. The first paper of the evening was by Professor C. F. Chandler, Ph.D., on the

COMPOSITION OF PETROLEUM AND THE PROPER STANDARD OF SAFETY.

Professor Chandler stated that, although petroleum had been known for centuries, it had only recently come into general use for illumination, for the reason that suitable lamps had been wanting. Lamp chimneys were invented about the beginning of the present century, previous to which time there had been only smoky lamps such as are found at Pompeii. The inventor of lamp chimneys had done a great deal for civilization, by making it possible to read at night. In 1856, the manufacture of oil from Boghead coal was begun, and in a short time coal oil, or kerosene, had come into extensive use. Lamps had been devised for burning this coal oil, and proved suitable for burning petroleum. A company was organized to collect the petroleum, which was soaked up by blankets from the surface of pools of water. The speaker then described the boring of the first well by Colonel Drake, the subsequent excitement, the quantity of oil produced, and other incidents connected with it. The oil, he said, usually comes from Devonian rocks, which are much older than the carboniferous or coal measures. Petroleum contains about 85 per cent of carbon to 15 per cent of hydrogen. It consists of a series of hydrocarbons of the simplest kind known as the marsh gas or paraffin series, CH_4, C_2H_6, etc., or of the general formula $C\ H_{2n+2}$ The oils of Italy do not contain any of the lighter oils, which have already evaporated. In Pennsylvania, the rocks are impervious, and evaporation was consequently impossible.

In California, where the oil is more plentiful on the surface, there is but little beneath, as it has all run away or evaporated. There is another series of hydrocarbons called olefines, of the general formula C_nH_{2n}, but these do not occur to any considerable extent in American petroleum. They are distinguished from the paraffin or marsh gas series by the fact that they are attacked by sulphuric acid and converted into alcohol, so that the manufacture of alcohol from illuminating gas is a possibility. Alcohol was exhibited at the Paris Exhibition made in that way. There is some doubt at present whether the white solid which we call paraffin belongs to the paraffin or the olefine series; probably there are some of each series. There is another series of hydrocarbons known as the aromatic series, benzol C_6H_6, etc., which is found in Rangoon tar, but not in our petroleum. When benzol is treated with nitric acid, it is converted into artificial oil of bitter almonds. Dr. Chandler thought he had noticed this odor in treating petroleum with nitric acid. After a digression on artificial alizarine, the speaker described the method of refining petroleum by fractional distillation, the destruction of coloring matter and gummy substances by sulphuric acid, and washing with soda, to remove traces of the acid. Sludge acid is the name given to the acid after it has been in contact with the oil, and it is from this acid that we derive the foul odors wafted to this city from Long Island City by every easterly breeze. This acid is used in the manufacture of fertilizers In regard to testing safe and dangerous oil, Dr. Chandler showed some interesting experiments. Some oil was placed in an open tester and gradually heated on a water bath with a thermometer It was found to flash, or give off combustible vapors, at 110° Fahr.; and it burned at 118°, being what is called very safe oil. He then placed some of this same oil in a closed vessel resembling a metal lamp, but provided with a cork instead of the common head or burner, and having electric wires attached. On heating the oil to 85°, and sending a spark through the vapors, an explosion took place which blew out the cork with a loud report, showing that oil, which has been considered safe, gives out explosive vapor at ordinary summer heat.

DEVICES FOR SECURING PRESSURE IN FILTRATION was the subject of a paper by Professor C. A. Seeley. He obtains the pressure on the principle of an aspirator, two bottles being employed and the water allowed to flow from one to the other.

This meeting was largely attended, a number of ladies being present, as is usually the case when the meetings are held at the School of Mines. Nor are we surprised at this, for Dr. Chandler's museum of chemical curiosities is always open to the inspection of the visitors, and recently this collection has received several important additions from the Centennial Exhibition. Among the finest of these is Bayer & Co.'s complete set of coal tar colors, both aniline and alizarine, with the intermediate products, each specimen being elegantly mounted with distinct gilt labels bearing the English and German name, and in many cases also the chemical formula. They are also numbered to indicate the order of manufacture; thus, Nos. 1 to 4 are coal, German, English, Scotch, and American; 5, coal tar; 6, benzol; 7, nitrobenzol; 8 aniline oil; 9, diamond fuchsine in large crystals; 10, silk dyed with fuchsine; and so on through each of the principal colors. Then came the rarer homologues of the benzol series, toluol, nitro and benitro toluol, chloride of benzyle; cumol, xylol, and toluidin; then naphthalin, nitronaphthalin, and napthylamine, muriate of aniline, a full set of methyl violets (ten in number), iodides of ethyl and methyl, wood tar, phenol (carbolic acid), rosolic acid, picric acid, and corallin. In the alizarine section, the same order is observed, coal, coal tar, anthracene (crude and pure), bibromanthracene, anthraquinone, sulphanthraquinonic acid, alizarate of sodium, and alizarine of seven different kinds, with specimens of cottons printed with them. Dr. Chandler has been particularly fortunate in securing to our city this beautiful and instructive exhibit, which he kindly places where all may see it free of charge.

American Fire Arms for the Turks.

The Providence Tool Company is at present filling the largest contract for arms ever given to a private armory. It is making six hundred thousand Martini-Henry rifles for the Turkish Government. At the close of last year there had been about one half of these rifles made and delivered. Recently the Turkish Government has been very urgent for the rapid fulfilment of the contract, and the works for some time have been turning out these arms at the enormous rate of one thousand per day.

Fire at the St. Louis Bridge.

A destructive fire took place a few days ago in St. Louis, Mo., among some shanties and frame buildings at the east end of the great bridge. A stiff breeze was blowing at the time, and the fire spread so rapidly that it was some hours before it could be checked, and by that time 1,000 feet of the approach to the bridge was rendered impassable, and it is likely to remain so for some time. The skeleton of the approach remains, all the woodwork having been destroyed. The damage to the bridge is estimated at $125,000.

Fruit Trees.

It is a good practice to wash the trunk and main branches of fruit trees with lime wash. If the white color is not agreeable, a little soot can be put in to neutralize the glare. The wash destroys the eggs of insects and the germs of fungi, and keeps the bark free to swell as the cells grow. Where the white scale abounds on the bark the branches may be painted with linseed oil. It is a sure cure, and really seems to make the tree more healthy and vigorous than it would be without the wash.

A New Anæsthetic.

A new anæsthetic has been described by M. Rabuteau before the Academy of Sciences, Paris. It is hydrobromic ether, which, he says, can be administered without difficu.., and which is, moreover, eliminated almost completely by the respiratory passages. It holds an intermediate place between chloroform, bromoform, and ether. Considering the frequent recurrence of chloroform accidents, any new anæsthetic which promises to yield a greater degree of immunity from danger of a fatal result is worthy of trial.

Inventions Patented in England by Americans.

From January 17 to February 1, 1877, inclusive.

CONNECTING LINK.—J. Mann, Buffalo, N. Y.
DRAWING WIRE.—American Screw Company, Providence, R. I.
DRYING LUMBER, ETC.—P. Pfeffer, New York city.
ELECTRIC LOG.—J. P. Haines, New York city.
EQUALIZING MOTION.—R. D. Milne, Santa Barbara, Cal.
INFUSION POT.—J. Cromwell, Cranford, N. J.
KNITTING MACHINERY.—C. J. Appleton, Philadelphia, Pa.
LIFE BOAT, ETC.—M. Bourke, Mineral Ridge, Ohio.
MAKING BRUSHES.—J. L. Whiting, Boston, Mass.
MARINE GOVERNOR.—G. Steele, New York city.
OIL STOVE, ETC.—J. J. Jarves (of Boston, Mass.), Florence, Italy.
PIANOFORTE KEYBOARD, ETC.—E. Esselby, Whitestone, N. Y.
PICKLING WIRE.—American Screw Company, Providence, R. I.
PIPE JOINT.—J. F. Parsons, New York city.
PRINTING FABRICS.—J. Harley, Lowell, Mass.
PULVERIZER, ETC.—A. B. Lipsey et al., Hoboken, N. J.
PUMPING ENGINE.—J. B. Waring et al., Stamford, Conn.
REFRIGERATING, ETC.—J. J. Bass, Brooklyn, N. Y.
SCALLOPING BOOT UPPERS.—W. Manley, Rochester, N. Y.
SETTING BOILER TUBES.—Tube Setting Company, Salamanca, N. Y.
TRANSMITTING MOTION, ETC.—E. A. Weston, Stamford, Conn.
WATCH MOVEMENT.—Elgin Watch Company, New York city.
WEAVING TUFTED FABRICS.—A. Smith et al., Yonkers, N. Y.
WIRE FENCE.—T. Seabury, St. James, N. Y.

Recent American and Foreign Patents.

NEW HOUSEHOLD INVENTIONS.

IMPROVED WASHING MACHINE.

Charles K. Rogers, Oswego Falls, N. Y.—For the purpose of washing out streaky and heavily soiled parts, as wristbands, etc., a washboard is added and detachably secured. There is also a suitable device for holding a wringer, so that all the implements required for washing are placed within convenient reach.

IMPROVED WASHING MACHINE.

William Doan, Blountsville, Tenn.—Tais consists in an arrangement of cup shaped plungers or compressors attached to a two-armed lever, which is pivoted to the side of a box for containing the clothes and water. The box is provided with a corrugated side and bottom, and in it the said plungers are worked.

IMPROVED WINDOW SHADE ROLLER.

Daniel Willis, Harrison, N. J.—When the shade is drawn down slowly, a catch at each revolution of the roller drops into a cam notch, and, when the shade is released, holds the roller from being drawn back by the tension of the spring. If the shade is drawn down a little and then released quickly, the quick motion of the roller throws the catch outward, so that it will pass over the shoulder of the notch, and when the motion is checked the catch will again drop into the notch and hold the roller in place.

IMPROVED WASHING MACHINE.

Samuel C. Wilson, Forest City, Ark.—By suitable construction, as each presser block moves forward and presses the clothes against the roller, the pawl of that roller will be drawn back, and as the presser block is drawn back the pawl will be pushed forward to turn the roller and change the position of the clothes, so that they may be operated upon each time in a new place.

IMPROVED AUTOMATIC FAN.

Seward F. Gray, Valdosta, Ga., administrator of James M. Gray, deceased.—This is an automatic fan for keeping off flies from dinner tables, sick beds, etc. The speed of the fan may be regulated, in the customary manner, by a suitable spring brake and regulating screw, that acts on a friction wheel placed on the shaft of one of the transmitting wheels of the clock train.

IMPROVED EARTH CLOSET.

Lemuel Altemus, Olney, Philadelphia, Pa.—This earth closet is so constructed that the dust from the falling earth cannot rise and settle upon the seat.

IMPROVED SHADE HOLDER FOR KEROSENE FIXTURES.

Partrick J. Clark and Joseph Kintz, West Meriden, Conn.—This is a shade holder for fixtures of all kinds, in which a lamp or fount with a chimney is used, so arranged that the fount, with the chimney attached, can be raised from the fount holder up into the shade. The fount chimney and shade can be moved horizontally sufficiently to be taken from the fixture without removing the shade.

IMPROVED COAL SCUTTLE.

Charles S. Irwin, St. Joseph, Mo.—This scuttle has a conical body with knees, on which it rests when placed on the stove. The bottom is concave, with median slide, to adapt it for use on magazine stoves.

IMPROVED PAPER DISH.

Sylvester E. Harlow, Fairbury, Ill.—The dish is made from a disk of paper which is cut radially from the center to the circumference, and it is stamped or crimped so as to form a conical bottom, that projects upward, and the flaring rim. The radial edges of the disk are thus made to overlap each other, and are secured by clips.

IMPROVED WARDROBE BEDSTEAD.

Wilson Sutcliffe, Wetherford, Texas.—This is an improved piece of office furniture, that combines office desk, bookcase, sliding and folding bedstead, hat rack, wash basin, and other devices, so as to utilize all available space in a very convenient manner.

IMPROVED COOKING RANGE.

Thomas J. Whitehead, South Paris, Me.—In this case, as in that for which a patent was granted to same inventor February 3, 1874, the range is in a double walled casing or air chamber, with doors and lids, affording access to the range. It is designed to have greatly increased facilities for cooking on a large scale, and possesses several new features adapting the construction to that end.

IMPROVED RECLINING CHAIR.

Benjamin F. Manier, Green Island, N. Y.—This consists of a supporting frame, which is attached to the bottom of the chair, and pivoted to the forked spindle, revolving in a stationary socket base. The bottom frame and chair are adjusted by the joint action of an arm pivoted to the spindle and to a bell crank lever.

IMPROVED NUTMEG GRATER.

Henry Schelbel, Bridgeport, Conn., assignor to himself and John Schneider, of same place.—This consists in the combination of a supporting main frame, having a socket or receptacle, with a spring-acted follower and a grating disk. By taking the handle of the frame in one hand, and revolving the disk with the other hand, the nutmeg is grated.

IMPROVED BOOK SUPPORT.

Allston Wilson, New York city.—This is a book rest of cheap and compact construction, on which the book may be conveniently arranged for reading and the leaves retained or clasped without the use of the hand, the book being quickly placed thereon and the leaves turned over in an easy manner. It consists of a supporting block, with swinging arms, folding away in a recess of the block, and having pivoted holding arms or clasps, folding into recesses at the ends of the arms, for holding the leaves. When the book is placed on the rest for reading, the arms are raised to the height required by the size of the book, and the holding arms then swing forward on the leaves. For turning a leaf, the arms are slightly raised, and, after the turning of the leaf, carried down again on the pages. When the book is taken off, after use, the leaf holders are folded back into the arms, and the arms then folded down on the block, so that the rest takes up only a small space, and may be stored away in convenient manner.

IMPROVED DOOR SPRING.

Frank C. Rheubottom, Union City, Mich.—Screen and storm doors are generally hung on the outside of, and so as to lap over, the case, rendering it necessary that the spring shall fasten on the edge of and swing under the door when opened, while the moulding of case also leaves a very small space for the attachment of spring. Hence this inventor employs a downwardly tapering spiral spring, which may be adjusted to the edge of a door or the oval surface of a moulding.

IMPROVED SPRING PILLOW.

Angeline Underwood, Carrollton, Ill.—This invention consists of a skeleton frame composed of longitudinal curved spring ribs of wire, and transverse stays attached to a square frame, and backed up by one or more elliptic and spiral springs, and the whole covered in a suitable manner. The object is to provide a pillow which shall retain its form and be cooler and more comfortable in use than those of ordinary manufacture. Eyes are formed on the ribs and stays form a joint with the frame, so that the parts may move freely without danger of breaking. The frame or skeleton thus formed is covered in any desirable way. A pillow made in this manner is cool, cleanly, and much more pleasant to use than the ordinary stuffed ones. It is specially adapted for sick rooms and hospitals, as it is readily aired and cleaned. When the pillow is to be used merely for a "sham," the spiral springs may be omitted.

NEW TEXTILE INVENTIONS.

IMPROVED YARN GUIDE AND CLEANER FOR SPOOLING MACHINES.

Joseph Garrett, Chester, Pa.—The object of this invention is to provide a cheap, durable, and efficient device for use in connection with the yarn guide of cotton spooling machines, for preventing the yarn passing through the guide slat always in the same place, so that the yarn will not be broken by the accumulation of dirt, seeds, etc., on the guide, as when the ordinary guide is used.

IMPROVED KNITTING MACHINE NEEDLE.

Stephen Woodward, Manchester, N. H.—This improved needle for knitting machines is so constructed that the hook and latch of the same may be turned up from the work, and thereby a part only of the needles be used for knitting, without the trouble of removing the unused ones from the cylinder; and the invention consists of a knitting machine needle provided with a hinge or loose joint between the latch piece and the shank, and also with an extension or crook of the shank. When the hook is down the shank will be at the left, the crook at the right, and the hinged part on the right of the end of extension, so that the shank will readily run in the cam, while the hinged part will be turned up from the work.

NEW AGRICULTURAL INVENTIONS.

IMPROVED CORN HARVESTER.

Aaron Wilson, Tekama, Neb., assignor of one half his right to C. B. Telyea.—This is an improved machine for gathering corn from the stalks while standing in the field, which removes all the ears from the stalk by means of stripper fingers.

IMPROVED MILK PAN.

William Cooley, Waterbury Centre, assignor to himself and C. C. Warren, Waterbury, Vt.—In using this apparatus, the milk is put into the pan, the cover is put on, the air pump is applied, and the air is pumped out, forming vacuum above the milk. By thus removing the pressure of the air from the milk the cream is claimed to rise quickly.

IMPROVED BEEHIVE.

Randall T. Van Valkenburg, Angola, Ind.—The new features are found in the door having a rear piece with contracted aperture for excluding robbers. Also frames inclosed by the gauze covered frames, which form the living and breeding apartment for the bees; and surplus boxes for receiving the surplus honey made during the summer season.

IMPROVED ANIMAL TRAP.

George Washington Gibson, Shelbyville, Ky.—This trap is so constructed that there may be nothing to alarm the animal as he enters the trap, that it will lock the animal in as he attempts to reach the bait, and will reset itself as the animal passes into the cage or inner chamber.

IMPROVED CHURN.

James W. Smith, Humansville, Mo.—The cream having been poured into the receptacle and the cover secured, a rotary dasher is set in motion, and made to throw the cream toward the center, while its arms operate the reciprocating dashers, that force the cream outwardly from the middle of the churn.

IMPROVED EGG CARRIER.

Lewis Inglee, New York city.—The eggs rest on elastic rubber disks stretched over suitable apertures in a board or tray, and are held upright by vertical leaf springs.

IMPROVED COMBINED CORN PLANTER AND CULTIVATOR.

Eli Chapman Gage, Witoka, Minn.—This improves the construction of the corn planter for which letters patent were granted to same inventor December 30, 1873. The novel features consist in the addition of a gear wheel, which may be removed and another substituted when it is desired to alter the distance apart of the hills, and a new mode of suspending the plows when turning or moving from place to place.

IMPROVED HARVESTER RAKE ARM.

Samuel Noxon, Jr., Ingersoll, Ontario, Can.—This consists of the metallic section of the rake arm made in two parts, each of which has a part of the pivot for the cam roller, and also a pivot for the hinge, by which the arm is hinged to the revolving head of the rake stand. The arrangement is such that not many pieces are required, and the construction is simplified.

IMPROVED HAND CORN SHELLER.

Ludwig H. Pirrung and Michael Zirbes, Chicago, Ill.—This consists of a grooved plate, swinging toothed lever, and conducting hood and spout, for conveying the shelled corn to a suitable receptacle. The ear is held with the left hand, and turned while the lever is worked to and fro with the right hand, until the corn is shelled from the cob.

IMPROVED CULTIVATOR.

Elijah H. Perkins and Solomon D. Perkins, Visalia, Cal.—This machine is adapted for cutting the weeds beneath the surface of the ground in cultivating plants so small as not to require soil to be thrown around them. It is also so constructed that it may be expanded and contracted for cultivating rows of plants of different widths.

IMPROVED HOP POLE.

Charles A Sands, Burlington, Kan.—This invention consists of a central pole that is permanently set in the earth, upon which slides a cross head, to the outer extremities of which wires are attached, that are held at their lower ends by hooks fixed in stakes driven in the earth. The pole is provided with a rope for raising the cross head, and the ropes are furnished with friction blocks for the purpose of holding them taut.

IMPROVED TREE PROTECTOR.

John G. Peace and Isaac D. Comstock, Salem, Mo.—This consists of a tree box or protector, made of a number of slats nailed to top and bottom bands of sheet metal, and closed by the hook ends of the same lapping over the end slats. The tree boxes may be manufactured very cheaply, and applied or removed with great facility.

IMPROVED CHURN.

James Higgins, Westfield, N. J.—This consists in hanging a dasher churn on trunnions in a suitable frame, and providing one of the trunnions with a toothed wheel and a lock lever or detent, by which the churn may be held in a vertical or inclined position. It further consists in the construction of the mechanism by which the churn is driven.

IMPROVED COMBINED FERTILIZER AND SEED SOWER.

Richerd L. Galer, Dunham, and Elijah E. Spencer, Paris of St. Armand East, Quebec, Can.—This invention consists in a combined fertilizer and seed sower with straight or crooked movable boots, divided into two flukes in such a manner that, the fertilizer being placed in the front boxes and the seed in the rear boxes (the boots having drills and covers attached thereto), the drills open the ground, and the fertilizer falls first and then the seeds. The fertilizer and the seeds are then covered with earth by covers hinged to the boots. This machine is capable, by means of its straight and crooked movable boots, of changing the width of the rows and furrows in which the fertilizer and the seeds fall.

IMPROVED BEEHIVE.

Hiram Hatfield, Ossian, Ind.—In this invention the main portion of the hive, being an inner case, *rests on* cleats on the front and back, having its bottom composed of two sloping pieces, one of which drops below the other sufficiently to make a suitable passage for the bees into the hive, but so that the passage cannot be gained by the crawling bee moths. The bees have entrance through the outside case to this passage. It may be closed by a slide, and the passages may be partially closed by a detachable gate. The hive fills the outside case between the front and back, but is narrower the other way to make ventilating spaces, in which the dampers are arranged to shut off the air; also, to cut off the passage into the upper part of the outside case when the honey boxes are to be changed.

IMPROVED CULTIVATOR AND CHOPPER.

William B. Killough, Larissa, Tex.—This cultivator and chopper is so constructed that the plows may be conveniently raised from and lowered to the ground, adjusted to work at any desired distance apart, and at any desired depth in the ground, which will enable the plows to be moved laterally in guiding the machine, and which will allow the plows and chopping hoe to yield should they strike an obstruction, to prevent the machine from being broken. This invention consists in combinations of the various parts, to receive and support the operating mechanism of the machine, for guiding and controlling the plows, and for other operations which need engravings to properly describe their nature.

IMPROVED HORSE HAY FORK.

John B. Denning, Ross, O.—This fork consists essentially of a straight stock and pivoted arms or spurs, operated by a sliding rod. There is a new construction and arrangement of the catch and sliding rod which economizes space, and enables the case to be made flat and narrow, and at the same time avoids the necessity heretofore existing of pivoting the catch in such manner as to be exposed exteriorly of the case.

NEW MISCELLANEOUS INVENTIONS.

IMPROVED COMBINED SACK HOLDER AND SACK FILLER.

Friedrick Sondermeyer and Frederick Schindler, Perryville, Mo.—This is an improved machine for holding sacks while being filled, and for raising grain or other subetances from the floor or ground and discharging it into the sacks. The new features are improvements in the hopper and adjacent mechanism, and also a device which guides the grain inward as the machine is moved forward, so that the grain may be taken up by the elevator.

IMPROVED CARTRIDGE.

Herbert Buffington, Jacksonville, Fla.—There is a movable anvil for cartridges, consisting of a tubular main part, conical head, and end collar or shoulder at inner end. The fire from the primer passes directly through the tube to the charge, and not around the outside of the tube, securing thereby the reliable firing of the cartridge, and also a more effective combustion of the powder charge.

IMPROVED HELMET LIGHT.

Henry K. Nütze, Philadelphia, Pa.—This is a safety reflecting light, combined with the helmet of a miner's hat, or adapted to fasten to the breast of a person by a hook.

IMPROVED ELECTRIC TRAIN SIGNAL.

Laning L. Ferris, New York city.—This is a signal to be used on railway trains for indicating the separation of the train or the detachment of cars, and for the use of the conductor in signaling the engineer. It consists of a device attached to each end of the cars that automatically makes an electrical connection so as to ring a bell at the engine when the cars are separated. It also consists in the arrangement of levers or keys by which the conductor by pulling a cord may signal the engineer.

IMPROVED HAT HOLDER.

Payson H. Miner, Rome, N. Y.—This consists of a support formed of a continuous rod, having conical spiral at one end, upon which the hat rests, and a coil for receiving the screw, by which it is attached to the under side of the seat. The device is provided with an arm, by which it is turned, and to which a spring is attached for holding it in place.

IMPROVED SCHOOL DESK SEAT.

Eldridge Haynes, Kirk's Cross Roads, Ind.—When the seat is thrown up into vertical position the supports form contact with metallic stays, that are screwed to the side standards and to the fulcrums of the seats, so as to strengthen the bolts and define the extent of motion of the seat.

IMPROVED HORSESHOE.

Harry B. Cornish and Charles P. Hunt, River Falls, Wis.—This invention consists in cutting slightly tapering arc shaped grooves in the under surface of horseshoes. The arc of the said grooves is described in a vertical plane, and the grooves are dovetail in transverse section and open downward. It also consists in forming upon the base of the calks a tongue that is the counterpart of the arc shaped dovetail. The object is to provide a horseshoe in which the calks may be readily inserted or removed, but which cannot become loosened by any action of the horse's foot.

IMPROVED REVERSIBLE SEAT.

Lucius T. Stanley, Indianapolis, Ind.—This seat is supported by two pairs of swinging bars, whose upper ends are pivoted nearer together than their lower ends, so that the seat is reversed by swinging it on the bars.

IMPROVED MACHINERY FOR SCALLOPING BOOT UPPERS.

William Manley, Rochester, N. Y.—This is an improved machine for holding the button flies, vamps, and quarters of shoes while being scalloped. It was fully described and illustrated on p. 322, vol. 35.

IMPROVED WEIGHTED HORSESHOE.

Eugene E. Selxas, Galveston, Tex.—This is an improved weighted horseshoe designed for use in training a horse to trot fast, by extending his stride and squaring his action. It may also be used to prevent a horse from striking his knees with his feet. It is so constructed that the weight may be attached and detached, as required, and which when attached shall be entirely out of sight.

IMPROVED BOTTLE STOPPER.

George A. Ohl, Newark, N. J.—This improves the bottle stopper for which letters patent have been granted to A. Luthy, under date of November 2, 1875. It consists, mainly, of a rigid curved stopper-carrying lever that is provided at the lower end with an elongated loop or eye that plays in an extension staple of a solid collar of the neck, to which the closing ball is pivoted.

IMPROVED BLANK BOOK.

Hezekiah S. Archer, Brooklyn, N. Y.—This book is so made that any sheets whose reading matter has become valueless, or whose memoranda have served the purpose for which they were originally intended, may be removed. The leaves are open slotted, and are held by clamp nuts working on screws.

IMPROVED WIRE FENCE BARB.

John Nelson, Creston, Ill., assignor to himself and William H. Gosse, of same place.—This consists in a barb for fence wires, made from a short piece of wire by forming loops at the ends of a straight middle part, at right angles therewith, or nearly so, and upon the opposite sides of the wire, leaving the points projecting in opposite directions.

IMPROVED FOUNTAIN PEN.

William Alexander Brice, care of R. Clifford Poulter, 4a Middle Temple Lane, E.C., London, England.—This consists in controlling the flow of ink to the nib by admitting the air to replace the ink in the reservoir through a bent U-shaped capillary tube leading from an orifice in the side of the reservoir or holder in a convenient position, to be covered by the thumb or finger of the writer when it is desired to check the supply of ink to the pen.

IMPROVED BLOWING TOY.

Henry J. Green, New York city, assignor to Henry Shaffer, of same place.—This is an instrument for indicating the capacity of the lungs by the number of revolutions made by the fan wheel when propelled by a single expiration from the lungs.

IMPROVED COMPOSITION FOR FIREPROOFING.

William J. Ryckman, Brooklyn, assignor to himself and Frank B. Burt, New York city.—In order to render fireproof stage scenery—curtains, dresses, and fabrics in general—this inventor proposes a sizing compound, which also brings out the subsequently applied paint. It consists of equal parts of borax, alum, and muriate of ammonia.

IMPROVED REIN HOLDER.

Ransom P. Murray, Ashtabula, O.—By this device the reins may be tightly adjusted or displaced in a moment, while they are prevented from dropping down and getting dirty or entangled with other parts. The invention consists of two steel springs attached by one fastening bolt, their free ends passing in opposite directions to each other, one end extending through a top slot of the upper spring part, to be guided thereby when inserting or detaching the reins.

IMPROVED ROWLOCK.

Eugene Spedden, Astoria, Oregon.—This rowlock is so constructed that it may be readily shipped and unshipped, and cannot be lost, mislaid, or stolen. It has the lower part of its stem made smaller than the upper part, and adapted to be attached to the gunwale of a boat.

IMPROVED SKATE.

John Marson Lamb, South Hampstead, England.—The improvements consist in fitting the sole plate to slide to and fro on the runner, in order to secure or detach the skate, said sole plate carrying adjustable toe-clamps, to embrace the side edges of the boot sole, and having a claw which imbeds itself in the heel. The sole plate is operated by a lever similar to some others, but possesses advantages in its operation.

IMPROVED WICK ATTACHMENT FOR LAMPS.

John C. Shopland, Northport, N. Y., assignor to himself and William Morgan, of New York city.—The object of this invention is to provide kerosene lamps with an improved wick attachment, by which the lamps may be filled at any time without extinguishing the light, by detaching the burner, and supporting the same during the refilling of the lamps, employing the light of the flame during the filling by the sufficient supply of oil contained in the wick. The invention consists of a wick attachment, consisting of two separate wicks, the upper sliding up to the wick tube of the burner, and being wound upon a slotted revolving frame below the wick tube, and forming continuous contact with the lower endless wick within the lamp by a guided and spring-acted roller pressing thereon. The burner has a base plate with downwardly extending posts, for supporting the burner and upper wick section during filling, and is tightly secured to a collar and intermediate non-conducting layer of the lamp bowl.

IMPROVED GIG HARNESS SADDLE.

John Neill, Sinclairville, N. Y.—In this invention the metallic saddle tree, the side plates or wings of which have their front and rear edges bent upward and outward, and have a leather secured to them, to form sockets to receive the upper ends of bearers, is fastened to the pad. The skirt has its edges sewn to the edges of the pad. In the lower part of the skirt is formed a cross slit, through which the bearer passes, and which is strengthened by a loop. The bearers are passed in through the slits in the skirts, are passed up beneath the said skirts into the sockets of the saddle tree, and are secured in place by the terrets, so that should the said bearers break, or require to be renewed from any other cause, they may be drawn out by simply screwing out the terrets. By this construction no jockey is required, making the saddle neater in appearance and simpler in construction, while at the same time requiring less labor and less stock.

IMPROVED TOY HOOP.

Henry F. Post, Paterson, N. J.—This inventor attaches to a child's hoop a diametrical rod with central frame, carrying a pivoted bell, that is actuated by contact of the frame with the tongue of the bell during the revolution of the hoop.

IMPROVED POCKETBOOK FASTENER.

Daniel M. Read, New York city.—This improves the construction of the pocketbook fastener for which letters patent were granted to same inventor January 11, 1876, so as to make it simpler in construction. The entire fastener is now made of only two pieces.

IMPROVED TRANSPORTATION PACKAGE.

Nathaniel Halsted, Scranton, Pa.—By means of this package, butter, lard, and other substances may be transported safely in glass, earthenware, and other jars subject to breakage, and at the same time may be kept on ice in warm weather. Springs are contrived to support the bottom and sides of the jars, and the partitions between the compartments are constructed with openings through the bottom for the circulation of cold air from ice to be carried in one of the compartments for keeping the butter cool.

IMPROVED INCUBATOR.

Harris W. Axford, Omaha, Neb.—This is a heating, ventilating, air moistening, and electric heat regulating apparatus for an incubator. A pan contains the eggs to be hatched, said pan being in an oven, surrounded by a dead air space, and an insulating box filled with powdered charcoal. A pipe admits the heated and moistened air from the chamber surrounding the heater. This pipe contains the damper, to be opened and closed by a lever, which is worked by the armature lever of a magnet, which is placed in the circuit of a battery. The circuit is closed by a mercury gage, which causes the valve to shut off when the heat is too high. When the reverse is the case, said gage allows the valve to be opened by the spring of the armature lever. The mercury gage enters the center of the incubating oven, where it is subject to the heat, and one part of the wire is kept in the mercury, while the other part connects with the adjusting screw, which is made to dip into the gage, more or less, according to the degree of heat wanted; so that when the mercury rises to the point of the screw, and makes connection, the armature lever will be attracted, and thus the valve will be closed until, by the cooling of the oven, the mercury falls away from the point where the circuit will be broken, and the valve will be opened by the spring. The heat is furnished by a lamp supplied from a tank, and having a float and a suitable valve for automatically regulating the supply of oil, and thus maintaining regular heat.

UNITING THE UPPERS OF BOOTS AND SHOES.

David W. Thompson, Englewood, Ill.—The seam is formed mainly by means of a narrow strip which is sewed to the vertical edges of the quarters (the face sides of the leather being placed together). The edges of the quarters, as well as those of the strip, thus lie adjacent and opposite when the seam is pressed flat. A linen stay piece is applied on the inner side of the seam, the same being stitched through the edges of the quarters and the strip, so that all are firmly secured together. But the edges of the quarters are not directly connected by stitches.

IMPROVED BOOK CLIP.

John T. Weston, Creston, Iowa.—This is an improved device for holding music books open upon organs and other musical instruments, and it consists in a music book holder formed of wire, having its middle part bent into U form, having coils formed upon the middle part of its arms, and having the outer parts of its arms bent over parallel with their inner parts. In using the device, a bend is placed at the back of the book, when opened at the required place, and arms are placed upon the pages of the book. The coils enable the device to be placed upon books of various thickness. The ends of the arms are bent to form eyes to prevent said ends from catching upon and tearing the paper.

IMPROVED ADDING PENCIL.

Charles C. Fields, Abingdon, Va.—The object of this invention is to provide a simple and convenient registering attachment for pencils and penholders to facilitate the addition of long columns of figures. The invention belongs to that class of adding devices in which nothing less than the tens are registered, while the units are carried in the mind until they are raised to tens. The working parts of the device are compactly arranged in a case, through which projects an extension of the slide to permit the operation of the latter by the finger to move the registering wheel, and the said case is provided with a clasp for attachment to the pencil, and has also an independent painter and set of digits, whereby the number of units to be carried are separately registered and kept whenever the addition of a column is interrupted.

IMPROVED CARPET SWEEPER.

Henry F. Noyes, Boston, Mass.—This invention relates to an improved form of box or case for carpet sweepers; and it consists in the construction and arrangement of the hinges for fastening the lid or cover of the case to the frame, which hinges are formed of straps of metal arranged to embrace a pintle contained within a marginal bead of the cover, and having their leaves extended vertically downward into a mortise or slits cut edgewise in the rear board of the frame wherein they are secured by rivets. It also consists in constructing the arched metal top with a marginal bead, and the edge of the frame with a corresponding groove, and combining the two so as to prevent the escape of dust.

NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED BOAT DETACHING APPARATUS.

William A. Brice, care of R. Clifford Poulter, 4a Middle Temple Lane, E.C., London, England.—This invention consists of a block with horizontal aperture, across which two bolts pass at opposite sides. The block is suspended at the upper part from the davit tackle, so that the bolts are vertical, and the boat is suspended from the device by a loop of rope passed through the aperture in the block from one side, and over or round the hold at the opposite side, and another loop similarly passsd through the aperture and round the other bolt from the other side. The strain on the two ropes thus tends to draw the bolts against the sides of the block and hold them in position, and they are thus held intact so long as the strain of either rope is upon them; but immediately they are relieved of the strain by the boat being completely water-borne. The bolts, being in a vertical position, fall by their own gravity and slip out of the loops, which are thus set free.

IMPROVED EARTH AUGER.

George W. Shapley and Daniel Phillips, Austin, Minn.—This auger is so constructed as to enable a much larger hole to be bored than the diameter of the auger. It moves the small stones from the center toward the rim, so that they may be taken up by the cutters.

IMPROVED CLOTH CUTTER.

George D. Ferris, Springfield, Ill.—This is a combination of a cutter and a measuring and clamping device, the object being to accurately cut cloth either straight across the piece or on a bias.

IMPROVED PLUG TOBACCO MACHINE.

Thomas W. Prather, Union Depot, Tenn.—This invention consists in an arrangement of rollers for forming plugs of tobacco from leaves, which are fed to the said rollers by an endless apron; and it also consists in a cutting device for cutting the tobacco into suitable lengths after it is flattened by the rolls.

IMPROVED METAL TURNING LATHE.

Sander Johnson, Minneapolis, Minn.—This consists in the combination of friction rollers placed in spring bearings with the tail stock of a lathe in such a manner that they bear up the tail stock, and thus obviate friction between it and the lathe bed.

IMPROVED APPARATUS FOR BUNCHING BROOMS.

Daniel Van Wicklen, Green Bay, Wis., assignor to himself, Frank Lenz, and August Brauns, of same place.—This consists of two adjustable needles projecting from a slotted bed plate, and each provided with an eye, the lower part of which is V-shaped near the points or upper ends. The object is to provide apparatus for rapidly tying brooms in packages suitable for market or transportation.

IMPROVED HORSESHOE NAIL CLINCHER.

Jacob Slautterback, Mifflintown, Pa.—By suitable construction, as the handles are pressed together, the jaw that rests upon the forward end of the nail will be drawn downward, bending and clinching the nail. Here is a new and powerful mechanical construction.

IMPROVED HAND SNOW PLOW.

Edwin R. Betts, Bear Lake, Pa.—This consists of a snow plow whose mould board runs by guide rollers and grooves along the rail, and throws the snow from the inside of the same by a curved upright flange or plate on the outside of the braces.

IMPROVED GATE-OPERATING MECHANISM.

Albert R. Sherman, Natick, R. I.—This apparatus is for springing and closing gates for railroad crossings and other places. It consists, essentially, of a piston rod connected to the gate so as to swing it open and shut. Said piston works in a cylinder open at one end to the atmosphere, and connects at the other end, by means of a tube with a pump for forcing a liquid or fluid substance against the piston, so that it is moved in one direction or the other to operate the gate both ways.

IMPROVED ICE ELEVATOR.

Louis Zistel, Sandusky, O.—This consists af an inclined way, extending from the float in the water to the shore, and from the shore up to the highest point of the ice house, along which an endless traveling rope is conducted, being stretched over suitable pulleys, and moved by horse or other power. Knots of the rope take up a follower, and convey the cakes of ice along the way to the chutes that conduct them to the ice house.

IMPROVED CIRCULATING DEVICE FOR STEAM BOILERS.

William Ord, Brooklyn, O.—This invention consists of a boiler with a downward extending water leg, arranged at both sides of the fire box at the front end of the boiler, the water leg being connected by rear cylinders and a series of conducting tubes to the rear end. The water leg communicates by bottom holes, and by side holes near the corner or upper part of the leg, with the boiler.

IMPROVED STEAM WHISTLE.

John Einig, Jacksonville, Fla.—This consists of a whistle that is divided longitudinally into three or more compartments of different lengths, each compartment being provided with an aperture for receiving the steam, and with the usual mouth. The object is to produce simultaneously in a whistle three or more harmonious sounds.

IMPROVED GAS RETORT COVER.

August Schwarz, New York city.—This cover is so constructed that it may be easily opened and closed, may be closed perfectly tight, and will keep the lid seat free from tar, etc.

IMPROVED ANTI-FRICTION JOURNAL BOX.

George Wilkes and Alexander Port, Monroe, Iowa.—This consists in the arrangement in the journal box of passages for oiling the rollers, and of a receptacle for oil into which the rollers dip at every revolution around the journal. The object is to provide a journal box that is adapted to journals of car axles, and to other heavy journals, that will be as nearly frictionless as possible, and which may be readily taken apart for repairs.

IMPROVED RAILROAD TIE.

George W. Chandler, Moingona, Iowa.—This consists of a tie constructed of clay or stone blocks, connected by longitudinal iron straps bolted together, the straps carrying fastening plates for supporting the rails.

IMPROVED HORSE POWER.

Radford C. Rhodes and William F. Holden, Crawfordsville, Ga.—This consists of a vertical supporting frame, placed on the main frame of the king post, and extended above and below the same for supporting a band wheel and fly wheel on a shaft above, and a band wheel and pinion on a common shaft below the top piece of the main frame, to transmit the power of the horizontal cog wheel

IMPROVED HEAT FENDER FOR FURNACES.

Joel B. Chandler, Clinton, Iowa, assignor to Francis L. Tupper and M. A. Chandler, of same place.—This consists of an arrangement of flanged strips, to which are riveted, upon one side, sheets of iron, and upon the other side sheets of zinc, inclosing an air space between. The device thus formed is provided with hooks on the iron side, for hanging it to the rods that cross the face of the furnace. The object is to provide a device for protecting workmen from the intense heat.

IMPROVED COTTON CHOPPER.

John R. McCormick, Georgetown, Tex.—This is an improved machine for scraping, chopping, and cultivating corn and cotton, which embodies new mechanical construction, enabling it to be easily guided and controlled and readily adjusted for chopping or cultivating, or both.

IMPROVED FASTENING FOR SECTIONAL RATCHET WHEEL.

J. Morris Childs, Utica, N. Y.—The object of this invention is to secure a ratchet wheel to the round shaft of a hayrake in such a way that it can be put on and taken off without removing the attachments of said shaft, and in such a way that it cannot slip upon the said shaft, and will carry the shaft with it in its revolution.

IMPROVED CIRCULATING DEVICE IN STEAM BOILER.

Jacob T. Wainwright, Philadelphia, Pa.—The object of this invention is to utilize the greatest possible amount of heat by conducting the products of combustion back and forth several times through the boiler, and by introducing the feed water near the point of exit of the products of combustion, causing it to move between the partitions or deflecting plates toward the warmer portions of the boiler in a direction contrary to that taken by the products of combustion.

NEW WOODWORKING AND HOUSE AND CARRIAGE BUILDING INVENTIONS.

IMPROVED CROSSCUT SAWING MACHINE.

Heinrich M. Blohm, New York city, assignor to himself and Johann [illegible], of same place.—This is a crescent sawing machine, that may be worked with great facility by one person, so as to be applied for the cutting of trees, sawing of the trunks into pieces, etc. It consists of a reciprocating saw carriage, to which motion is imparted by a rocking seat arrangement, the saw being guided in horizontal or vertical position and fed to the work by spring-acted roller attachments.

IMPROVED FLOOR CLAMP.

John Milton Wilson, Nashua, N. H., assignor to himself and James H. Hall, of same place.—This consists in the arrangement of two arms hinged together, so as to form a toggle or knee joint. Upon the extremity of one of the arms a lip is formed that embraces the edge of the flooring. At the extremity of the other arm a mortise is made, in which a spur is placed, which is driven into the joist. One of the arms is provided with a ratchet, and the other arm with a pawl, which retains the parts in position when the desired pressure is secured.

IMPROVED WAGON LOCK.

Frank Rakes, Greenup, Ky., assignor to himself and William Bryson, of same place.—This device is so constructed that it may be applied to and removed from the wheel while the wagon is in motion. It is formed of an U-shaped block, provided with the bent shank, a swiveled or pivoted link, and a strap. The block is applied to the wheel rim, and as the wheel rotates forward the jaw clamps the sides of the tire and felly.

IMPROVED SLED TONGUE.

John P. Lawson, Chandler's Valley, Pa.—This consists of a sled tongue, in which the tongue part is readily detachable from the roller, it being held in place by chains, which answer the purpose of braces. Said chains are made taut by a key driven through the tongue against a ring to which the chains are hooked.

IMPROVED FLOORING.

Otis S. Dickinson, Granville Corners, Mass.—This relates to a peculiar fastening for the blocks composing tessellated wood flooring; and consists of fastening strips that are T-shaped in cross section, and are fastened to the floor, and which fit into grooves cut across the end of the grain in the blocks.

IMPROVED BOARD ROOFING.

Arnold W. Zimmerman, Denison, Tex.—This is so constructed that the boards may contract and expand with changes of temperature without opening the joints, and which will carry off the rain without allowing it to work in through the said joints. The boards are provided with wide rabbets, made with lips upon their outer edges and along the opposite sides of their opposite edges.

IMPROVED FRAME BUILDING.

William R. Morris and Joseph Slanser, La Rue, O.—In order to enable any person to put up such buildings without requiring skilled help, this inventor proposes to construct the posts and beams of several planks that are bolted together, and locked to the girders by wedge pieces. The posts support the roof by angular plates and plate bearers spiked to posts.

IMPROVED MACHINE FOR PLANING SHINGLES.

Willard A. Kitts, Oswego, N. Y.—This invention relates to machinery for planing taper sawed shingles both sides at one operation, in which the shingles are passed along the planing knives by push bars worked by endless chains. The machine consists of rotary planers in stationary bearings, one for each side of the shingle, and spring pressers, for pressing the shingles against the planers. The arrangement is such that the taper shingles can be presented to planers in stationary bearings.

IMPROVED WHEEL PLOW CARRIAGE.

Abner K. Wolfe, Prairie City, Mo.—This invention consists in arranging crank axles independently, so as to swing upon tongue, and combining them with evener, arms, and draft rods, so that when one plow stops the other can advance to relieve the machine from shocks and side draft, and to prevent the striking of the horses by the pole.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion. If the Notice exceeds four lines, One Dollar and a Half per line will be charged.

Notes & Queries

J. E. M. will find a description of the jointed boat oar on p. 343, vol. 34.—J. L. will find directions for fastening leather to iron pulleys on p. 409, vol. 33.—H. W. T. will find something on incubators on p. 273, vol. 33.—D. F. H. will find a description of the manufacture of postage stamps on pp. 208, 227, vol. 27.—J. M. will find a description of a flour bolt on p. 117, vol. 32.—O. F. S. will find something as to acid chromate of lime on p. 28, vol. 36.—H. E. W. will find a good recipe for lacquer for brass work on p. 116, vol. 33.—C. L. C. and F. W. D. are informed that the botanical name of the garden box is *buxus sempervirens*.—A. B. will find directions for grinding old faucets on p. 182, vol. 1, SCIENTIFIC AMERICAN SUPPLEMENT.—H. A. B. will find directions for the decalcomanie process on p. 275, vol. 34.—A. B. C. will find something on lubrication in an engine cylinder on p. 298, vol. 36.—A. A. B. will find particulars as to the opening of the Paris Exposition on May 1, 1878, on p. 376, vol. 34.—W. I. will find directions for changing cider into vinegar on p. 106, vol. 32.—J. A. W. will find directions for making Pharaoh's serpents on p. 218, vol. 34. Ether, in a test tube held in the hand, boils by the heat of the hand. The glass does not make it boil.—J. H. W. is informed that the United States Capitol is lighted with gas, which is ignited, when necessary, by electricity.—T. R. W., Jr., will find on p. 299, vol. 35, directions for making paste.—F. W. will find a recipe for a silver polish for metals on p. 299, vol. 31.—Will A. Y., who asks as to shellac varnish, state explicitly what it is that he desires to know?—T. F. T. will find something on burning petroleum in boiler furnaces on p. 165, vol. 30.—J. A. C. will find directions for galvanizing iron on p. 346, vol. 31.—V. A. S. will find directions for making indelible ink on p. 394, vol. 35.—F. W. H. will find a description of an incubator on p. 273, vol. 33.—P. S. T. will find directions for making a blackboard on p. 299, vol. 28.—D. O. will find something on the use of old silk on p. 309, vol. 31.—J. J. B. will find a recipe for a black mortar on p. 123, vol. 36.—W. S., H. W. S., J. J. T., J. D. M., W. A. M., J. A. C., A. K., A. J. W., A. J. B., H. K., J. L., W. C. F., J. T. S., and others, who ask us to recommend books on industrial and scientific subjects, should address the booksellers who advertise in our columns, all of whom are trustworthy firms, for catalogues.

(1) P. F. K. says: 1. We have a forty horse power return tubular boiler which I blew off lately for the purpose of washing it out. I blew off at 10 lbs. pressure, having previously pumped it full of water. After I had blown off all the water, I closed the blow-off cock and left it to cool off. I soon heard loud reports in the boiler, like pistol shots. I shut off the water as soon as I could, whereupon the reports died away. A. The noise was caused by sudden contraction of the heated plates when cooled by the entering water. 2. Why do the rails on curves of a railroad last longer than those on a straight track? A. We could not answer this question satisfactorily without knowing more details.

(2) S. G. asks: 1. How is salicylic acid manufactured? A. By strongly heating for several hours a neutral alkaline carbolate in an atmosphere of carbonic acid. The residue in the retort is dissolved in hot water, and the salicylic acid is precipitated in an impure state by the addition of a mineral acid. It is purified by distillation in a current of steam. See p. 259, vol. 35. 2. Could it be used in solution, without quicklime, for preserving eggs? A. Yes, if the eggs were kept in a cool place.

(3) J. N. S. says: I have concluded to paint my floor and some shelves contiguous to a small engine with tungstate of soda, as I fear that the excessive heat from the furnace will ignite the woodwork. Will you please give me the formula for mixing the tungstate of soda and water, and the tungstate with the silicate, for the paint? A. Dissolve about 1 lb. of the salt in 3 or 4 gallons hot water, and apply with a brush. Dissolve 1 lb. of the waterglass, in fine powder, in 1 gallon of boiling water and apply as a varnish. It may be mixed with a little oxide of zinc, well agitated when using. It will preserve the wood, as well as render it fireproof.

(4) L. K. says: I have an achromatic telescope which makes stars of the first magnitude appear as large as the full moon; and I wish to know what additions I can make to increase its magnifying power? A. We think you want to increase its defining power instead of its magnifying power; for no good telescope will show stars to be anything but a point with more or less radiations of light according to the state of the atmosphere. Your telescope lenses are not properly made or they are misplaced, they have too much aberration, either spherical or chromatic, or probably both. Take a piece of paper three fourths of an inch in diameter, and cover the center of the objective; then focus on an object. Then remove the piece, and cover the outside portion, letting the light pass through only that part which was covered in the first instance. Then focus on the same object, and note the difference of the two. These will agree if the glass is of the proper curves. If the edge is the shortest focus, then that part of the lens between the center and edge will require flattening by polishing, and *vice versa*.

(5) W. W. M. says: I have just completed a large barn, and up through the center I have erected, from a solid foundation, a strong framework of 8 feet square; this runs up to the roof. The object of this was to erect some kind of a wind power which would do my barn work, such as cleaning oats, cutting hay, shelling corn, pumping water, etc. I have seen a power erected in the form of a drum with perpendicular fans which could be closed or opened at pleasure. 1. Can you give me a plan for the construction of such a power? A. If such a form of windmill should be inclosed in a revolving rectangular cupola upon your barn, the fans might be fixed stationary within a light circular rim, and the force of the wind, when too violent, moderated by the insertion of automatic luffer-blinds in the front of the cupola. The most simple form of such a windmill, however, would be that in which the sails or fans are set horizontal, and the shaft horizontal and with bearings near the floor of the cupola, in which case only the upper half of the mill wheel is exposed to the wind. 2. Would it be practicable to have a power of this kind worked on the principle of the turbine wheel? A. We think not, as in the case of the turbine the weight of the water is an element that would not apply here.

(6) G. B. M. asks: Can you give me any information concerning the building of a Vienna bake oven? A. We have been informed that the bread of the Vienna Bakery depends, not upon any peculiarity in the oven for its alleged superiority, but upon the yeast and the method used in the manufacture. The ovens are said to be constructed as follows: They are like the old-fashioned brick ovens which were used before the introduction of stoves and ranges, but on a much larger scale. There are six of these, each twelve feet long and at the broadest part nine feet wide, the shape being oval. A roaring fire of wood is made in one of these ovens, and kept until three feet of masonry underneath it are heated through. The ashes are then carefully swept out, and the bread is baked on the hot tiles which form the oven floor. Steam pipes pass through these ovens, but these are heated only while the baking is in progress in order to maintain an even temperature. It is necessary to make a new fire in an oven only once or twice in three days, according to the amount of baking required.

(7) S. G. asks: What is the greatest number of revolutions allowed to a steam fan blower per minute? A. It depends on the form of the fan, pressure of blast, etc. It would require a considerable treatise to answer your question properly, but you will find much information in the catalogues of manufacturers.

(8) T. R. V. asks: Does pouring hot wa'er on a frozen lead water pipe cause it to burst? A. We imagine that the hot water only reveals the cracks that have already been made.

(9) O. C. L. says: I wish to move a lever up and down with a force of about 12 lbs., and at the rate of about 80 strokes each way per minute, by means of a weight having a fall of 6 feet. How heavy a weight shall I use, and how shall I arrange it to work at the above speed? How long will it run? A. You do not send sufficient data. You can make the calculation for yourself from the following considerations: Theoretically, weight × (distance it moves while lever makes a stroke) = 12 × length of stroke; so that, if the weight moves $\frac{1}{5}$ as fast as the lever, it must be 144 lbs.; and if the distance moved by the lever per minute is 6 feet, the contrivance will run for 12 minutes. A set of gear wheels, with a clock escapement, or some similar contrivance to regulate the movement, will answer very well.

(10) J. C. T. asks: What is the loss of power on the crank motion compared with the power applied at a tangent? In other words, if it takes 1 ton of coal to do a given amount of work on the cylinder and crank movement, cutting off at half stroke, with a piston traveling 300 feet per minute, how much coal would it take to do a like amount of work if power were applied at the rim of a wheel of the same size as the crank, and cutting off so as to work steam down to atmospheric pressure, the rim of the wheel traveling the same number of feet per minute as the piston does? A. There is no loss of power. You will find this point fully discussed on p. 121, vol. 31.

(11) G. A. D. asks: Is it more economical to carry a steam pressure of 60 or 65 lbs. on boiler than it is 40 or 45 lbs., the engine easily doing the work required with 25 or 30 lbs. pressure? A. It depends on the engine. If the pressure is reduced by throttling, it will be rather a disadvantage to use high pressure steam. If the engine has an automatic cut-off, there may be considerable economy in using the increased pressure. You can readily settle the matter by experiment.

(12) J. C. D. asks: What is the best way of testing a boiler in order to ascertain its economy in fuel? A. Measure the coal burned and water evaporated, and also test the quality of the steam.

(13) G. W. K. says: 1. Which is the best way to drive a burr, with belt pulley on spindle, or with bevel gear? A. Unless you use cut gears, the belt will be rather more efficient. 2. Will it be difficult to keep an 8 inch belt from running off of pulleys on upright shafts 10 feet apart? A. Flanged pulleys are often used on vertical shafts, but are not necessary if the shafts are accurately lined and the pulleys crowned.

(14) C. W. N. asks: 1. If a vessel and her cargo weigh 1,000 tons, will she displace 1,000 tons of water, or more or less? Can the hull be modeled so as (always weighing 1,000 tons complete) to displace more or less than 1,000 tons? A. The weight of water displaced will always be equal to the weight of vessel and cargo, whatever the models, it being understood, of course, that the vessel floats. 2. A butcher has stated positively to me that, if a creature were put on the scales, weighed, and then killed in his tracks, that he would weigh more dead than alive. I disputed this; was I right? A. We should have been inclined to dispute it too, unless your friend had produced some indisputable evidence in support of his assertion.

(15) J. B. says: I wish to run a small engine, a little time each day, by compressed air, using a boiler 40 inches x 20 feet for a reservoir, and a windmill to force air into the boiler. Can I force the air in with a common force pump, such as is usually used for forcing water into steam boilers? A. It will probably be necessary to use a water jacket, or some device for cooling the air, if the compression is considerable, unless the pump is new.

(16) M. A. K. says: There are five machines run by compressed air. The compresser stands half a mile from the work. When the compressers are run by steam, it takes 65 lbs. pressure to run them. When there is 55 lbs. on the engine, all the machines will not run well. But if one of them stops, the others run all right; and the air escapes from the escape valve on the compresser just as much when the five machines are attached as it does when only four are running. I claim that they do not raise pressure enough; another man claims they are making more than the machines need; for, he says, it is blowing out of the escape valve all the while. A. According to your account, we agree with you that it would be better to increase the pressure.

(17) W. J. McG. asks: In an ellipse the semi-conjugate diameter is equal to the distance from one of the foci to another and of a semi-transverse diameter; and in the application of square root, employed to find distance of foci from center, I make use of a contraction, as follows: To find the difference between the squares of two numbers, multiply their sum by their difference. Example: What is the difference between the squares of 7 and 9? A. 9+7=16. 9−7=2. 2×16=32. Proof: $7^2=49$, $9^2=81$. 81−49=32. A. This is a well known principle, to be found in nearly every treatise on algebra.

(18) J. H. D. asks: Is a locomotive any heavier on the track when drawing a heavy load than she is running light or drawing a light load? If she is, how much, and why? A. If, as is usual, the locomotive is attached to the load in such a manner that it only draws and does not exert any lifting force, the weight on the driving wheels is not affected by change of load.

(19) O. G. S. asks: Will a certain quantity of ice placed in an airtight glass box and suspended in water give a greater amount of cold to the water than if the ice were first placed in contact with the water? A. A given quantity of ice at 32° Fah., unless acted upon by some hygroscopic salt which determines its rapid liquefaction, cannot be made to reduce the temperature of a surrounding body of water more than a certain number of degrees in a given time. The total and ultimate quantity of heat absorbed or rendered latent by the ice, in the process of liquefaction, regardless of the time consumed in the act, will be the same under any conditions. Surrounding the block of ice by a glass envelope will somewhat retard the refrigeration of the surrounding body of water. The degree of refrigeration of the water is dependent only upon the exclusion of exterior heat, the quantity of ice liquefied, and the time consumed in the act of liquefaction. See answer to J. J. S., p. 91, vol. 36.

(20) B. F. M. asks: Is there a cement that will fasten the butt ends of a rope together, and do it quickly? A. We do not think it probable that you will succeed very well in this. One of the strongest cements adaptable to this purpose consists of a solution of best glue in strong, hot, acetic acid. Even this, however, does not dry immediately. A fused mixture of equal parts of asphalte and gutta percha is also recommended.

(21) D. H. says: In a recent issue of your journal, you advised blue colored lamp chimneys to be used by persons reading a great deal at night. How can I color my lamp chimneys? A. You cannot stain them satisfactorily, but may purchase suitable chimneys of blue glass.

(22) C. M. says: A German paper gives the following: "Lamp chimney and blowpipe combined. In this novel device the vapors of petroleum mixed with hot air produce a high degree of heat, on a small scale, the whole apparatus being of the size of a common lamp, and an experimenter can melt in this way, in a small crucible, 4 ozs. of copper or nickel, or 3 ozs. of wrought iron within 10 minutes' time." Is this possible? A. Popular accounts like the above are usually to be taken with some grains of allowance, but the result given does not seem impossible.

(23) H. B. asks: 1. Is a short stroke engine better than a long one for sawmill use? For instance, is a 10 x 16 or 18 inch engine better, and will it furnish more power and more quickly than a 10 x 20 inch one? A. For the same piston speed, the short stroke engine will make more revolutions per minute than the other, which may be an advantage or not, according to the design and construction of the engine. For the same number of revolutions in each case, however, the long stroke engine will develop the most power. 2. Will a portable engine and boiler, say of 25 horse power, for sawmill use, furnish as much power as one of the same size stationary? A. Yes, if the machinery has the same general proportions and design.

(24) N. E. L. says: Which takes the most power, a large or a small circular saw, both having the same surface speed and the same number of teeth to the inch, and cutting the same kerf? A. If one saw has twice the diameter of the other, and cuts at the same rate of speed, it only makes half as many revolutions in a given time, and hence does not require any more power to drive it, under the conditions you have stated. In practice, however, large saws are thicker than small ones, and frequently run proportionately faster and with larger feeds and deeper cuts; so that generally large saws take more power than small ones.

(25) G. H. E. T. asks: What sized fan blower, and what number of revolutions of such, would be required to fill an iron tank which is 2 x 1 x 2 feet in 2 minutes of time to 5 lbs. pressure? A. You will find it difficult, if not impossible, to produce such a pressure with a fan blower; and if you use a positive action or displacement blower, you can calculate its size to deliver a given quantity of air at a fixed velocity, or the velocity required to deliver this quantity with a fixed delivery per stroke.

(26) G. T. asks: Our engine room is of stone, two stories high, and is excessively hot in summer. I think it could be much improved by proper ventilation, but do not know exactly how to proceed. I thought of putting a large air shaft, say 2 x 4 feet, above the boilers to extend above the roof. Do you think that would improve it? The boilers are covered with brick, but the dome, cylinder, and heater are not jacketed, and they radiate a great deal of heat. A. From the description, we judge that there is considerable radiation of heat that might be prevented with advantage both as regards economy and comfort. Then you should admit the outside air, either by means of a wind sail or ventilating wheel, and provide a shaft to allow the heated air to escape.

(27) T. W. D. asks: How may a novice refine bookbinders' gold rags on a blacksmith's forge? A. Cut the rags into very small pieces, mix them with a small quantity of carbonate of soda, place loosely in a small, covered, black lead crucible. Heat the crucible at first moderately and when the cloths are all carbonized raise the temperature to bright redness. The fused gold will collect as a small button in the bottom of the crucible, and when cold may be removed and freed from the soda by a little sulphuric acid.

(28) F. L. asks: In your issue of February 3 there is an article on bronzing. I have tried the composition, but there is something wrong about it. My method of applying it is to cover the article I wish to bronze, and let it dry, and then brush it off. What is wrong? A. Heat the metal in the same manner as when applying a lacquer. The preparation is intended more particularly for articles of brass.

(29) A. S. asks: 1. Would a plan for cleaning out or scouring sewers be patentable? A. Yes, if novel. 2. Are the mouths of sewers in New York city open, or under the water at all tides? A. Some of them are partly open at low water. 3. What are the maximum and what the minimum grades given to sewers? A. The maximum is that of the steepest streets, which in some cases is considerable, although we have not the data to name either that or the minimum. The latter is very low indeed—in some streets not sufficient to prevent the water from backing up into the drains during the prevalence of showers. 4. Are any with only the grade caused by the fall of the tide, such as the Canal street sewer must be, I think? A. There is a slight grade even in Canal street. 5. Are the inlets from the streets open, or have they traps? A. They have culverts which form a trap; these, however, are easily punched through in cleaning them out, and are not always kept in repair. 6. Is there any difficulty in keeping any of the sewers from accumulating sediment? A. Yes. 7. Is any expense incurred yearly in removing sediment, and is it heavy? A. A contract is made to remove the sediment in the sewers by the load, and that in the culverts by the year. It is a source of great expense.

(30) S. H. B. asks: Can aniline ink stains be easily removed from clothing? Most recipes for re-

moving ink stains refer to iron inks. A. First try a little strong alcohol, and if this fails, moisten with very dilute sulphuric acid, then with a strong solution of chloride of lime, expose for an hour to bright sunlight and wash well with clean hot water.

(31) M. A. F says: 1. I want to make a boiler 8 inches in diameter and 20 inches long. If made of ¼ inch copper, how many lbs. pressure will it stand per square inch, and how many tubes of 1 inch diameter shall I put in? A. You can carry a pressure of 100 lbs. per square inch with a copper boiler. 2. Will a wrought iron boiler of the same size stand as much pressure as the copper one? A. The iron boiler will stand 140 lbs. Allow a space between the tubes of from ½ to ¾ inch. 3. Will the iron boiler do to run an engine 1½ x 3 inches? A. The boiler is rather small, if you desire to work the engine up to full capacity.

(32) T & D. say: We have a blower, running at the rate of 3,000 revolutions per minute. Does it make any difference in the hardness of iron, if the blower is near the cupola or some distance from it? A. Within the ordinary limits of a foundry, the position of the blower will not make any material difference.

(33) E. C. B. asks: I hold that if 1 ton pressure be applied to the plunger of a hydrostatic pump, which is 1 square inch in area, the pressure on a 6 inch ram connected therewith will be 28⅓ tons, regardless of size of connecting pipe, if the latter is full of water. My friend asserts that the hole in the connecting pipe gives the pressure, and the increase will be as its area differs from the area of the ram. Who is right? A. You have the correct idea.

(34) S. H. B says: One of your correspondents recently asked for the correct name of what is called the blue hawk. I find, by Cone's "Key to North American Birds," that it is the peregrine falcon (*falco communis*).

(35) S. H. B. says: I had occasion to test one of your answers a short time since as to silvering glass, and had good success, except that I do better without warming the solutions, and by cleaning glass as a photographer does.

(36) J. A. H. says: I have a hard black rubber ornament that I wish to fasten to a piece of hard wood. How can I do it? A. Try glycerin and white lead.

We use plumbago, etc., and that, with iron and steel filings and other dirt, gets ground into my hands so that it takes a great deal of time and labor to clean them. Can you give me a recipe for something that will take the oil and dirt off thoroughly and quickly? A. Wash your hands first with oil and sand and then with soap and water and pumicestone.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On Separating Cobalt from Nickel. By L. S.
On Reapers. By G. H. R.
On Instinct. By E. H. R.
On the Supposed Planet Vulcan. By P.
On Poisonous Fireworks. By D., S., & Co.
On Boiler Explosions. By C. W. Y.
On Milking Cows. By A. E. U.
On Force Analyzed, etc. By T. D.

Also inquiries and answers from the following:
P. H. & C. F.—J. E. G.—J. C. W.—D. D. J.—E. G. M.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who makes machinery for spinning cotton twine? Who sells acid chromate of lime? Who sells cedar board for boat-building? Who sells hair-heading machines? Where can sunflower seed be bought? Who sells machines for cutting cards? Where can railway ticket-printing machines be bought?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

OFFICIAL.

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

January 30, 1877,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

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