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NEW GRANARY AT BRISTOL, ENGLAND.

We present herewith an engraving of a building (lately erected at Bristol, England), which is a favorable specimen of highly ornate architecture applied to commercial purposes. The ground being defective for so heavy a structure, a layer, 6 feet thick, of ground brown lime concrete was spread over the whole site, and upon this platform the external walls were erected, to the great hight of 100 feet. The building is 95 feet long, 45 feet wide, and contains ten stories. The lowest story is used as one large bonded cellar, a portion of the top story for an engine room, and all the rest of the building for storing grain, and it will contain 96,000 bushels.

There are only nine internal supports for the granary floors, and this leaves the large floor space unusually free of pillars. The external walls are faced with the hard Cattybrook bricks, and advantage has been taken, of the necessity of obtaining a large surface for the introduction of air into the granary, for ornamenting the lower portion of the window openings with open patterns in brickwork. The great difficulty experienced in designing the usual external lifts and external doors on each floor, for the introduction and delivery of grain, has been avoided by arranging the lifts in niches at the angles of the building, and by delivering the sacks of grain into carts upon movable skids, sliding out of the round holes under the first floor string course. The cost of the building was $30,000.

NEW GRANARY AT BRISTOL ENGLAND.

Facts about Storms.

From the United States weather maps for 1872–3, Professor E. Loomis has made an extensive series of deductions, deriving many interesting facts, from which we take the following:

The average direction of the storm paths for two years was N. 82° east, or 8° to the north of east, and the average velocity was 25 6 miles per hour: but there is a noticeable variation, both in the direction and velocity, depending upon the season of the year. The course of storms is most southerly in summer, and it is a little less northerly in winter than it is in spring or autumn. July is the month in which the course is most southerly, and October is the month in which it is most northerly, the mean difference between these two months amounting to 23°. The velocity of progress is greatest in winter and least in summer

The diversity in respect to the velocity of progress of particular storms is still greater. In some cases a storm center has remained sensibly stationary for 24 hours, and occasionally still longer, while in four cases a storm center has advanced over 1,200 miles in 24 hours, and in one case, May 15, 1872, the average velocity for 24 hours amounted to 57·5 miles per hour. Thus the velocity of progress ranges from zero to 57·5 miles per hour.

The storm path may have every possible direction, and the velocity of progress may vary from 15 miles per hour toward the west to 60 miles per hour toward the east.

The fall of rain appears to have a decided influence in modifying the course of a storm path.

Every considerable depression of the barometer is accompanied by a fall of rain, and the area of rain fall usually extends further on the eastern side of a storm center than it does on the western side. The average extent of the rain area on the east side of the storm's center is 500 miles.

The fall of rain, that is, the precipitation of the vapor of the atmosphere, is generally accompanied by a fall of the barometer. According to the theory advocated by the late Mr. Espy, when the vapor of the atmosphere is condensed, its latent heat is liberated, which raises the temperature of the surrounding air, causing it to expand and flow off laterally in all directions in the upper regions of the atmosphere, thus causing a diminished pressure over the region of precipitation, and an increased pressure on all sides beyond the area of the rain.

The progress of the storm eastward is not due wholly to a drifting, resulting from the influence of an upper current of the atmosphere from the west, but the storm works its own way eastward in consequence of the greater precipitation on the eastern side of the storm. Thus the barometer is continually falling on the east side of the storm and rising on the west side, in consequence of the flowing in of colder air upon that side. The stronger the wind on the west side of the storm, the less is the velocity of the storm's progress.

Some persons might have anticipated that an increase in the velocity of the wind in the western quadrant of a storm would have the effect of driving the storm eastwardly more rapidly: that is, of increasing its velocity. But upon each side of a storm's center the wind blows obliquely inward, and hence we must infer that in the central region of the storm there is an upward motion of the air: and this is the cause of the precipitation of vapor, that is, the cause of the rain fall. An increase in the velocity of the wind in the western quadrant is accompanied by an increase in the velocity of the upward motion in this quadrant, that is, an increase of precipitation. This increased precipitation of vapor tends to depress the barometer on the western side of the storm, that is, tends to retard the eastward motion of the storm's center; and this cause may operate with sufficient force to carry the storm's center westward, as actually happened in several instances in the years 1872 and 1873. On the other hand, an increase in the velocity of the wind in the eastern quadrant tends to produce a greater precipitation on the eastern side of the storm's center; that is, tends to push the storm's center eastward, or increase the velocity of its progress.

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Contents:

(Illustrated articles are marked with an asterisk.)

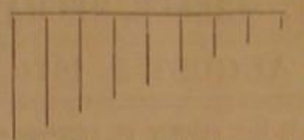
THE SIMULTANEOUS PERCEPTION OF SOUNDS.

The celebrated German physicist Helmholtz has, in his *Physiological Theory of Music*, made some modifications in various points of the hypothesis by which he accounts for the functions of our organs of hearing.

It will be remembered that, in the process of hearing, the sound waves of the air are collected by the outer ear which is peculiarly adapted by its form to concentrate them. The waves then pass along a canal to the tympanum or drum, which they vibrate. This vibration is communicated by a chain of bones to the membrane covering the *foramen ovale*, by which it is passed to the fluid contents of the inner ear and thus reaches the nervous surface which transmits to the brain the sensation of sound. It is not difficult to understand how the liquid in the inner cavities may be thrown into vibrations of which the durations are the same as those in the outer air, while the amplitudes are proportional, if acted upon by sound waves coming from a single source. But when we consider that the vibrations of so small a quantity of air as that contained in the auditory canal, transmitted to the still smaller surface of the inner ear, suffice to convey a perfect perception of the most complicated exterior phenomena, then the mystery begins. During the passing by of a military band, for example, we hear not only sounds emitted by the instruments, but the rolling of carriages, the voices of the crowds, the rustling of the leaves of trees, and innumerable other noises, all clearly distinguishable.

The eye, it is true, can regard an extended view or a multiplicity of subjects, but its perception is successive; it glances quickly from point to point and thus embraces all, but the ear recognizes a number of sounds simultaneously.

To understand the theory by which Professor Helmholtz explains the phenomenon, it is necessary to consider the oscillations of a pendulum. It is well known that a suspended body, even if of considerable weight, may be set in motion, by slight successive impulses, provided the latter be properly timed. These impulses must be repeated at equal intervals, and, in the case of a pendulum, act in the same direction as the movement of the body, determined by gravity, which is the motor force. Otherwise their effect will be to stop the motion rather than to accelerate it. Hence the interval of time which separates two consecutive impulses must be equal to the duration of an oscillation of the pendulum or to a multiple of such duration. Suppose a number of pendulums of different lengths be arranged in regular succession in the same vertical plane, as shown in the accompanying diagram. With a rigid horizontal rod, imagine the experimenter to strike all these pendulums in some particular rhythm. It is evident that such pendulums of which the times of vibration are equal to the interval between two successive blows, or to a submultiple of such interval, will oscillate. To all others the cadence of the rod will be in opposition, and they will hence stop and remain at rest. The same result takes place if sonorous cords, each having its own duration of oscillation, be substituted for the pendulums. Suppose that in the internal ear a great number of nervous fibers exist, the movements of which correspond to a determinate impression for each one. If the liquid vibrates during a certain period all the fibers having a corresponding time of oscillation will be set in motion; and a combination of impressions will result, peculiar to a given vibration, and different for any other. Such in brief is the theory by which Helmholtz explains the perception of simultaneous sounds, harmonies, the production of beats, and in fact all the phenomena due to audition.



The probability of the truth of this view is strengthened by the fact that the internal ear does contain a great number of organs which appear to be suitably disposed in order to serve as vibrating fibers. In the first edition of his work, Helmholtz believed that the nerve prolongations, known as the organs of Corti, fulfilled the purpose, but in subsequent editions he has renounced this idea, since Hasse has proved that the Corti fibers do not exist in amphibious animals. Among the membranes, however, in the interior of the inner ear, is one known as the basilar, which is ruptured with difficulty in a direction longitudinal to its fibers, while it yields readily to force applied in a perpendicular direction to the same. Helmholtz now considers the fibers of this membrane to act as a series of juxtaposed cords, and the variation in the length of the fibers (since Hensen has proved that the breadth of the membrane increases from one extremity to the other in proportion of one to twelve) tends to confirm the hypothesis.

M. G. Guérolt, the French translator of Helmholtz' work, suggests that the Corti fibers may serve the purpose of dampers, but adduces no experiments or other proof in support of the idea. An exhaustive comparative examination of the auditory mechanism in various animals, by means of the microscope, would doubtless show which organs are everywhere necessary to audition. Besides, as there appears to be a relation between the auditory faculties and the pitch of the voice of animals, the detailed comparison of the ears of those having deep voices with the similar organs of others having voices of a high pitch would probably elicit curious and valuable results.

THE AQUARIUM.

One of the first principles, in constructing a tank for an aquarium, is to give the water the greatest possible exposure to the air. The simple rectangular form is the best. This is generally constructed of iron and glass; the iron should be japanned, and the glass be French plate, to insure brilliancy and strength. The breadth and hight of the tank should be about one half of the length. Cheap tanks can be made of wood and glass, the frame and bottom being of wood, and the sides of glass. In order to make the joints watertight, care must be taken to get a proper aquarium putty or cement. The following is a good recipe: Put an eggcupful oil and 4 ozs. tar to 1 lb. resin; melt over a gentle fire. Test it to see if it has the proper consistency when cooled; if it has not, heat longer or add more resin and tar. Pour the cement into the angles in a heated state, but not boiling hot, as it would crack the glass. The cement will be firm in a few minutes. Then tip the aquarium in a different position, and treat a second angle likewise, and so on. The cement does not poison the water. It is not advisable to make the aquarium of great depth; about eight inches of water is sufficient. In regard to the light, great care must be taken. Too much often causes blindness, and is a common source of disease. The light fish receive in rivers comes from above; and an aquarium should be constructed so as to form no exception to this rule. All cross lights should be carefully avoided, at least if the light is very strong. Never place the aquarium in front of a window so that the light passes through it; for, when viewing an aquarium, the source of light should come from behind us. Not enough light is as injurious as too much, and causes decay of the vegetation. Having constructed a watertight aquarium, the bottom is strewn over with clean sand to the depth of 1 to 3 inches, on this a little gravel is spread; then a few stones or rockwork. Heavy large rocks should be avoided; they displace a large amount of water and increase the danger of breaking the glass sides. Pumicestone, well washed, is the best kind, being light and with a rough surface suitable for the rooting of plants, etc.; and if fancy forms are desired (bridge work, etc.), the pumicestone can be cut quite easily to the desired shapes. The plants are rooted in the sand and the vessel left at rest for a week for the plants to vegetate. The following plants will be found useful: *Utricularia inflata, uuricularia vulgaris, myriophyllum spicatum, anarcharis Canadensis*, and *hottonia inflata*.

In obtaining plants, procure all the roots and see that they are well rooted. If fungus should form, add snails (*planorbis tricolvis*); they will completely destroy it. After the plants are well started, add the shells and amphibious animals. The following shells will be found desirable: *Planorbis tricolvis, physa heterostrapha, unio complanatus*. Many shells are not needed. Snails act the part of scavengers; and where the different elements of an aquarium are rightly balanced, two or more snails will be found sufficient.

If amphibious animals are introduced, the rock work must extend above the surface of the water, or a float of some kind must be substituted. It is impossible for them to live under water all the time, and they would die without some such arrangement.

The turtles claim first rank. The *emys punctata*, or spotted water turtle, and the *chrysemys picta*, or painted water turtle, will be found to be the best for the aquarium, and should be procured when very young, as they are very destructive when old. The tritons (*triton tigrinus, triton niger*), the red salamander, the cray fish (*astacus Bartoni*), are all suitable, and present a very odd and yet a very natural look to the aquarium.

In selecting the fishes, there is no boundary to the number to be obtained, but experience has proved that comparatively a few only thrive in confinement. Among these, and the first, is the gold fish. He can live for months without introduced food, and is, without comparison, the most hardy, standing remarkable changes in the temperature; and he is the most gaudy and attractive. A large number of the fishes prey upon each other, and will only do for the aquarium when in the young state. Among these may be mentioned *pomotis vulgaris*, or sun fish, *esox reticulatus*, or common pickerel, and *perca florescens*, or yellow perch. The *leuciscus pygmæus*, or rock fish, is a great addition, and is found very plentifully in our streams. The *pimelodus atrarius*, or common black catfish, is another worthy of a place. So also is the *hydrargia diaphana*, or transparent minnow. But few fish can live in an aquarium; and the needless crowding together, so often seen, is very hurtful to health, and causes sound, strong fish in a short time to become weak and poor. The great difficulty in keeping an aquarium is to secure enough oxygen for the fish. To a slight degree, it is the duty of the plants to supply this; but if too much vegetation be present, decomposition takes place and ruin follows. It has been demonstrated that only a small amount is necessary to absorb the carbonic acid given off by the fish and amphibians; consequently, if the water be daily aerated with a syringe, it will absorb an abundant supply of oxygen for the animal life, and the trouble arising from the decay of much vegetable matter will be lessened or altogether avoided.

THE PRACTICAL MAN.

He sat beside us in a street car. He looked over our shoulder at the new copy of the SCIENTIFIC AMERICAN, which, fresh from the press, was receiving our final scrutiny, and requested the loan of the paper for a moment when we had finished. He glanced at the first page, skimmed over the middle, and peeped into the inside.

"I suppose that paper interests a great many people," he remarked.

We modestly signified our assent, and murmured something about forty odd thousand.

"Wa'll, it does'nt me," he interrupted sharply. "It does'nt take no books or papers to learn me my business, you know. Never learned nuthin from books in my life. Did'nt have but a quarter's schoolin, and then I went into the shop. Served my time with old Pete Reynolds, of Boston. You know'd him, mebbe; dead now. Was his foreman; now I'm boss of my own works in the city. I'm a practical man, I am. All yer hollergeys and hosserphys may do well enough to write about; but they ain't no sort'er use in the shop. They just git inter mens' heads, and set'em a thinkin about other things than their work, and then they git inventin', and that's the last of 'em. Why, I had a likely young feller, who used ter buy that paper, and read on it, dinner hour. Sometimes he'd stick it up on his lathe, until I stopped that, mighty sudden. Wall, one day I caught him scribblin' with a piece of chalk on a bit of board; then I know'd the invention fit had got hold of him, and that he was a goner. A few weeks after he comes to the office, and says he: 'Boss, I've got a little arrangement here that'll make the old lathe do better work,' and he out with one of them reg'lar printed paytents, and showed me a new attachment for making gearins, and sich. 'Wall,' says I, to humor him, like, 'sonny,' says I, 'you can go make yer masheen and set it up on the lathe, if yer wanter.' But the ungrateful villin began to say something about royalty and shop rights, and I told the book-keeper to pay him right off and let him clear out. Blow me if he did'nt go over to Smith's, acrost the street, and rig his affair there; and the first thing I know'd, Smith was turnin' out work at half my prices. Then I had to go find that feller, and pay him his blamed royalty, and a heap it was too.

"Now, there was a good hand just spiled by a-readin'; if he'd a let that ere paper of your'n alone, he might ha' been a good, stiddy man, gittin his three dollars a day comfortable and reg'lar. Now they say he's makin stamps by thousands, but he's spiled. Wont be worth nuthin ever fer work agin. Where'ud I have been if I'd pegged away at books and noozepapers—eh?"

Our practical friend did not wait for an answer; for while we were cogitating a suitable response, he suddenly made a bolt out of the car and rushed down a side street toward a dilapidated looking edifice, which, we conjectured, was none other than the "works."

"We want no theorist, we require a practical man." "Where can I find a practical man to take hold of my invention and push it?" How frequently we have heard these remarks! And how often, when we have turned to the speaker and asked for a definition of the term practical man, has a puzzled expression and a lame attempt at explanation, usually ending with "Oh, I know what I mean," been the sole reply!

Our street car friend is one type of the practical man. He is of the "self styled" variety, the most numerous, probably, existing. He is the least useful as an individual, the least progressive as a brain worker, and the least enlightened as a member of the human race, of any class of civilized mankind. He is a compendium of thumb rules, an epitome of set ideas encircled by the iron barriers of his own mind, which allow of neither the substitution nor admission of better views, nor the expansion of those within. At mere handicraft, he may be skilled; but ask him for a reason, and he is dumb. He it is who leads the van of the shriekers against free and liberal education, who clings to that sophism which argues that the "world is the best teacher;" who turns his son directly from the nursery into the shop; who renounces the inventor and all his works, until compelled, by absolute force of circumstances, to yield to progress: and finally, who, having no knowledge other than his manual skill and set of thumb rules, scorns it in others.

"But we want no longhaired philosophers to run our shops," possibly thinks the reader. True, nor need we have them. "Science," says Lord Brougham in his fine definition of the term, "is knowledge reduced to system." The true scientist is he who not only possesses this systematic knowledge, but, if he be so situated as to require its immediate aid, knows how to put it in practice. He is neither the sage who meditates erudite abstractions, nor the *soi-disant* "practical man" who devotes himself to mere system. He is eminently the man of practice, but of intelligent practice, who is a master of principles, of reasons: to whom the mere application of a truth is nothing as compared with the truth itself: the latter immutable, the former an idea to be changed as occasion may require or judgment suggest. Such is the person we mean when we seek the "practical man," not the blatant individual who thrusts himself forward under that title.

Our acquaintance of the street car carried off our paper. He honestly mailed it back to us the other day. We smiled as we saw the thumb marks on all the pages, and opposite an engraving there was a pencil note of: "I kno a bettur plan than this." Perhaps after all a latent idea in his brain has been aroused; or has he taken the invention fit? Should he see this, he will probably scout the idea that our humble efforts have awakened him, for "it does'nt take no papers to learn me my business, you know."

LANGUAGE OF INSECTS AND ANIMALS.

Our notice was lately attracted to the labors of a colony of small black ants, which has taken up its abode in a chink in the wall outside our office window. A solitary ant, evidently on a private foraging expedition, suddenly encountered a scrap of bread, which had fallen on the sill several feet from his home. Instead of nipping off a fragment and carrying it away, the insect apparently made a careful examination of the entire piece and then turned and ran at full speed back to the hole. In an instant hundreds of ants emerged and marched directly to the bread, which they attacked, and very speedily, morsel by morsel, transported it to their dwelling.

Another good instance is that of a terrier dog belonging to a friend, from whom we obtained the facts. The animal somehow, it seems, excited the ire of a larger dog, and accordingly received an unmerciful shaking. Shortly afterward the terrier was seen in close consultation with a huge Newfoundland. The result was that both trotted off together, and found the terrier's assailant, which then and there received a furious thrashing from the Newfoundland, while the terrier stood by and wagged his tail in high glee.

The last case which came under our own observation was that of a brood of very young chickens which, losing their parent, refused to go with another hen but manifested an extraordinary affection for a pair of turkeys almost as juvenile as themselves. The turkeys have assumed all the parental functions, scratching worms for their charges, and gathering them under their wings, while the chickens appear to comprehend the significance of the turkeys' "peep" equally as well as they did the clucking of their natural mother.

In the case of the ants, it is clear that the single insect must have imparted the news of his discovery to an entire community of his fellows; in that of the dogs, the terrier must have made the Newfoundland understand the circumstances of his misfortune and so secured sympathy and assistance; lastly, between the chickens and turkeys, apart from the singularity of the relation, it is curious to remark that the language of one fowl was understood by others of different species.

DEAD CITIES.

To Americans especially the ancient world is little more than an abstraction. Save the relics of the mound builders which dot the prairies of the West, and the occasional discovery of old Indian remains buried here and there in New England, we have little to bring us face to face with evidences of human existence in ages gone by. We study our histories and become familiar with them as we are with the tale of the romancer: we can discuss the Punic wars with as much freedom, perhaps more, than the closing campaigns of the Rebellion: but the new world, except in its sparsely filled museums, shows us nothing tangible, nothing which we can directly connect as part and parcel of the times and men of historic yore.

But let the old world be visited, and the antiquarian may find the very handiwork of nations which have utterly disappeared. Whether he wander through civilized Europe, half civilized Asia, or barbarous Africa, everywhere are relics of the past, all forming, to the lover of archæology, a feast, never so rich as at the present day. He may ramble through Spain, and muse over the quaint architecture of Moors, recalling the heroic prowess of the Cid; he may climb that hill jutting into the harbor of Cartagena, and stand in a building reared by the army of Hannibal. He may trace out the Roman camps in Northern England, or the earlier relics of the Druids and Norsemen, or he may roam for hours through the streets of Pompeii, reading the history of everyday life seventeen centuries ago in the marks of the wheels on the pavements, the signs on the stores, or the very bread lying, black and dry, in the ovens. He may watch the laborers as they slowly dig out the loose ashes in a buried room, and will see them stop their work when the floor is almost reached. Then, as we did ourselves one warm summer morning not many years ago, he will see the men carefully grope through the residuum. A shout denotes a discovery, and then very carefully a bar is pushed down into the place where the object is supposed to be. Into the hole thus made, the liquid plaster is poured. A few moments of anxious, curious delay and the spot is again attacked, the ashes thrown quickly upward, and the plaster, now set and hard, withdrawn. Perchance the mold of some household object is produced; sometimes it is a human figure, such as we saw unearthed, which, with its arms doubled over its head, had crouched into a corner for shelter, but only to die there, suffocated in the deadly shower.

Then there are the Syracusan ruins, little visited by the tourist, but overflowing with interest. He may wander past the very walls, cross perhaps the threshold over which Archimedes stepped while pondering the problem, of which when solved, he shouted *Eureka!* (I have it), and rushed naked, through the streets. On some seat of the amphitheater, which he enters, the great inventor may have reclined while devising his burning glass, his levers, and the engines of war with which he routed a besieging enemy. On descending the huge caves hewn from the solid rock, he may marvel at the knowledge of acoustics which dictated to the tyrant Dionysius the building of that labyrinthine passage which so closely counterfeits the duct in the human ear. Clambering up the rough hewn steps, the little closet is before him where the cruel king used to sit and hear the slightest whisper of his captives in the vaults below. The tearing of a scrap of paper sounds there like the rushing of a vast wind, and a pistol report is deafening. Hard by is the circus made famous by the story of the slave Androcles, whom the lion refused to attack because his antagonist had before removed a thorn from a wounded paw. There also is one of the earliest of Christian churches, erst a heathen temple, in the crypt of which are still to be seen the gridiron, the pincers, and the other instruments of torment by which perished the early martyrs of the Church.

The subject is a fascinating one, and, as we write, it looms up before us to such magnitude that the traditional "acres of paper and oceans of ink" would barely suffice to do it justice. But the confines of newspaper space are inexorable. Therefore, with this brief glimpse of the romance of archæology, we refer the reader to the latest news from the subterranean world, which he will find in the record, of the excavations and explorations now or lately in progress, printed on another page.

SCIENTIFIC AND PRACTICAL INFORMATION.

STRASBOURG GOOSE CULTURE.

Pâte de foie gras, or Strasbourg pie, is an oleaginous luxury, very expensive in this country, and about as indigestible as it is costly. As its name indicates, it is a pie filled with the livers of geese, which are rendered, by peculiar treatment, diseased, and hence abnormally enlarged. To produce the necessary development, the fowls are closely confined by tying, for a period of seven weeks, in dark cellars, during which time they are fed with a paste of maize, chestnuts, and buckwheat. This is stuffed down the throat once in two hours, and the effect is at last to produce an enormous enlargement of the liver, when the fowls are killed, and the livers used as above mentioned.

PULVERIZING THE CHLORATES.

Chlorate of potash and other chlorates are extensively employed in the manufacture of fireworks. The inconvenience, of moistening with alcohol before pulverizing them, and pulverizing wet, may be overcome by employing the following method of Gawalovski: The salt is dissolved in hot water until a perfectly saturated solution; is obtained, when a pane of glass is dipped into the solution; and on taking it out, it is found covered with a layer of fine crystals of the salt. They are scraped off with a paper card on to a sheet of paper, and form a kind of meal. This method is entirely free from danger to the workmen, and a large quantity of the salt is readily prepared in a relatively short time and with very little inconvenience.

ACTION OF SULPHUR PREPARATIONS IN CHRONIC LEAD POISONING.

By the advice of Dr. Liebreich, M. Siew has attempted to chemically combine the lead distributed through the organism, so as to render it harmless. To satisfy himself of the possibility of doing this, he injected subcutaneously some chromate of lead; and after introducing suitable sulphur compounds, he tested for sulphide of lead at those points. If alkaline sulphides were administered, the red color of the injected tissue remained unchanged; but if a rabbit partook of glycosulphuric acid, which is easily soluble in water, and forms with lead a very insoluble salt which passes off unchanged from the system, then the injected part showed a black spot. Siew considers this to be sulphide of lead, from the reduction of the glycosulphate of lead. That this salt is really reduced by the organism is proved by feeding animals a long time on glycosulphate of lead, when the walls of the stomach are found to be black. He does not state his conclusions.

LIME DEPOSITS IN WATER PIPES.

MM. Fabre and Roche point out that wherever there is a joint in water pipes, made to connect tin conduits or copper faucets, at such points carbonate of lime is most abundantly deposited. If a piece of silver be placed inside in contact with the lead pipe, it becomes covered with the carbonate in a very short time. The investigators find that all metals, electro-negative with relation to lead, are thus affected. A voltaic couple is in fact formed, and a veritable chemical precipitation caused.

TESTING URINE FOR ALBUMEN AND SUGAR.

The following tests by Siebold are so simple that an inexperienced person can employ them for testing urine: In testing for albumen, ammonia is added to the urine until it is slightly alkaline; it is then filtered, made slightly acid with dilute acetic acid, and a portion of the mixture boiled. This portion is compared with the cold portion, when any turbidity is easily detected. In testing for sugar, he employs a modification of Roberts' process, whereby an inexperienced analyst can detect $\frac{1}{25}$ per cent of sugar, while a more experienced person can easily recognize half that quantity. About one and a half or two fluid drachms of Fehling's solution is heated to boiling, and five to ten drops of the urine added. If much sugar be present, a yellow or brick red precipitate is formed. If this does not happen, add 50 or 80 minims more of urine, and set aside to cool. If the liquid is not milky when cold, less than $\frac{1}{40}$ per cent sugar is present.

ANOTHER NILE EXPLORING EXPEDITION.

An expedition is being organized in Egypt for the purpose of examining the geological and physical constitution of the valley of the Nile, and of the land bordering on the Red Sea. The most important question to be determined is the possibility of establishing a branch of the river in the ancient bed of a stream occupying the base, or the valley called by the Arabs the Valley of the Dry River. If this work can be accomplished, a large amount of now waste land will be rendered suitable for agriculture.

NON-INFLAMMABLE SHIPS.

The British Admiralty have lately caused some experiments to be conducted at Plymouth, England, upon wood saturated with a solution of tungstate of soda. These, we understand, have given successful results, sufficient to warrant the construction of two small vessels, one made of ordinary timber and the other of the same material treated with the chemical. Both, when completed, will be filled with combustibles and fired simultaneously, thus submitting the efficacy of the protective substance to a final and crucial test.

PRIMEVAL MUSICIANS.

Another curious relic of primeval man has been discovered, which shows that our very remote ancestors, in addition to being cognizant of the arts of sculpture, drawing, and engraving, were also, in their rude way, musicians. M. Piette has recently found, in a cavern in Dourdon, France, mingled with scraps of pottery, bones of animals, and flint implements, a flute. The instrument is made of bone, and has but two holes, so that it could produce but four sounds. It bears a close resemblance to the similar instruments used by the savages of Oceanica.

DANGER IN BAD FLOUR.

From an investigation, recently conducted in Petersburgh Michigan, into the cause of the epidemic of cerebro-spina meningitis, with which the locality has been afflicted during the past spring, there appears ground for ascribing the prevalence of the disease to some poisons in the food of the people. Experiments conducted many years ago showed that grain affected with smut was capable of producing violent illness. Ergot of wheat is more active even than ergot of rye. The examining physician, in the present case, reports that the crop of the first mentioned grain, raised in the vicinity last year, contained much more smut than usual. It is, therefore, possible that the disease is due to consumption of bad flour.

ARSENICAL WALL PAPER.

Some new cases are reported, by the Michigan State Board of Health, of severe illness caused by living in rooms papered with green hangings. Two instances are mentioned of families becoming sick; and on the paper being examined, 1·16 grains of arsenic to a square foot of surface were found.

ORNAMENTING METAL SURFACES.

A NEW process for ornamenting metal surfaces, by K. Goddard, of Richmond, N. Y., consists in plating, electroplating, or otherwise covering a plate, bar, or ingot of soft metal with a thin film of harder metal, and then rolling out or pressing the ingot into a sheet; whereby the coating is broken into irregular forms, and a marbleized appearance produced on the surface of the sheet

Sensitizing Gelatin Paper.

This is accomplished in a solution of one part bi chromate of potash in twenty parts of water. The purer the bichromate salt, the better the paper. If small sheets of eighteen to twenty square inches are to be sensitized, the above solution is poured into a zinc or porcelain dish, the bottom of which should be covered to the depth of half an inch at least. The gelatin paper is dipped into the solution and left there until it gets soft, which generally takes thirty to forty seconds. It is then taken out and laid, gelatin side down, on a well cleaned glass plate. By rubbing with a piece of india rubber, not too hard, the greater part of the liquid is removed from the paper. On lifting the paper from the glass, it has a fine, smooth surface, on which there will be no streaks or drops formed afterward, as it is already half dry. It is then hung, on laths provided with pegs, to dry. Thus prepared, it will bear a much higher temperature than when the solution is not pressed out. In cold weather, the paper can remain some minutes in the chromate bath; it should be left there until soft and pliable.

In preparing large sheets, another method must be employed. A sufficient number of thin strips of pine wood, three fourths of an inch wide and long enough to rest on the opposite side of the dish, are saturated with shellac varnish, and, when dry, rubbed with cocoa butter, and then polished with an old linen rag. Horizontal sticks are put up in the preparation room with notches to receive these strips. The dish for a large chromate bath is best made of stout zinc. A sheet of gelatin paper is allowed to float on the bath, gelatin side down, until soft, when one end is lifted up and laid on one of the pine strips; another strip is laid on the paper, and the two clamped together. The paper is then drawn, face down, over a glass rod or tube fastened to one side of the dish. In this way small air bubbles are removed, as well as a large portion of the solution. The paper is now hung up by placing the strips of wood clamped to it in the notches on the horizontal sticks. A third strip is pressed gently against the back of the paper just below the others, and drawn down to the lower edge, thus partially removing the solution from the back. It is then clamped to the lower edge. In this manner, says the *Photographische Archiv*, a sheet of paper five feet long may be sensitized in less time than it takes to describe it. The chromate bath should be kept covered to keep out the dust; and before using it, a piece of blotting paper may be drawn over the surface.

AN IRIS AND AN ORCHID.

Our first engraving, extracted from *The Garden*, depicts a beautiful specimen of variegated orchid, the leaves of which are richly colored and highly ornamental, while the flowers are quite insignificant. It is indigenous to the East Indian Islands and Continent, and has short rhizomes, very short stems, and alternate leaves, more or less oval in shape, often heart shaped at the base and pointed at the apex, on very short foot stalks, which embrace or clasp the stem. The flowers are arranged in clusters or terminal spikes. They are of a white or reddish color, and are undeserving of notice in an ornamental point of view. The leaves are velvety, of a dark green color round the margins, while the central part is of a yellowish red. The whole of the upper surface is traversed by a network of veinings of a brilliant golden yellow color. The under surface is red. The plant is also known in gardens under the names of *a. xanthophyllus* and *a. latimaculatus*. The plant should be grown in pots, the lower half of which should, for the sake of securing perfect drainage, be filled with broken crocks, while the rest should be filled with a compost of peat, charcoal, and sphagnum,

ANÆCTOCHILUS (XANTHOPHYLLUS) LOBBIANUS.

the surface being covered with a layer of living sphagnum. The plants, after being potted, should be placed under a bell glass or *cloche*, in a warm house, where the temperature during summer should range from 70° to 78° Fah., and in winter from 55° to 60° Fah. A moist atmosphere is indispensable, and this should be maintained equally and constantly during the summer; but in winter, when the plants require some rest, the supply of moisture should be considerably diminished. The plants should at all times be kept well sheltered from the direct rays of the sun, and the inside of the bell glass or *cloche*, under which they are placed, should be carefully wiped out every morning and evening, otherwise the condensed moisture, accumulating on the glass, will drip on to the leaves, making holes wherever it touches. As the principal object in cultivating these plants is to bring the foliage to its full perfection of beauty, the flowers should be pinched off as soon as they begin to appear. This will throw more vigor into the leaves, cause them to grow closer together, and vastly improve the luster and richness of the coloring. It is also favorable to the multiplication of the plant, as it causes numerous shoots to spring from the axils of the lower leaves, and also from the rhizome. These shoots, when detached and planted, will form each a new plant. They should, of course, be potted in the same compost, and subjected to the same treatment which has been above described for full grown plants.

The plants of the *iris* family, of which the *iris susiana*,

THE IRIS SUSIANA AS A BORDER PLANT.

represented in the second of the two engravings given herewith, is a very beautiful variety, exist both in the temperate and torrid regions of the globe. There are several species similar to that in our illustration, having bulbous roots or stems, and exquisitely scented blossoms of an elegant pearl white hue. Almost every variety of the flower has some intrinsic value—the root of one species is the orris root sold by apothecaries; the powdered root of another gives a kind of snuff; the same powder of another variety may be used for making ink; and the fresh juice of other species is said to be a valuable cathartic medicine.

Hypodermic Medication.

The day that Alexander Wood, of Edinburgh, discovered "that a solution of morphia injected under the skin, in the vicinity of a painful part, afforded remarkable relief to the pain," the clock of ages marked an epoch in scientific medicine, which indeed rivals Harvey's discovery of the circulation, or Morton's discovery of anæsthesia. At that hour, throughout the civilized world, suffering humanity became heirs to a boon which has been to them as a pearl of price, and that particular province in the practice of medicine which looks to the alleviation of pain, which in times gone by was the bane of the physician's life, became so modified that pain presents but a few phases that we may not readily overcome, and but few characters we may not subdue. Such crises in medicine as have been wrought by the discoveries of Jenner, Cinchon, Harvey, Morton, and Wood are precursors of glorious "gala days" in their departments, and command the admiration and respect of not our profession alone, but the good and noble the world over.

Dr. Wood, after his discovery, continued to practise the method from November, 1843, to 1856, a period of thirteen years, and until he became thoroughly convinced of its utility and worth, when he published his first account of the subject in the Edinburgh *Medical and Surgical Journal*—now over thirty years ago.

I have known the hypodermic syringe to be employed almost in every available portion of the body, and on an average of four times in twenty-four hours, for a period of several years, in the same patient, making an aggregate of six thousand and four hundred times, without the slightest accident and without even the formation of an abscess.

My own method of using the hypodermic syringe is as follows: After being satisfied that the instrument is in perfect order, the piston properly fitted, the barrel clean, etc., I draw up slightly more fluid than I design using, invert the syringe, press up the piston to expel the air which is nearly always drawn in, and the surplus solution; then with the thumb and finger of the left hand, I pinch up a fold of integument, pressing it pretty firmly for a few seconds, to lessen its sensibility; with a firm, steady pressure I introduce the needle at an angle of about 45°, directly into the cellular tissue, to the depth of one eighth to a quarter of an inch, according to circumstances; press down the piston, withdraw the needle quickly, place a finger over the puncture to prevent the escape of fluid, and the operation is complete.

The first drug employed hypodermically was morphia. And its range of application has kept pace, co-extensive with its employment. While its various salts have been used, the sulphate seems to have outgrown all others in favor, for various reasons, and is at present the favorite; it is perfectly soluble in distilled water, which is, for all purposes and under most circumstances, the very best vehicle for hypodermic use, on account of being perfectly unirritating to the tissues and not liable to produce inflammation or abscess.

The physiological effects of morphia are too well understood to require repetition here. It was early—in fact, first—employed in neuralgia, in which a single application cured the disease. It had yielded equally as good results in my own hands a number of times; and although we will often fail to cure so promptly, by perseverence, for a limited time even, we will be satisfied with its results. At present, I cannot call to mind a single case of ordinary neuralgia which I have treated hypodermically that was not speedily and, so far as I know, permanently cured by a few applications.—*J. C. Bishop, M. D. in Southern Medical Record.*

OAK APPLES OR GALLS.

These, says the *Garden*, are produced by an insect known to entomologists under the name of *cynips quercus-petioli*, which deposits its eggs in the tender bark of the young twigs of the oak. Soon afterwards the portion of the bark in which an egg has been deposited begins to swell, and ultimately forms a rounded tumor or excrescence, sometimes over an inch in diameter. "On cutting into these galls," says Dr. Fitch, "the small limb on which they grow is found to have its wood thickened or swollen, and, over it, forming the chief bulk of the tumor, is a corky substance of a yellowish brown or snuff color, between which and the wood are several small hard grains (resembling seeds, each having a cavity in its center), in which, doubled together, lies a soft, white, footless worm or maggot. This, on completing its growth, changes to a pupa in the same cell, and, subsequently, into a fly; whereupon, to escape from its confinement, it gnaws through the corky substance and the external bark, thus producing those small perforations like pin holes, which are always seen in these tumors after the insects have made their exit therefrom." Fig. 2 in our illustration represents a section of one of these galls cut through the middle, and showing the central cavity in which the grub grew to maturity, prior to eating its way to the outside, through the channel which is also shown. The injury done to oak plantations by these insects is sometimes very great. A few years since they appeared in such numbers in England as to create quite a panic among the landowners, who were threatened with the entire loss of their oak plantations Some of the trees withered and died, others had their leading shoots killed, while the younger trees were seriously checked in their growth. There is another species of cynips which deposits its eggs in the same manner in the leaves of the oak, causing them to swell similarly. The tumors, however, pro-

OAK GALLS

duced by this insect are soft and much smaller than the bark galls. In both cases it is probable that the parent insect, when depositing her eggs, injects with each a small quantity of some acrid secretion which has a specific effect in so irritating the tissues of the bark or leaf that they at once commence to swell and produce the spherical induration which forms the *nidus* of the future larva.

Fig. 1 shows the oak gall in its natural size, and Fig. 2 is a section of the same. Figs. 3, 4, and 5 are, respectively the larva, male and female of the cynips.

THE FLOWER MARKETS OF FLORENCE, ITALY.

The city of Florence: in which are to be found an unequalled number of art treasures, ancient and modern, where are the "Venus di Medici," the "Niobe and Her Children," the wondrous dome of Brunelleschi, the gates of Ghiberti, the church of Santa Croce (in which are the tombs of Michel Angelo, Machiavelli, Galileo, and Alfieri), and a world of other relics and shrines of beauty, art, and science: is renowned among all the capitals of Europe for the magnificence of the flowers exposed for sale in the markets. It is asserted that nowhere is the trade in flowers so extensive as in Florence, and the exhibitions of the floriculturist's art are numerous and very popular. They are to be found in the "Mercato Vecchio" and "Mercato Nuovo" (the Old Market and the New Market), and in a more modern building, called the Central Market, of which we publish an engraving. It is a large and well built structure, with a lightness and grace in the roof which is admirably in keeping with the purpose for which it was built. In extent it rivals the Floral Hall in Covent Garden, London, and the celebrated *Marché aux Fleurs* at Brussels, while it has an advantage over both buildings in its exterior garden and its open surroundings. We are indebted to *L'Illustrazione* for the engraving.

RECENT ARCHÆOLOGICAL EXPLORATIONS.

Of late years progress in the exhumation of lost relics of ancient life has made such gigantic strides that, viewing the various explorations in the aggregate, it would be difficult to ascribe to any one a special importance as compared with the others. To detail all the interesting discoveries made, or even to trace out the proper significance and bearing of the knowledge thus acquired of past generations, would necessitate both a reviewal of historical facts and an amount of antiquarian discussion, the writing of which would swell the present article to a volume; so that merely a passing glance at recent explorations among the ruins and buried cities of the old world is all that we can hope to offer in the following lines.

Since the removal of the Italian capital to

ROME,

the government has undertaken extensive researches, which have resulted in the discovery of many statues and works of art of great archæological value. At Ostia, about a dozen miles from the city, extensive explorations are in progress; and, as the locality was once a town of 80,000 inhabitants, many important discoveries are anticipated. Some time ago the Italian Parliament voted $60,000 for the purpose of excavating the whole of the Palatine Hill, with the slopes around it, as far as the Forum and the Arch of Janus on the north; and it is in this locality that many of the finest remains have been found. The most extensive archæological researches in the Eternal City have, however, been conducted by Mr. J. H. Parker, C.B., the record of which fills two volumes, recently published in England. Nineteen aqueducts, we are told, have been traced, which served to convey water to the city from the elevated regions of Subiaco, forty miles away, through pipes of stone. At every half mile great reservoirs or filtering places were located, the construction of which completely disproves the idea that the Romans did not know that water rises to its own level. Within the city the principal buildings belonging to various eras were readily recognized. Portions of the Arx of Romulus yet remain on the Palatine Hill. The stones employed are 4 feet long by 2 feet wide and deep, and were split from the *tufa* quarries by iron wedges, exactly as at the present day. They are roughly dressed. Fragments of the wall of Servius Tullius are to be found, connecting, by a great road, the several citadels of the famous seven hills. In this wall the stones are wrought and closely fitted and secured to one another by iron clamps, not run in with lead. Portions of other walls of equal antiquity are built of concrete, the great durability of which is ascribed to the lime used being burnt on the spot where required, and to its mixture with rough and gritty Pozzolana sand and broken bricks. From these samples of the art of the mason 2,600 years ago, down to the splendid productions of the time of Hadrian, archæology can trace the progress of the builder's art and the development of the city.

PALESTINE.

In the Holy Land, the Palestine Exploration Society of England has been foremost in carrying on investigations. Little has been accomplished toward definitely locating the sites of the Temple of Solomon, the sepulchre of David, or of many other structures mentioned in the Scriptures. In Jerusalem a mysterious tomb was opened; and in it, below a bed of rough clay brick, a human skeleton was found, its head turned to the South, but past all identity of race or period. Throughout all the territory there is inextricable confusion of origin and date. There are tombs with Greek inscriptions bordering upon Roman roads, and over all are signs of the changes caused by the wars which have swept over the land. Over two hundred excavations have been made in and about Jerusalem. The remains of a large building facing the cardinal points have been found among the ruins of an entire town which, situated twelve miles west of Nablus, once covered a square mile of area. The edifice was probably an ancient monastery. Some interesting examinations have been made concerning the Holy Sepulchre and the Dome of the Rock, the materials used in the pillars of which appear to be the remains of older structures.

The English Ordnance Survey of Palestine now extends over three elevenths of the area of the country, or 1,800 square miles. This includes a map of Jerusalem, which shows that the original rock on which the city was built is now covered with from 25 to 120 feet of *débris*. There appears every reason for believing the truth of the tradition that Jerusalem was utterly obliterated by the Roman Governor Turnus Rufus, and its site plowed over.

Lieutenant Conder, R. E., has examined the ruins of the great temple at Baalbek, of which but six columns now stand. He concludes that the structure was not of Phœnician origin, and considers that the rubbish about its foundations hides statues and treasures of the greatest archæological value.

TROY.

In attempting to prove that the Iliad is not a myth, that Paris and Helen, that Priam and Hecuba, and all the Greek heroes did live, Dr. Schliemann undertakes an arduous task, but he bases his speculations on the actual revelations of the relics dug up at the site of the ancient city. About four years ago excavations were begun at modern Hissarlik, and the first discovery was the remains of a city of Greco-Roman origin, in which none of the articles found were of a later date than the seventh century B.C. This town, it is believed, was built about 700 B.C., and destroyed by the Roman Emperor Constantine II. Soon after, within a mound, were found walls of a Greek city, and beneath these a still older structure which served as their foundation. Encouraged by these discoveries, the explorer opened an enormous trench, and laid bare three distinct strata, in the lowest of which, upon the virgin rock, were found fragments of pottery, in the next ashes and calcined fragments, all bearing the marks of a great conflagration, and, in the last, houses of small or cut stone joined with mud.

More extended excavations revealed the walls of a grand temple of Minerva, 240 feet in length, in which were found vases of gold and silver, copper, weapons of war, and ornaments of every description, numbering some twenty thousand in all, and all traceable to a period earlier than that of the Greeks.

The tools brought to light were either of hard stone or of bone. There are saws made of silex and knives of obsidian. Hammers had holes for the reception of handles cut by the action of sand and water. Nothing resembling a lathe was found. Pottery was molded entirely by hand. Mills for grinding grain existed in profusion; but bread could not have been known, as nothing resembling a baking apparatus was met with. The work in gold and silver was beautifully executed, apparently entirely by hand; and from the fact that much of it was made in the figure of an owl, sacred to Minerva, the tutelary deity of the Trojans, the explorer finds additional evidence for his belief that the remains discovered are veritable relics of Homer's Troy.

EPHESUS.

For some time past Mr. J. T. Wood, an English archæologist, has been making excavations with a view of determining the site of the Temple of Diana. These researches at first uncovered the remains of a gate, with the vestiges of a portico or colonnade. Then another gate was reached, and then roads converging from the two. Following these paths the excavators actually struck upon the angle of the outer wall of the great temple, bearing inscriptions recording its restoration by the Emperor Augustus. The Western face of this wall was followed some 1,200 feet. Soon after, Mr. Wood

THE CENTRAL MARKET. FLORENCE ITALY.—A FLOWER SHOW came upon a fine white marble pavement, laid in Greek fashion on a lower bed of black marble, the very floor of the temple itself. The remains of the thirty-six massive columns, sixty feet high, perfect in carving and decoration, were dug out and subsequently sent to the British Museum. The excavations will probably be continued until many other vestiges of the magnificent temple are brought to light.

ASSYRIA.

The excavations at Nineveh, carried on many years ago by Layard and others, have lately been continued by Mr. George Smith, of the British Museum, in the interest of the London *Daily Telegraph*. The most important portion of the discoveries lies in the engraved stones from which Mr. Smith deciphers the history of the nation. Deeds of property and private contracts have been found, inscribed and covered with clay, on the exterior of which the substance of the agreement was stamped as a memorandum. No less a document than the will of Sennacherib has been met with, in which that monarch leaves all his "chains of gold, heaps of ivory, a cup of gold, crowns and chains with them, all the wealth that [I have] in heaps, crystal, and another precious stone, and bird's stone" to his son Esar-Haddon. Fables of the beasts have been found; also chronological tablets which enable us to restore the chronology of Western Asia from the ninth to the seventh centuries B.C., and to correct the corresponding dates in the Old Testament, hitherto the despair of historians.

CYPRUS.

General Di Cesnola is still prosecuting researches for pure Phœnician relics on the island. The collection, at present located in the Metropolitan Museum of Art in this city, is the result of seven years' exploration; and as it includes the first known works of Phœnician art, is of the highest interest and value. The island of Cyprus is one vast graveyard, Greek graves being made in the soil which, in the lapse of ages, had obliterated the tombs of the earlier inhabitants. General Di Cesnola identified the site of ancient Idalium, which was destroyed about 500 B. C., and subsequently found the Temple of Venus at Golgos. He then proceeded to excavate the supposed sites of other cities, and in so doing made the collection now on exhibition in New York. This includes a large amount of pottery, among which is a colander still bearing a white stain which chemical analysis has proved to be that of milk. There are also a number of statues, hewn from calcareous stone and very perfectly preserved, beside a large variety of specimens of ancient glassware, ornaments, etc.

SCOTLAND.

Mr. J. S. Phené, F.S.A., has opened a number of mounds in Scotland, which, it appears, served as tombs for the early inhabitants. These tumuli are of exactly the same construction as the similar heaps found in Mexico. Some served as monuments; and in one opened at Largo, Scotland, were discovered particles of bone calcined and mingled with the *débris*. Evidence has been found that there the Norse king, Haco, after his great battle with the Scots in 1263, ordered the ships stranded on the shore to be burned. The bodies of the dead were thrown into the burning pile, together with armor, etc.; and when all was consumed, the mound was formed from the ashes.

THE RUINS OF OPHIR.

Mr. Mauch, an African traveler, believes that he has found the veritable remains of Scriptural Ophir, in lat. 20° 15' S., long. 26° 30' E. One edifice is still 30 feet high, and is formed of granite with beams of cedar. It stands on a mountain, the sides of which appear to be terraced. It is built in imitation of Solomon's temple. The second structure, supposed to have been the residence of the Queen of Sheba and her suite, is circular in form, with labyrinthine walls built without mortar. It is still known to the natives as the "House of the Great Princess."

Excavations are now in progress in Athens, Greece; and recent researches in Malta and Sicily have resulted in the discovery of a variety of tombs of Etruscan and Phœnician origin, regarding which we note no especial points of interest.

Correspondence.

Hardening and Tempering Tools.

To the Editor of the Scientific American:

In reply to your correspondent John T. Hawkins, whose letter appeared in your last issue, I would say that he is correct in stating that the difference in the degree of hardness to be obtained, simply by "the different temperatures at which the tool has been originally dipped," is practically very slight, providing, however, that the tool is heated to a red heat. Hence my instructions were to heat the tool to a "moderate red heat," but "not hot enough to cause it to scale," a range of degree sufficient, I think, for all practical purposes.

With reference to the colors produced upon steel, in the process of tempering it, being due to the formation of a film of oxide, it is not my purpose to treat upon the chemistry of metallurgy, but to confine myself to workshop practice as the workman understands it. "The element of time and the greater or less facility for access of the oxygen of the air," I have not found to be of vital practical importance in tempering, probably from the following causes: The tempering of steel tools should proceed slowly, because it is not so easy to determine and to obtain the precise shade of color desired when the lowering of the coloring proceeds rapidly as when it proceeds slowly. A uniformity of color is not so easily or accurately obtained under a rapid as under a leisurely lowering of the color, especially in the case of taps or other tools having protruding parts or edges, because such parts receive the heat (and hence temper) more readily than the body of the tool. Rapid tempering I therefore always discard. The method commonly employed to impart an even and particular degree of temper to tools excludes the air from the tools to a much greater degree than does the tube process given by me, although the color is, in that case, the universally accepted test. That method is to place the tools in sand heated over the fire (and kept there during the process), and covering the tools with the sand during the first part of the process, and only removing them (at the later stages) sufficiently to expose the upper surface to view that the color may be seen. Excellent results are claimed for and obtained by this process. My objections to it are that it is often advantageous to make one part of a tool softer than the rest (such as the square ends of taps, reamers, etc.), which is very difficult to accomplish in the sand process, and also that the tube process produces a more uniform temper, because the tool can be revolved in the tube, and thus receive the heat evenly all over; whereas the sand is always hotter at the bottom than at the top, and sometimes, from unevenness in the degree of heat in different parts of the fire, and from the uneven depth of the sand, hotter in one part than in another.

To dip a cold chisel in the water in such a manner as to only require "a few seconds" to bring the cutting edge to a blue, as your correspondent asserts may be done, is an error, because in such a case the band of blue will be very narrow, and but very few grindings of the chisel will remove the part tempered. A chisel should be dipped in the water about three eighths inch deep, and held there about ten seconds, and then suddenly immersed, say another three eighths inch, and withdrawn, in which case the band of blue will be a broad one, and the temper of the chisel will remain about the same after many grindings.

If, however, from an error of judgment in heating or dipping, it becomes necessary to impart to the chisel additional heat, to assist the tempering, it should not be imparted by holding the chisel over "the clear coals," because, in such a case, the extreme end of the chisel, from its excessive exposure to the heat and from its being the thinnest part, receives the heat, and tempers, more quickly than the metal behind it; hence, when the extreme end is at the proper degree of temper, the metal behind it is too hard and breaks, when used, in consequence. A better method of imparting additional heat is to take a piece of hot coal from the fire and hold the chisel over it about an inch from its end.

New York city. JOSHUA ROSE.

To the Editor of the Scientific American:

In my communication on "Hardening and Tempering Tools," published in your issue of August 1, I notice three typographical errors; and as two of them are quite serious ones, particularly the last, I shall ask you to correct the two last mentioned below in your next.

1st column, 18th line from bottom, for "takes" read *taken*. This is not very important. 1st column, 22d line from bottom, for "temperature" read *temper*. 2d column, 29th line from top, for "strongly" read *slowly*. This last is almost exactly the reverse of what is intended.

63 Cannon street, New York city. JOHN T. HAWKINS.

Treatment of Erysipelas.

To the Editor of the Scientific American:

I have just been reading an article on erysipelas (page 40, current volume), and it induces me to give you a remedy. It is powdered charcoal mixed with thick sour milk, outwardly applied with a swab as often as the itching occurs.

One of my children was attacked with erysipelas at noon. In an hour his eyes were entirely closed, and his face was frightful to be seen. I made constant application of the above, and at 3 P.M. the swelling had subsided, leaving his face full of wrinkles. The disease then passed to his neck and thence downward till it traversed every inch of him, getting to his feet at midnight, twelve hours after its first appearance. He then slept quietly till morning, when he appeared languid; a dose of senna was given, and the next day he appeared as well as usual.

I will add that erysipelas is hereditary in my husband and in myself. I have used this treatment many times, and always with the best success. ITALIA.

The Relations of Planetary Motions.

To the Editor of the Scientific American:

In your issue of July 11, you refer to some recent researches of mine in regard to the asteroids. The second of the propositions quoted, permit me to say, is an error committed by myself in transcribing from my note book. The following instances of remarkable relations between the mean motions of certain asteroids are especially interesting:

Let $n^{(11)}$, $n^{(50)}$, etc., represent the mean motions of Parthenope, Pales, etc., the numerals in parentheses denoting the minor planets in their order of discovery; and n^{V}, n^{VI} represent the mean motions of Jupiter and Saturn. Let also $L^{(11)}$, $L^{(50)}$, etc., represent the mean longitude at a given epoch. Then $n^{(50)}-3n^{(78)}+2n^{(11)}=0$ . . . . . . (1)

$$L^{(50)}-3L^{(78)}+2L^{(11)}=180° \quad . . . . . (2).$$

The exact similarity of these equations to those found by Laplace, connecting the motions of Jupiter's first three satellites, is at once apparent. The origin of the relation, whether we accept the nebular hypothesis or Proctor's theory of planetary accretion, may be accounted for as in Note VII., Vol. II., of Laplace's "System of the World."

But were the relations expressed by (1) and (2) rendered rigorously exact by the mutual attraction of Pales, Diana, and Parthenope? This, to myself, seems wholly improbable. The required explanation is to be looked for in the perturbing influence of Jupiter and Saturn. A comparison of mean motions gives the following equations:

$$2n^{(11)}-9n^{V}+7n^{VI}=0 \quad . . . . . . (3)$$
$$n^{(50)}-3n^{V}+2n^{VI}=0 \quad . . . . . . (4)$$
$$n^{(78)}-4n^{V}+3n^{VI}=0 \quad . . . . . . (5).$$

Eliminating n^{V} and n^{VI} from (3), (4), and (5), we obtain equation (1). The mean motions are taken from the *Annuaire* for 1874. DANIEL KIRKWOOD.

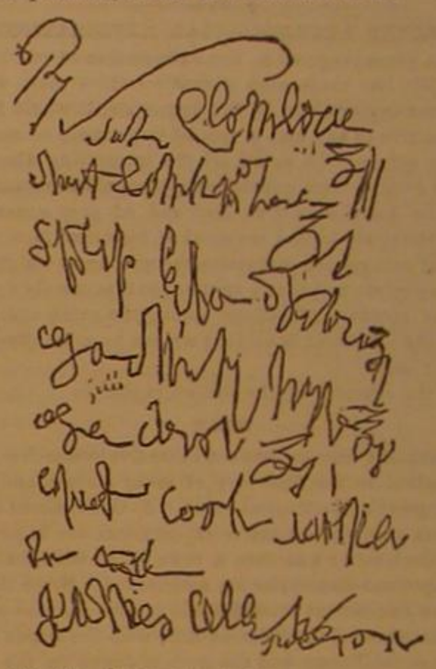
Bloomington, Ind.

A Queer Looking Prescription.

To the Editor of the Scientific American:

Your article in No. 4 of the present volume, entitled as above, is both sensible and just; and the facsimile of the prescription referred to is indeed a queer-looking thing, but it can be matched by those of a Brooklyn M. D., as a number of druggists can testify.

Thinking that some of your readers would like to know what they were taking, should they conclude to have this recipe compounded, I send an elucidation of it:



"R. Tinct. colombæ, 3 drams.
Mistura camphoræ, 1 oz.
Spir. eth. nitr., 1 dram.
Aqu. menth. pip., 1 oz.
Aqua dist., 2 drams.
Capiat cochleare amplum,
ter in die.

JAMES CLARK."

In plain English, it is a mixture of tincture colomba, camphor water, spirit of niter, peppermint water, and distilled water, with directions to take a tablespoonful three times a day. J. M. HUGHES.

187 De Kalb avenue, Brooklyn, N. Y.

Petrifaction vs. Putrefaction.

To the Editor of the Scientific American:

In *The Columbian Register*, of New Haven, June 20, it was stated that the body of Alanson Dyer, who died at Rutland, Vt., in March, 1872, of congestion of the lungs, was recently disinterred and found to be petrified. At death the weight was 145 pounds, and when disinterred, 1,200 pounds, the gain being 700 per cent.

If the body retained the same proportions, it seems to me that the claims of the skin worm are rejected, and that petrifaction takes full sway as soon as the sexton has finished his work.

This bone has undoubtedly been often picked by the savans, but have any of them ever broken the bone, examined the marrow, and found the reasons why? If they have, and will answer the following questions, I should like very much to see their answers in the columns of the best scientific paper in the world: 1. What prevents putrefaction and decay? 2. What elements are combined to produce petrifaction? 3. From what source or sources comes this tremendous accumulation of weight?

Stratford, Conn. TRUMAN HOTCHKISS.

REMARKS BY THE EDITOR.—Putrefaction is not a process of oxidation, but the presence of oxygen is necessary to its commencement. Every case of putrefaction begins with decay; and if the decay or its cause, the absorption of oxygen, be prevented, no putrefaction occurs. The most putrescible substances are preserved indefinitely by enclosure in metallic cases from which the air has been completely removed and excluded. Chemical matter recently liberated is ready to form new chemical compounds. This burial undoubtedly took place in very damp ground. This earth was charged with water containing a great amount of lime, silica, alumina, etc., in solution. The water being taken up by the body during putrefaction, the mineral ingredients accumulated in it and formed a hard, stone-like mass.

EVERY day sends to the grave a number of obscure men, who have only remained in obscurity because their timidity has prevented them from making a first effort; and who, if they could have been induced to begin, would, in all probability, have gone great lengths in fame.—*Sydney Smith.*

MEDICAL NOTES.

Dyspepsia and the Use of Pepsin.

The views of Dr. Schacht concerning digestion have been confirmed by Professor Leube (the inventor of Leube's meat solution) of Jena in a lecture just published on stomach diseases. He says: 1. No condition of the stomach has yet been observed in which pepsin is altogether absent. 2. The cause of indigestion is generally the absence of sufficient acid. 3. The action of pepsin in a solution of albumen resembles that of a ferment, and it will continue so to act without end, merely by the addition of more acid. 4. Alcoholic solutions, especially wine, on account of the tannin it contains, should be avoided as vehicles for pepsin. Finally, he recommends, in case of indigestion, a solution of chopped meat with water, adding a small proportion of pure muriatic acid, and some thickening. He finds such a solution very nourishing, and reports excellent results. These views and experiments are not novel, but exhibit the old doctrine as to digestion, and it appears to be the sound one. The secretion of the pancreas is now thought necessary to the digestion of fatty substances; and where these are used to any extent—as in cod liver oil—it would be best to take the new medicine pancreatin, which acts best with an alkali instead of an acid, or to use a little of the solution of the pancreas of freshly killed animals. We conclude with the recommendation that some good medicine-manufacturing firm should prepare a genuinely pure muriatic acid for the use of dyspeptics. It would meet with a large sale, and should be sold in a moderately diluted state.

Benzoic Acid for Ammoniacal Urine.

Professor Gosselin and M. A. Robin recently read a paper before the French Academy of Sciences, in which they detailed experiments upon rabbits and guinea pigs to show how far ammoniacal urine is poisonous when entering the system by a wounded surface. Subcutaneous injections of carbonate of ammonia solution caused death, preceded by convulsive symptoms; but a solution of ammonia in urine or human ammoniacal urine caused the animals to die with febrile symptoms similar to those of urinary fever, without any nervous effects. Normal human urine so injected produced no injury. The conclusion is that ammoniacal urine is poisonous to animals, and probably to man if absorbed into the circulation. It thus becomes important to correct this state of the urine, not only because it favors the formation of phosphatic calculi, but because, in case of injury to the urinary passages, there is also danger of urinary poisoning. Benzoic acid has been shown by Ure and Keller to be rapidly transformed into hippuric acid, which is harmless. The authors above named refer to three cases in which this acid was used, two of the patients having calculi. In one case, the ammoniacal urine was rendered neutral by one and a half to two grammes of benzoic acid daily, given in water or mucilage. The urine soon became acid, and the patient did well. In another case, where the urine became ammoniacal after a third lithotrity *séance*, two grammes of the acid daily for a week restored the urine to a proper state. The third patient, a subject of stricture, had urine containing from four to six grammes of ammonia per litre. Twenty days' employment of the acid rendered the urine harmless to animals. The authors conclude that benzoic and perhaps other vegetable acids should be prescribed for patients suffering from ammoniaco-purulent cystitis, and especially for those who have to undergo operations on the urinary organs.

Vomiting—Sea Sickness.

The well known physician Brétonneau strongly recommended belladonna in the frequent vomiting of pregnancy. He used frictions of the extract diluted with water, rubbed into the hypogastrium for several minutes two or three times a day. This treatment relieved in many instances when all other means failed. For over 25 years Dr. Guéneau de Mussy has extended Brétonneau's treatment to all descriptions of vomiting; but he has found that a plaster is the best way of use, allowing continuous application. He takes diachylon plaster and theriac plaster, each two parts, extract of belladonna one part, the plaster being 12 centimeters in diameter. It may be applied to the epigastrium for 12 or 15 days without being renewed; and out of the thousands which he has employed, he met with only one case in which an idiosyncrasy caused any trouble. In a great number of cases he either stopped or greatly mitigated the vomiting, from whatever cause. Dr. Mussy has tried this remedy in four cases of sea sickness with good results, and has great hopes of the benefits to be derived from such treatment in that painful affection. His plan certainly looks promising in a disorder which seems to resist all other remedies.

While on the subject of vomiting, let us note the method of Dr. Woilliez, who recommends swabbing the pharynx before eating with a concentrated solution of bromide of potassium: this in cases of consumptives and others who vomit their food in paroxysms of cough. The patient is warned not to cough for a few minutes after the application. The same treatment is said to be successful in the vomiting of pregnancy.

Poisoning by Shot.

It is often the case that bottles to be used for wine, cider, and medicines are cleaned by shaking shot and water in the bottle. It has been found that a crust of carbonate of lead adheres to the sides of the bottle where there is much shaking, and especially where the shot and water are left to stand in the bottle. To make the matter worse, arsenic is always present in shot in a poisonous quantity. If people will clean bottles in this way, they should pour out the shot soon, and rinse with vinegar or nitric acid solution.

Hay Fever.

Dr. T. C. Hoover, of Bellaire, Ohio, in the *American Journal of the Medical Sciences*, relates his successful treatment of this curious disease, so baffling to the profession. The first patient was a lady who had fits of sneezing which lasted several hours. She also had a slight cough, and suffered much at times from difficulty of breathing. The doctor made the following solution: Chlorate of potash 20 grains, sulphate of morphia 4 grains, pure water 2 fluid ounces; mix. He used this solution by means of an atomizer. Relief was instantaneous. Continued application kept the patient well for five days. Then the sneezing returned, and the Doctor ordered the use of the following solution through the same instrument: Bromide of potassium one drachm, water two fluid ounces. This also stopped the paroxysms. She was ordered to use these preparations alternately, from 6 to 10 inhalations three times daily, or about one fourth of a drachm. She continued to improve till she discarded the spray, being entirely well. Several other cases were similarly cured, some in a short time.

Chloral for Headache.

Dr. E. M. Nolan, in the Atlanta *Medical and Surgical Journal*, describes the following cure of a very painful headache in a lady. He dissolved 15 or 20 grains of chloral in very little water, and with the tip of a finger rubbed it upon one of her temples until she could sensibly feel the burning, and the skin was reddened. The part rubbed was no larger than a silver dollar. The pain was entirely relieved and remained so. The Doctor has also used this method of applying chloral for headache with success in many other cases, sometimes rubbing on one temple, and sometimes on both. No permanent sign is left.

Etherole of Sulphur.

This is highly recommended as a remedy for Asiatic cholera. It is made by adding one part of washed sublimed sulphur to ether, 65° Baumé, specific gravity, 0·722. The flask may be held a few seconds in warm water to increase the dissolving power of the ether. Well rectified ether dissolves one eightieth of its weight of sulphur. It is given as follows: At the immediate time for exhibition, a glass half full of sugared water has a small piece of ice added, and 25 or 30 drops of etherole are poured in, then the tumbler is filled with seltzer or soda water; the patient drinks this by small mouthfuls. Before adding the etherole, shake the flask well, but let the heavier particles of sulphur settle.—*C. C. Boutigny.*

Lockjaw and Quinia.

Several cases of tetanus have followed hypodermic injections of sulphate of quinia, which will render medical men more careful in thus employing it. M. Bourdon says the following preparation is not irritating, and may be injected without danger: By weight, sulphate of quinia 2 parts, tartaric acid 1 part, water 40 parts; mix.

Iodide of Potassium Improved.

Sir James Paget first called attention to the fact that carbonate of ammonia greatly increases the therapeutic action of iodide of potassium. Mr. J. P. McSweeny states, in the British *Medical Journal*, that he has tried this combination extensively in syphilis with the best results, and finds that 5 grains of iodide combined with 3 grains of carbonate are equal to 8 grains of the potassium salt as ordinarily used.

Prevention of Mistakes in Giving or Using Medicines.

The many deaths that occur through the lack of a proper system in the apothecary business demand a speedy reform. There will be ignorant and careless young men in that as in every kind of employment, and also plenty of ignorant or careless people among the sick or their friends, who, without some better warning than they have at present, will mistake one drug for another. They have a stricter system as to this matter in Germany, and one still more strict in Sweden. In those countries, the poisonous medicines are locked up by themselves in a special closet. We cannot see why this should not be done here. If morphia or any two or three dangerous substances are so much used that they must be handy, let each have its own place and package, so as not to be mistaken for anything else. Some have suggested triangular vials for poisons, so that nurses and patients, as well as clerks, may know the danger by the touch; and the suggestion is a good one. But best of all, we think, is the plan of having every proprietor or chief clerk of a drug store make out a complete list of poisons that he sells, and place it in a conspicuous position on his prescription counter, and compel every clerk who waits on customers to learn the list by heart. The list must of course include the dose within which safety lies. If druggists performed their duties properly, there would be no need for protective legislation.

An Optical Delusion.

The following is an optical delusion which is none the less interesting for being very easily explained.

Let a person, standing before a looking glass, look attentively at the reflection of the pupil of one of his eyes, and then at that of the other—let him look at different parts of the eye, and from one eye to the other, first at one and then at the other. Knowing that thus, in changing the direction of his gaze, his eyes must move about in their sockets, he will expect to see that they do so in the glass. As a fact, they will appear perfectly still.

If he looks at the eyes of another person trying the experiment, the peculiar fixedness of his own will be still more striking, when he looks at them again.

I will not spoil the riddle by giving the answer at the end. —*Nature.*—*J. H.*

Compressed Air as a Motor.

The use of compressed air as a motive power is destined to receive an enormous development as its capabilities and advantages become better understood. What countless wealth is thrown away in the unheeded fall of our rivers and the flow and the ebb of the ocean tides, simply because few consider that the power thus wasted could be conveyed to almost any distance, at very trifling cost, by means of compressed air, or rope transmission! As long ago as 1837, a series of experiments were made in Coscia, by order of the Italian government, to determine the resistance of tubes to the flow of air through them; it was found that:

1. The resistance is directly as the length of the tube.
2. It is directly as the square of the velocity of the flow.
3. It is inversely as the diameter of the tube.

And as the volume is directly as the square of the diameter when the velocity is given, it follows that, under a given pressure and velocity, the relative resistance, that is to say, the resistance divided by the power, will vary inversely as the cube of the diameter.

There is, consequently, a great advantage in making the tubes and openings through which the air has to pass as large as possible. Experience has shown that tubes can be made so as to allow of very little leakage. At the Mont Cenis tunnel, no leak was ever found in tubes nearly a mile and a half in length, nor did the expansions and contractions of the tubes, due to changes of temperature, appear to affect sensibly the firmness of the joints. On one occasion it became necessary to leave the receivers of compressed air for twenty-four days; the loss in all that time did not exceed 5-1000 part of the daily supply.

It is therefore possible to transmit power by compressed air to very great distances, with scarcely appreciable loss in its transmission. There is, however, a much more important loss than that just mentioned. When air or any other elastic fluid is compressed, there is generated an amount of heat which is the exact equivalent of the force employed in the compression. This heat, in practice, is radiated from the compressor, the reservoir, and the tubes, and is lost; when the compressed air has attained the temperature it possessed before compression, it has lost in cooling exactly as much power as was expended in compressing it; but since the air still remains under a considerable pressure, if allowed to expand its temperature falls below that of the atmosphere, and in so doing it develops work; but inasmuch as the temperature in expansion will not be depressed nearly as much as it was increased in compression, the loss of work will always be considerable, increasing with the pressure to which the air has been subjected; the loss is moreover susceptible of exact calculation. Taking the case of the Mont Cenis tunnel, where a pressure of six atmospheres was attained, the air, instead of being compressed to one sixth of its volume, as would have been the case were no heat generated, actually entered the reservoir when its volume had been reduced but 3·6 times, and, theoretically, the power available would have been but 60 per cent of that expended; practically it was somewhat less than this. If the air were compressed to eight atmospheres, there would remain available but 55 per cent; and for about eleven atmospheres of compression, but 50 per cent of the compressing power could be obtained. If the compression is less, say four atmospheres, 67 per cent would be secured; for three atmospheres, 73 per cent would, according to theory, be available, and so forth; hence we see that where the lower pressures will perform the work to be done, and will not necessitate the use of extra large and costly engines to utilize the power, there is an evident advantage in not using a very high degree of compression.

To this loss of power, practically inherent in compressed air, we must add the loss due to its transmission through tubes; this, where the pressure is not excessive, and where the velocity is reduced by the use of large tubes, is a much smaller item of loss than the other; it would not be over one third or one fourth of it. In carrying the air through, say 10 to 15 miles of pipe, it would not exceed, say, 5 to 8 per cent.

As we have stated, it is impossible, under ordinary circumstances, to utilize more than, say, fifty to sixty per cent of the power expended in compressing the air; yet, from the fact that compressed air enables us to carry, at a small cost, the power wasted in waterfalls to points where it can be used with advantage, the loss of 50 per cent in the motive power is a small matter, and the actual power obtained would cost in general much less than if generated with our most economical steam engines.

The use of compressed air for driving underground machinery, whether it be hoisting engines, rock drills, coal cutters, or other machines, is peculiarly advantageous, for it provides a valuable addition to the ventilation of the mine, and reduces the temperature, which in deep mines is so excessive. It can be carried to much greater distance than steam, which, moreover, is very destructive to mine timber.—*Engineering and Mining Journal.*

That is so.

American manufacturers have, from the first, been only placed at a disadvantage with England in one particular, and that is in the comparative dearness of labor. To overcome this difficulty has been the task of inventive ingenuity and enterprise in the States for many years past, and the result is such a substitution of machinery for hand labor, and such an application of scientific methods to economize production, as can be matched probably by no other country in the world.—*Colliery Guardian.*

BONE CHARCOAL.—Compact bones, such as marrow bones, give more charcoal, and of better quality, and yield less ammonia, oil, and gas, while the converse holds with light bones.

ORD'S CUT-OFF GOVERNOR.

This invention is a graduated steam cut-off, conveniently adapted to most engines in general use, and designed to take the place of the common governor. In its construction the inventor claims that the valuable advantages of sensitiveness, isochronism, strength of action, durability, simplicity, and cheapness, are all included. How such a result is obtained we shall explain as we proceed, reference being first necessary to the details of the device which are represented in the accompanying illustrations.

In Fig. 1, the complete apparatus is shown in perspective. Motion is communicated to it by the wheel, A, which, it will be observed, is provided with a corrugated periphery. Into the indentations of the latter fit the links of a chain, which is employed to transmit the power, in place of the ordinary belt. In Fig. 2 is represented one of these links, and also a section of the wheel and chain. This device, we are informed, secures a smooth, noiseless, and positive action. The chain is also said to be cheap, readily applied, and durable.

At the inner extremity of the shaft of wheel, A, is a bevel gear, by means of which motion of the same speed is transmitted to an upright shaft, B. Upon the latter is a pinion, C, which, being to the wheel, D, as 1 to 4, causes said wheel, and consequently the valve stem, E, to rotate once to every eight strokes of the piston.

Also, on shaft, B, is a wheel, F, which, by the gear shown, rotates the balls. Below the inner ends of the arms of the latter is a fixed collar, G, on the valve stem, E, and above is a loose collar, H, into grooves in which the extremities of the arms fall, turning the same upon the stem with them during their revolution. It will be plain that, as the balls fly outward, the arm ends will press down on the collar, H, and consequently push the valve stem also downwards.

I is a lever and weight, suitably pivoted to the frame and provided at the inner end with a gear segment, which works in a rack upon a sleeve sliding upon the valve stem. By moving this weight, speed can be increased or lessened, or the device may be used to open the valve in starting the engine.

The valve arrangements are shown in sectional detail in Fig. 3. There is a movable valve, J, secured to the extremity of the valve stem, and a fixed valve, K, in which the former fits, within the steam chamber. In each cylinder are four horizontal rows of eight triangular orifices each, making thirty-two orifices in all, considered jointly, which open and close at every stroke of the piston. It will be seen by reference to the diagram, Fig. 4, that by thus providing a valve with steam port openings, so arranged in connection with a movement that will give the necessary aperture to secure full boiler pressure at the beginning of each stroke of the engine, and which will close at any part of the stroke, according to the power required, that the supply of steam is regulated in an efficient and economical manner. Referring to the steam port, K, which is represented as moving to the right, the upper corner overlapping the lower corner of the stationary port, and touching the horizontal line denoting three eighths, should the governor carry the valve in that line, it will intersect the perpendicular line corresponding to three eighths in the cylinder, which is the point where steam

Fig. 3

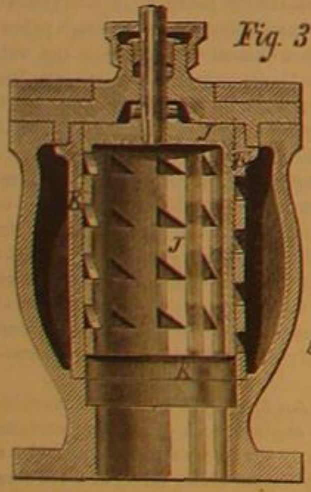
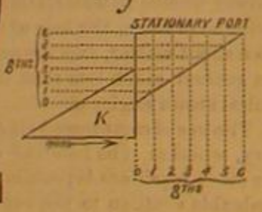


Fig. 4



is cut off. Should, however, the engine be more heavily loaded, the balls will drop and give a correspondingly increased opening, cutting off at a later period of the stroke. The increased pressure on the end of the valve stem, together with the changed position of the weight, secures the same rate of speed as when running light.

The valve has a limited up and down motion, and, when at rest, the moving cylinder takes against the steam chamber cover. The openings in the two portions of the valve do not then correspond, so that steam is thus shut off, and a means of safety provided, should anything occur to prevent the proper action of the governor. Similarly, if the movable valve should become disconnected, steam would be again shut off, as the valve would drop to a seat in the bottom of the chamber, and the orifices would not correspond. Steam from the boiler being around the exterior of the valve, the latter is perfectly balanced.

The inventor directs especial attention to the fact that steam is admitted to the cylinder at the point where the main valve opens to take steam. Consequently the degree of pressure acting on the piston valve is also applied to the end of the valve stem. This has a tendency to force the latter up and enlarge the opening, holding the engine to its speed, although the balls are not carried as high as when running light.

The parts of the valve are made of a fine grade of iron and fit perfectly true. No difficulty, we are informed, has been encountered through expansion. The inventor submits a number of laudatory testimonials from well known firms in Cleveland, Ohio, with reference to the successful working of the device, which also obtained a first premium at the New Orleans Fair of 1873. Patented May 6, 1873. For further particulars regarding rights, etc., address the inventor, Mr. William Ord, Brooklyn, Ohio.

Fig. 1

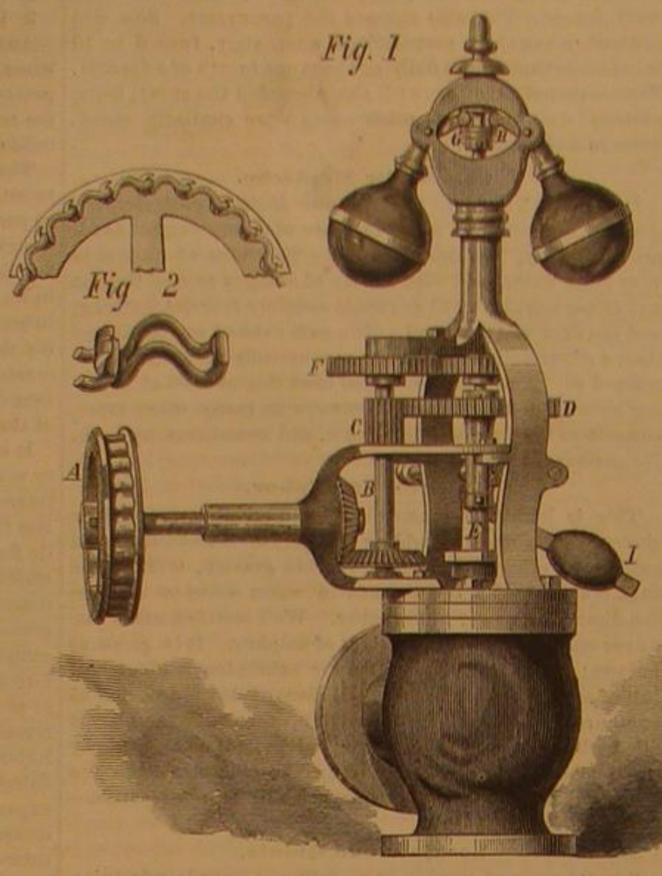


Fig. 2

ORD'S CUT-OFF GOVERNOR.

Oil Fired by Lightning.

An extensive conflagration, in which 60,000 barrels of oil were destroyed, recently took place at the Erie Railway oil depot, Weehawken, N. J., opposite this city. The origin of the fire was due to lightning, an eye witness stating that the flash appeared to descend into the oil tanks, from which, before the reverberations of the thunder had ceased, flames shot up hundreds of feet into the air. Tank after tank burst, adding their contents to the already burning streams, from which a tremendous blaze and dense clouds of smoke poured almost uninterruptedly for over forty-eight hours. Several buildings in the yard where the material was stored were destroyed, the total losses aggregating an estimated sum of $250,000. The tanks were of iron. The ignition is supposed to be due to the contact of the electricity with the light, inflammable gases which are given off by the oil and rise in the air above the oil tanks. It has been suggested that high masts, with lightning rods upon them, should be erected in such positions, in the vicinity of oil tanks, as to protect them from such disasters as the present.

Screw Propellers.

Mr. J. E. Wilson, of Brazoria, Texas, writes to say that Mr. Griffiths' screw propeller, inserted in a channel within the bow or stern of the vessel, appears to be similar to his invention of a spiral screw placed between two keels of a ship so constructed. Mr. Wilson applied for a patent, but the application was rejected on the ground that a patent had already been issued for a screw to be worked in a channel running the entire length of the vessel. In the latter, a cog wheel was on the screw shaft and in the water, and it would need a larger cog wheel,also in the water. "The most ordinary mechanical intellect," says Mr. Wilson, "would unhesitatingly and truthfully decide that a spiral screw arranged after the manner of my invention could be driven with greater speed and with half the power that it would take to drive one with cog wheels thus submerged, besides avoiding the liability of the latter to be broken or clogged by drift." Mr. Wilson is making further experiments, and will communicate the results thereof.

Metal Ornamentation.

Mr. W. C. Aitken, in a paper recently read before the British Society of Arts, gives the following interesting details regarding some ornamental processes connected with metallic industries: Enamel is simply glass, composed of lead and sand. When transparent, oxide of tin renders the transparent glass opaque; mixed with oxide of gold, it changes the clear or opaque glass into a purple; red is produced by the addition of sulphate of iron; oxide of copper produces green, violet is produced by manganese, blue by oxide of cobalt.

The enamel is poured from the crucible in which it is melted into flat cakes; these cakes are broken up and reduced to a fine granular condition in a mortar, or to an impalpable powder by grinding with a muller on a slab; it is applied on metal which will stand a red heat without changing its form or fusing. Gold, silver, copper, brass, or iron can be enameled. There is no true enamel which has not been fused at a red heat. The modes of application vary; applied on a flat plate or plaque, it is worked with a brush. Of this class are the Limoges enamels. Other methods of application consist in incising or cutting small troughs in the surface of the metallic object intended to be enameled. In these the enamel is placed or applied; this method of application is called the *champlevé*. Another method of reproducing is by means of electro-deposition.

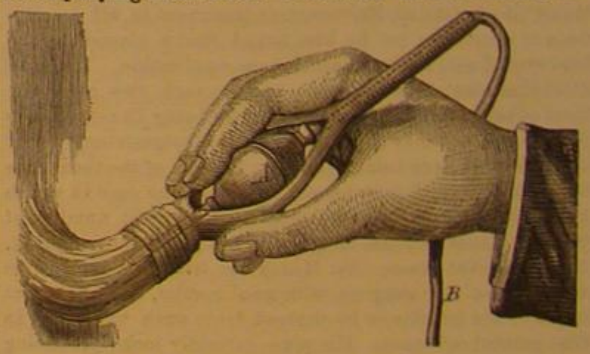
The next variety of enamels is the partitioned or *cloisonné*; in this variety the cells are formed by bending a flat narrow strip of metal in such a manner as to form the retaining walls. These, after being prepared, are arranged on the object and soldered to it. The various colors of enamel are then applied in the cells, and fired by subjecting the object to be enameled to the heat of a muffle. Repeated applications of enamel with repeated firings are required to fill the cells. The superfluous enamel is finally removed by grinding it away with pumicestone, and smoothing it with stones of different degrees of fineness. Apart from the labor of forming and placing the minute cells, there are difficulties attending the firing operation. Should one part of the muffle be too hot, and the solder become melted which holds the cells, the more the enamel is in a fluid condition, the colors mingle, and a confluent mixture of colors is the result.

Niello may be called a metallic enamel composed of silver, copper, lead, and sulphur; in its preparation the most difficult metal to fuse is first melted, the next fusible added, and so on; the melted metals in the crucible are stirred with stick charcoal to insure homogeneity; the result is a black compound, which, poured from the crucible, is beaten into strips. The design to which it is applied is engraved on the metal object to be decorated, the lines being more pronounced and stronger than on an ordinary copper plate for printing from. The mode of applying the niello is by heating the object and rubbing the niello into the lines; when skillfully applied, the niello adheres firmly; excess of it is removed by files, the surface is then stoned, and finally polished. Niello is undoubtedly by far the best means for decorating in a quiet, rich manner surfaces exposed to friction or wear; it is tougher than enamel.

Damascening, or inlaying one metal in another, is an art which has been practiced for a very long period, introduced chiefly on armor and caskets, etc. There are two methods of practicing the process. By one method the surface of the metal to be damascened is raised up into a file-like surface; the artist, by his skill, causes to adhere, to the roughened surface, threads of gold or silver, which are applied and burnished down. Broad surfaces are produced by working the threads or wires side by side. Heat is applied; the degree necessary requires great judgment. In the other the surface to be damascened is incised or cut into, the incision at the bottom being expanded; into this channel gold or silver is introduced and beaten down.

IMPROVED PAINT BRUSH.

A convenient device for painters' use, recently patented through the Scientific American Patent Agency, by Mr. Amasa S. Thompson, of Little Falls, Minn., is represented in the accompanying illustration. It consists in constructing the



handle of an ordinary brush to contain an india rubber syringe bulb, A. One end of the latter communicates with a rubber tube, B, which, connecting with the upper and hollow portion of the handle, dips into the paint. The other extremity of the syringe carries a short pipe, which terminates, as represented in the dotted lines, among the bristles of the brush. Through the working of suitable valves within, the bulb, on being compressed, draws up and discharges the paint into the brush, so that the latter is kept constantly supplied.

GEORGE M. MANN, C. E., of Brooklyn, N. Y., was recently killed by an accident on the Canal Railway, near New Haven, Conn. He was a young man of brilliant promise in the profession. The recent surveys of the harbor of New Haven were conducted by him, also the West River Canal and other engineering works. He was also assistant engineer of the new Quinnipiac bridge.

SCIONS and cuttings of fruit trees have been worked with success nine months after being severed from the parent stock.

THE MESSRS. STEVENS OF HOBOKEN, AND THEIR IRONCLADS.

One of the greatest engineers living at the commencement of the present century was Colonel John Stevens, of Hoboken, N. J. He was born in this city in 1749, but early became a resident of New Jersey, of which State he was a prominent and public-spirited citizen. In 1787, while driving on the bank of the Delaware, he saw the steamboat of John Fitch on one of its trial trips; and its partial success induced him to attempt the solution of the same problem, and he was assisted, until 1801-2, by Chancellor Livingston, who then went to France and there met Fulton. In 1789, Stevens asked of the Legislature of New York an exclusive right to steam navigation of the Hudson, stating that he had perfected the plans of his vessel, that they were entirely new, and that they did not interfere with any then existing inventions. In 1803 he built, and in 1804 actually had in use, a steamboat embodying ideas a half century or more ahead of his time. Steam was furnished under 50 lbs. pressure by what we to-day call a "safety" tubular or sectional boiler. The engine was quite similar to that built many years later for the French steamer *Etoile*. The propelling apparatus consisted of a pair of twin screws. His boiler was forty years ahead of his age; the engine was copied thirty years later; the screw came into use only when Ericsson and his rivals brought it forward, thirty years after Stevens, and twin screws are hardly yet recognized as standard practice under proper conditions. The machinery of this vessel is still preserved in good condition at the Stevens Institute of Technology. An engraving of it has been published in the SCIENTIFIC AMERICAN and in the SCIENCE RECORD. The British patent on the boiler is still to be seen at the Stevens Institute.

The success of this little craft was such that he built another in 1806, 50 feet long, 12 feet wide, and 7 feet deep, with a single screw. What remains of this screw—the hub and one blade—is to be seen at the Stevens Institute of Technology. The success of this latter and larger boat encouraged him to construct quite a large steamboat, the Phœnix, which was brought out and which very closely contested the claim of Fulton for the monopoly of steam navigation on the Hudson River. Beaten by, it is stated, a quarter of an hour in time of completion and trial, Stevens sent his boat, in June, 1808, in charge of his son, Robert L. Stevens, around into the Delaware, and the latter thus had the honor of being the first to make a sea voyage in a steam vessel. Stevens' boats were successful on the Delaware and on the Connecticut for many years, and, after the expiration of Fulton's monopoly, became the most successful on the Hudson.

In 1812, Colonel John Stevens proposed to construct an ironclad floating battery, which was identical in all its leading features with the circular battery, proposed sixty years later by the late John Elder, of Glasgow, and which has recently been illustrated in foreign engineering periodicals. This odd craft was intended for harbor defence. It was to be a saucer-shaped vessel with a bomb-proof deck, and armed with a number of the heaviest guns. It was anchored by a swivel at its center, about which it was to be rapidly turned by a set of submerged screws driven by a steam engine. As each gun during its revolution came into the line of fire, it was discharged and was reloaded before the completion of another revolution brought it into line again. The plan evidently resembled somewhat the "monitor" in principle. This was probably the first ironclad of which plans were ever prepared. In 1812 Colonel Stevens proposed and urged upon the New York State Legislature the construction of a railroad to connect the waters of the Hudson with those of the great lakes, and insisted that economy of first cost, and of maintenance, as well as convenience and speed of transportation, dictated the adoption of his plan rather than the construction of the canal proposed by De Witt Clinton, Gouverneur Morris, and other distinguished men of that time. He published a pamphlet in May, 1812, embodying his views and arguments. He describes precisely

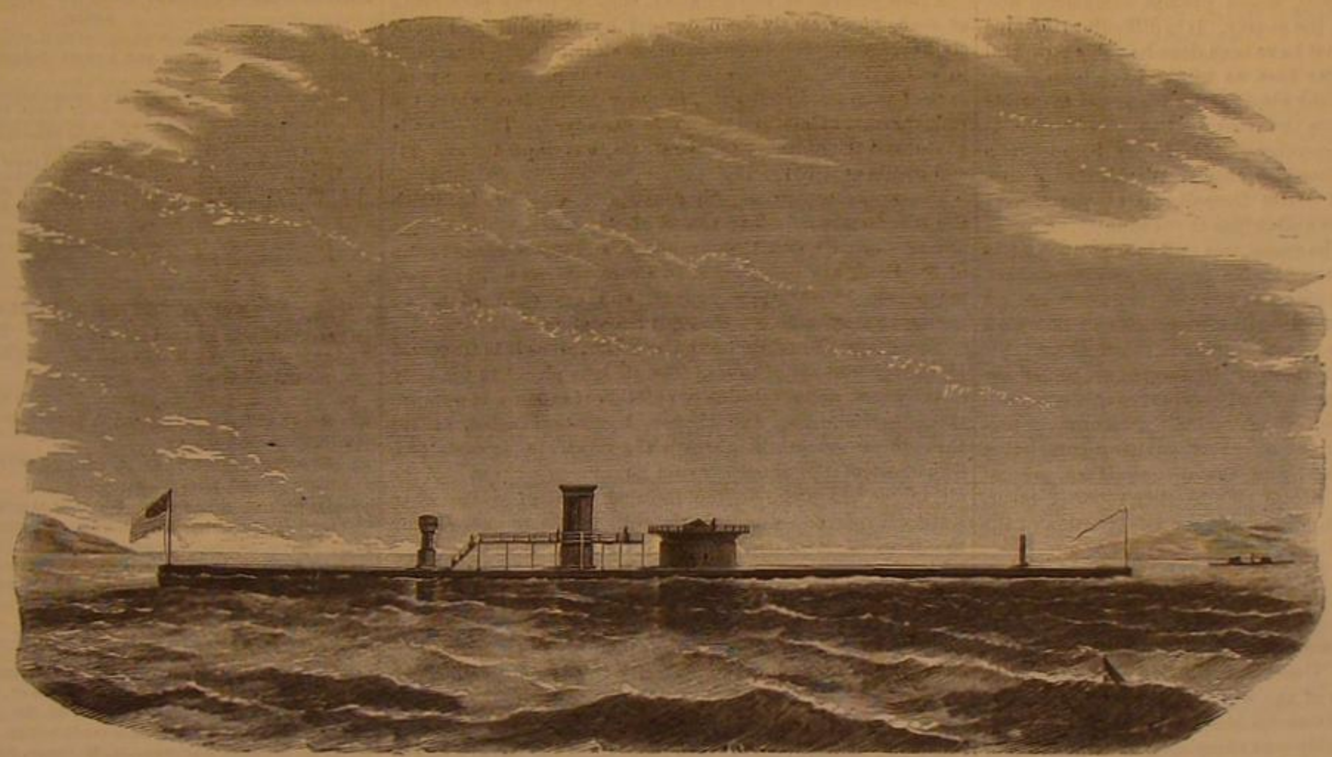
EDWIN A. STEVENS.

the modern railroad and even the non-condensing locomotive engine, with wheels fast on the axle, with flanges and every modern detail. He states, with wonderfully prophetic judgment, that the probable practical average speed may be expected to be twenty or thirty miles per hour, and that he can "see nothing to hinder a steam carriage moving on these ways with a velocity of one hundred miles an hour." And all this was before the British engineer, George Stephenson, had begun even the rude Killingworth machine which drew its little train with so much velocity.

A little later this great man had an experimental locomotive in operation on his own premises, and subsequently, with his sons, he was the prime agent in setting in operation, in 1831, the first New Jersey railroads. In all of his engineering operations, Colonel Stevens was aided by his sons, who inherited much of their father's peculiar talent and engineering skill, and who had also the necessary energy and enterprise to carry out their great schemes. Robert L. Stevens seems to have been the most persistent worker in the field in which his father had first labored. In 1814 he started the Philadelphia, and attained the then wonderful speed of thirteen and a half miles an hour. This was the first boat of the first day line to Albany. He subsequently added a false bow to this vessel and, by thus fining her lines, increased her speed considerably. Fulton introduced steam ferry boats, and, in 1822, Robert L. Stevens built the Hoboken, the first ferryboat of the now standard form in the United States.

The locomotives used on the Camden and Amboy Railroad were built from the plans of R. L. Stevens, either at his own shops in Hoboken or in England, where among his correspondents was Robert Stephenson. An autograph letter from the latter to the former, dated 1833, descriptive of his "large" locomotive, which weighed nine tuns and could draw a hundred tuns at the velocity of "sixteen or eighteen miles an hour on a level," is preserved in the "Relic Corner" of Professor Thurston's lecture room at the Stevens Institute of Technology.

This ingenious man invented the now almost universally used wrought iron T rail; and when the great Dowlais Works of South Wales were unable to find a man to roll the new form, Mr. Stevens himself went abroad and accomplished the self-set task successfully. He had already made many valuable improvements and inventions. In 1808 he had induced his father to introduce hollow water lines in the Phoenix; and in the succeeding year he invented the feathering paddle wheel, now so generally used in Great Britain, and the A frame and guard beam which is now always used on our own side wheel steamers. In 1813 or 1814, during the war with Great Britain, he invented elongated shot and shell to be fired from smooth bored guns, and the shell were fitted with a percussion fuse so arranged that only the tremendous shock of striking the object fired at would explode them, and were thus safe against explosion by any percussion produced by ordinary accidents. Being hermetically sealed, they could not deteriorate with age.

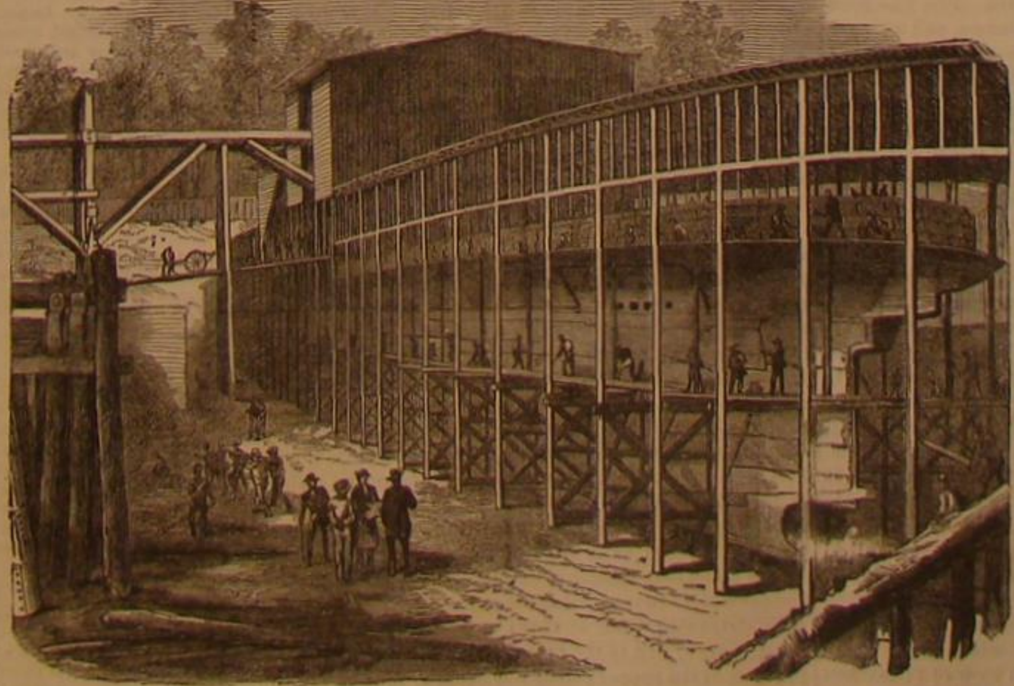


THE STEVENS IRONCLAD BATTERY.

In the Philadelphia, in 1813, he used steam expansively; in 1818 he used coal in the cupola furnace, and a little later in the steam boilers of the Passaic. He invented the now universally known American skeleton walking beam, with its cast iron center and forged strap, and used it on the Hoboken in 1822. He placed the boilers of the Trenton on the guards, in 1824, a custom now universal here; he used blowers, for the first time, on the North America in 1827; and, in the same vessel, he applied the hog frame to stiffen the long, slender hull. He brought out the New Philadelphia, in 1832, with spring bearings under the shafts, which, it is worth knowing, were of cast iron and are still running. In this boat, also, he used the first double puppet balance valve. He built an ice boat in 1832 for the Philadelphia and Camden ferry. At that time he built fire tubular boilers, a form which had hitherto only been used on locomotives, and gave them the shape now known as "marine." He used steam packed pistons in 1840, in the Trenton.

With Mr. Francis B. Stevens, his nephew and still the well known superintendent of the Camden and Amboy repair shops at Hoboken, he invented, in 1841, the Stevens cut-off valve gear, which is still used on the larger number of marine beam engines. He built, at about the same time, locomotives with cut off valves, brought out eight wheeled engines, and used anthracite coal in their furnaces. In 1848 he used anthracite successfully in passenger locomotives; and at various times he made numerous minor inventions which cannot be even named here.

When a very young man, Robert L. Stevens commenced experimenting on the shot-resisting power of



THE STEVENS BATTERY IN THE DRY DOCK, HOBOKEN, N. J.

iron plates. As a practical result of his investigations, his brothers, James C. and Edwin A. Stevens, addressed a letter, August 13, 1841, to the Navy Department, proposing, as the idea of Robert L. Stevens, an ironclad vessel of great speed, with machinery entirely below the water line, driving the screw. The armament was to be the heaviest breechloading rifled ordnance, with elongated projectiles, both shot and shell. The usual delays deferred the decision of the government, and the preparation of plans and preliminaries occupied several years; but finally, in 1843, a contract was made, and, in 1854; the keel of the ironclad was laid, and the work progressed intermittently, as changes of plan and of naval administration interrupted it, until Mr. Stevens' death. The vessel as first proposed was to have been 250 feet long, 40 feet beam, 28 feet deep, of 900 indicated horse power, and protected by armor 4½ inches thick. At Mr. Stevens' death he had made a far more formidable vessel. The dimensions, when General McClellan was engaged to rebuild and complete the ship, were: length, 415 feet; beam, 45 feet; depth 22½ feet; and thickness of armor proposed, 6¾ inches. The power of the machinery was estimated at 8,624 horse power, and her twin screws were to drive the vessel twenty miles an hour. The vessel was in this form at the commencement of the late war, but without armor or armament. The Navy Department appointed a board to examine the vessel, the majority of which board after, as claimed by Mr. Stevens, a cursory inspection, reported against completing the vessel, except on terms unsatisfactory to Mr. Stevens. Professor Henry, in a minority report, urged prompt completion and her employment against the enemy. It is difficult to imagine what good work might not have been done had this powerful vessel been placed in our fleet, as might have been done, early in 1861. Mr. Stevens obtained for his vessel favorable professional opinions from the most distinguished engineers and shipbuilders in the country. R. L. Loper, Samuel Harlan, Jacob G. Neafie, Theodore Birely, Washington Jones, Erastus W. Smith, and Meirs Coryell, all of whom were acknowledged as the best authorities in the country, endorsed Mr. Stevens' plan; but the vessel was still looked upon without favor by the government. No generally acknowledged authority on the subject seems to have had influence against the ship; yet, notwithstanding the exigencies of our civil war, she was allowed to remain idle upon the stocks.

After his death, the brothers of Mr. Stevens continued the effort to obtain the completion and acceptance of the vessel, with no greater success. Commodore Goldsborough presented a somewhat ambiguous report, advising completion and trial before purchase, and the distinguished present Chief of the Bureau of Steam Engineering reported favorably as to the machinery, which was the vital portion of the plan.

Finally, Mr. Edwin A. Stevens, who inherited the property of his brother, died, leaving the vessel to the State of New Jersey, and appropriating a million of dollars to complete her. The executors, in accordance with the known desire of the testator, appointed General McClellan as engineer to carry out the provisions of the will.

Under the direction of General McClellan and his assistant, Mr. Isaac Newton, the ship was completely rebuilt and new machinery constructed; and the vessel was converted into a monitor. The funds, however, proved insufficient to complete the vessel on the new and elaborate scale proposed, and, at last, work was stopped. A question arose as to ownership, and the State Legislature directed that the vessel be sold as she stands, and the proceeds paid into court.

The commission appointed to effect the sale, Governor Parker, Vice-Chancellor Dodd, and Mr. Stevens' executors, have now employed Professor Thurston as their consulting engineer, and have issued a pamphlet containing his report, in which the vessel and machinery are minutely described, and the calculations of strength, of speed, and of other important particulars are given at considerable length. The pamphlet is beautifully gotten up and is illustrated by drawings of the vessel and machinery, and views of the premises where the ship now lies. From this book we learn that the vessel is intended to be made a turreted ironclad, as here illustrated. She has a greater displacement than has any vessel in our navy—over 6,000 tuns. She has four main engines, is 6 feet in diameter of cylinders, and of over 6,000 horse power. The details are shown to have great strength, and the journals to have ample bearing surface. The drawings show the lines of the vessel, and the engines are shown in plan and in side and end elevation. The boilers are of immense size, having 876 square feet of grate and 28,000 square feet of heating surface. Air is supplied by several large blowers which force it into the airtight fire room. The sides are to be protected by armor 10 inches thick, while the turret, 16 or 18 inches thick, can protect the heaviest ordnance in the world. The speed is estimated, on the basis of ordinary everyday performance, at 16½ knots as a maximum. Could the apparently unusually favorable conditions of the case be relied upon with certainty, Professor Thurston informs us, the speed would become not far from 20 miles an hour. The estimates of speed are made in several different ways, that usually considered most reliable—Professor Rankine's method—giving highest results. The slip of the screws, in consequence of their great area, is calculated at but 9 per cent, and this will effect considerable economy of power. At 16 knots the vessel will steam 109 hours, on 800 tuns of coal, making a run of 1,744 nautical miles. At 6 knots, she will steam 30 days, and 5,256 miles. As a merchant steamer, carrying 1,600 tuns of coal, she would go from New York to Liverpool in 8 days, or to Queenstown in 7½ days, with *favoring* winds and smooth sea. As a steam ram, she would strike a blow of 60,000 foot tuns energy, which is equal to the concentrated impact of eight or nine British 600 pounder rifles, of six 20 inch Rodman shot, or of four of the 81 tun rifles recently designed for the British navy.

We give overleaf a view of the vessel as she lies in dry dock at Hoboken, not far from the Stevens Institute of Technology. Our advertising columns contain Professor Thurston's advertisement, which gives the main dimensions. We are indebted to that gentleman for many of the interesting particulars which have been given above.

The vessel is to be sold either as an entirety or in detached parcels, in November next, and the public, as well as naval men and engineers, will await the result with interest. It would certainly be sad if a splendid ironclad vessel, upon which millions of dollars and a vast amount of the finest engineering talent ever known had been expended, should go into the scrap heap because of the indifference of our own Navy Department, or in consequence of the reluctance of officers to trust their own judgment when the value of the vessel is so plainly shown them. It would be even more unfortunate if the superior intelligence or enterprize of some foreign government should add the fastest ironclad in the world to a foreign navy, where it may at some time act against what miserable remnant of a navy we may then still retain. Should it seem probable that such may be the case, it is to be hoped that some public spirited citizen may buy her and present her to our impecunious Navy Department.

A New Refrigerating Process.

A new process of refrigeration, adapted to the preserving of food, has recently been devised by M. Tellier, a French civil engineer. It consists in maintaining, in the receptacle in which the material to be preserved is placed, a temperature of from 30° to 32° Fah., in order to produce which the condensation of methylic ether is employed. This ether is gaseous at the ordinary temperatures, but liquefies at —22° and distils at +5·8° Fah.

The apparatus principally consists in a cooler, in which the ether is placed. The vapors of the latter, which escape at a tension of about 1½ atmospheres and at the temperature of 58° Fah., are compressed in a condenser at 6, 7 and 8 atmospheres. They then liquefy, and are returned to the cooler, so that there is a constant circulation.

The cooler resembles a tubular boiler, since it is traversed by a large number of tubes. The ether is placed in the body of the vessel, and a solution of chloride of calcium is pumped through the pipes, and thence, becoming cooled, is led through the receptacle in which the meat, etc., is contained. The effect of the intensely cold liquid current is to cool the air in the chambers to the freezing point of water, when watery vapor and atmospheric germs become deposited in the form of hoar frost. The solution is then conducted back to a reservoir, and thence through the cooler pipes again. A committee from the French Academy of Sciences, deputed to examine this invention, speak of it very highly, and state that meat thus kept for months, and subsequently cooked, was found to be in perfectly fresh condition.

Compressed Gun Cotton.

A series of experiments is in progress at the Royal Arsenal, Woolwich, Eng., with a view of further elucidating some of the various attributes and characteristics pertaining to compressed gun cotton. Interesting facts as to the extraordinary rapidity of detonation of gun cotton were brought to light about a year ago. It was ascertained that this was unprecedented, the swiftness of the action being marvelous; indeed, with the exception of light and electricity, the detonation of gun cotton traveled with greater rapidity than anything we are cognisant of. Thus, detonation would take place along a line of compressed gun cotton disks, placed so near as to touch each other, with a velocity only inferior to that of electricity or light, igniting a charge or conveying a signal, if desired, almost instantaneously; 20,000 feet, or nearly three miles per second, was calculated to be the rate of transit, according to Noble's electro-chronoscope. A powder quick match of the most delicate construction ignites so leisurely that the process can almost be observed with the eye. Now, comparing the velocity of detonation of gun cotton with some other speeds, we find that it is eighteen times greater than that of sound, fifteen times greater than that of a rifle bullet and actually one hundred and eighty times superior to that of the swiftest express train. One important characteristic in the detonation of compressed gun cotton is its power of self-transmission, unimpaired in violence and vigor of action, through a continuous train of disks. It is carried on from one disk to another, each in its turn being acted on by its neighbor behind, and setting up a similar action on its neighbor in front.

The present experiments are to determine the relative effects of the detonation of various classes of gun cotton, nitrated and common, when performed in the open air. A "crusher gage" has been employed. It consists of a cast iron body with an orifice at the top, into which a socket is screwed. Within this a piston works up and down, which is recessed around for packing. Pellets of copper are placed upon an anvil beneath the piston, and they are kept in position by a little india rubber washer placed around them. The crusher gage is then securely screwed to a large wrought iron plate at its three corners. The pellets employed are cylinders of copper ½ inch high, diameter 2·306 inches, and area, $\frac{1}{12}$ inch. The means adopted for determining the amount of pressure exerted upon the piston by the shock of an adjacent explosion are by measuring, with a delicate micrometer, the extent to which the pellets are compressed. Several 5 lbs. charges of compressed gun cotton were detonated, each at about a foot's distance from the crusher gage, and in the open air. In some instances the compression of the copper pellets was equal to 3½ tuns per square inch.

The concussion given to the air, then, by the detonation of a large mass of gun cotton must be simply prodigious. But we were prepared to find that it was extreme from observations taken during experiments recently instituted at the Arsenal with disks of gun cotton detonated upon wrought iron slabs, 1½ inches, 1¼ inches, and 1⅛ inches thick. Although loosely placed upon the slabs, with only a light tamping of sand over them to keep the detonating fuze in position, and not in any way confined, upon firing the charges, consisting of ¼ lb. compressed gun cotton, the slabs of iron were split into fragments. Moreover, a band of disks placed around the trunk of a large tree at Upnor, and detonated, severed it instantaneously as though felled by a single blow from an ax.—*The Engineer.*

DECISIONS OF THE COURTS.

United States Circuit Court—Southern District of New York.

PATENT BRACELET.—BARCLAY AND KNAPP *vs.* THAYER AND CUSHMAN.

Blatchford, Judge.

"This suit is brought on reissued letters patent granted to John Barclay, December 6, 1870, for an "Improvement in the manufacture of plated metal bracelets," the original patent having been granted to him as inventor August 24, 1869."

This patent bracelet is constructed by turning over the two edges of the under plate until they rest on the base metal, and form a bead on each side, and then fastening by solder between the beads the edges of a single outer plate, so next that a section of it is the form of an inverted U. Held by the court (Judge Blatchford) that this is the subject of a valid patent, although a previous patent covered a bracelet with its under plate of a similar form, but which was completed by sliding bits of metal with projecting lips under the beads.

[*J. Van Santvoord*, for the plaintiffs.
Carroll D. Wright, for the defendants.]

United States Circuit Court.—District of Massachusetts.

PATENT ALPHABET BLOCKS.—SAMUEL L. HILL *vs.* J. T. HOUGHTON.

[In equity.—Before Clifford and Lowell, Judges.—Decided May 20, 1874.]

Lowell, Judge.

Placing the letters of the alphabet upon cubical blocks of wood, or spelling blocks, having been practiced many years, and also placing two such letters upon some of the blocks, it is not patentable to place two or more upon each block, even if they are placed more systematically, and with the design of rendering the blocks more useful.

Letter blocks with pictures upon some of their faces do not infringe upon a patent for such blocks with figures upon some of their faces, by which they can be selected in accordance with a key accompanying them, so as to spell particular words, such blocks with pictures having been long known.

Bill dismissed.

[*J. Van Santvoord*, for complainant.
A. A. Ranney, for defendant.]

NEW BOOKS AND PUBLICATIONS.

IMPROVEMENTS IN STEAM ENGINES. By John Houpt, Pennsylvania. With Diagrams. Philadelphia: J. B. Lippincott & Co.

Mr. Houpt has invented and patented a long list of improved steam engine details, and he here reprints, in pocket book form, the specifications and drawings thereof.

EL ATENEO. $6 a year, 50 cents a number. Office, 31 Park Row, New York city.

This is the title of a new and beautiful monthly periodical, in the Spanish language, the first number of which is before us. Its contents include literature, the arts and sciences, each department being copiously illustrated with plates or engravings, while the general typography is most excellent. Taken altogether, it is a very beautiful publication, full of interesting and valuable information. We trust it may have a very wide circulation.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

From June 19 to July 26, 1874, inclusive.

BARBER'S CHAIR.—W. M. Golden (of Brooklyn, N. Y.), London, England.
BEARING, JOURNAL BOX, ETC.—W. W. Crane, Auburn, N.Y.
BUTTON AND FASTENING.—D. Heaton, Providence, R. I.
CARD FASTENER.—J. H. Small, Buffalo, N. Y., *et al.*
CHANGING COSTUMES.—J. Morris (of New York city), London, England.
GAS BURNER.—A. T. Welch, Brooklyn, N. Y.
GAS ENGINE.—G. B. Brayton, Boston, Mass.
GAS MANUFACTURE.—W. Harkness, Providence, R. I.
GUANO BAG, ETC.—B. R. Croasdale (of Philadelphia, Pa.), London, Eng.
HOLDING AND PUNCHING TICKETS, ETC.—J. H. Small, Buffalo, N. Y.
INKSTAND.—B. Brower, New York city.
LAWN MOWER.—D. Williams, New York city.
LUBRICATING COMPOUND.—B. French, Rochester, N.Y.
MAKING FISH NETS.—B. Arnold, East Greenwich, R. I.
METALLURGICAL FURNACE.—S. P. M. Tasker, Philadelphia, Pa.
PULLEY HUB.—W. W. Crane, Auburn, N. Y.
REAPER AND MOWER.—W. N. Whitely, Springfield, O.
REFRIGERATOR.—J. J. Bate, Brooklyn, N. Y.
SOLDERING PIPES, ETC.—W. A. Shaw, New York city.
SURFACING TEXTILE FABRICS.—W. Bell, New York city.
WHARLE TUBE FOR WOOL SPINNING MACHINES.—J. C. Wellens, Phila., Pa.

Recent American and Foreign Patents.

Improved Screw Driver.

James A. Wakefield, Minneapolis, Minn.—This consists of a combination of a screw driver and one or more countersinks or other similar tools. When the screw driver is in use, the countersinks are drawn back toward the brace, with the backs in contact with the screw driver. When a countersink is required, it is turned on a pivot pin, as on a hinge, to the proper position. A small slit in the back of the head of each countersink receives the end of the screw driver. The faces of the countersink are fitted to the sides of the screw driver, and the screw driver turns the countersink as it would turn a wood screw.

Improved Combined Wheat Scourer and Cockle Extractor.

Lourens Arentsen, Gibbsville, Wis.—In using this machine the wheat flows from the hopper into a cylinder, where it is cleaned from dust and other substances that may adhere to it. If the wheat is free from cockle a sleeve is adjusted to uncover the hole through a partition and allow the wheat to pass through a tube or spout to the wheat spout, where the dust is withdrawn through the spout by the air blast. If the wheat contains cockle seed the sleeve is adjusted to close the hole in the partition, and open other holes, allowing the wheat to pass into the space between a screen and cone. As the wheat passes down through the said spaces, the cockle seeds enter the recesses in the screen, where they are held by the pressure of the air, which passes in with the wheat and through the openings in a ring plate. As the cockle seeds come opposite openings between the parts of double threads between cylinder and screen, they are forced through said openings by the current of air passing through the holes in the screen, and through the said openings between the parts of the threads as it makes its way through the spout to the fan. The cockle seeds drop through the interior of the cone to the air spout, whence they escape through the valve door.

Improved Plow.

William Warinner, Creelsborough, Ky.—This is an improved plow for loosening the subsoil around small plants, and at the same time throwing soil around them, which may be readily adjusted to throw less or more soil around the plants, as may be desired. The essential features are the adjustment of the wings for the last mentioned purpose and the arrangements for strengthening and supporting handles and beam.

Improved Corn Planter.

William A. Watkins, Culleoka, Tenn.—This invention is an improvement in the class of seed planters whose hopper slide is vibrated or reciprocated, by means of arms or other projections on the inner side of the transporting wheels. The essential features are rectangular or polygonal plates, pivoted in the ends of a platform, the seed slide, and the blocks attached to the wheels, which are fast on the axle, all constructed so that the slide is reciprocated and its movement arrested by the pivoted plates in alternate succession.

Improved Sewing Machine Table.

Elias R. Clark, Marshfield, Ind., assignor to himself and William L. Hamilton, same place.—This invention consists of a table top, to which the sewing machine is connected, which is detachable from the top of the stand, and a sliding top for said stand, contrived in a peculiar and simple manner, to take the machine off the stand, when not in use, and inclose it within the case under the sliding top; and when it is in use, to adjust the sliding stop so as to be used as an extension of the top of the machine.

Improved Lamp for Heating.

James Iredale, Toronto, Canada.—There is an adjustable frame outside the wicks for regulating the flame, which frame is raised and lowered by means of the arms on a shaft. The arms enter holes in the flanges of the frame, and the shaft is turned by means of a thumb piece. A strip of metal is arranged diametrically in the mouth or top of the air tube for the purpose of dividing the air current, and diverting it laterally to the wicks. See illustration, page 38, present volume.

Improved Revolving Scraper.

Wilkins J. Webb, Butler, Ill.—The scraper is of semicircular form, having circular heads, and is attached by means of gudgeons in the center of the heads, with suitable bearings in a frame. The tongue, which is hinged to the cross piece of the frame, is adjustable as to hight. The position of the scraper in reference to the frame is governed by a long lever, which extends back over the scraper, and is controlled by the attendant who walks behind. Pins come in contact with catches when the scraper is filling; and when the scraper is loaded, it is prevented from revolving by by the pins and catches, until the load is conveyed to the desired location to be dumped. When this point is obtained, the catches are thrown from under the pin by turning a rock shaft, which is done by drawing back a lever. This allows the scraper to revolve and deposit its load, and then to serve as the wheels of a cart in moving it back to its work.

Improved Method of Facing Porcelain-Lined Vessels.

John C. Milligan, South Orange, N. J., assignor to Lalance and Grosjean Manufacturing Company, New York city.—It has been the custom, in the manufacture of porcelain-lined ice pitchers and the like, to inclose the porcelain-lined bowl or pot in an outer shell, plated on the outside to obtain the necessary exterior finish. Hence two bowls or pots have been used when one would answer as well, provided its exterior surface could be properly finished. This the present inventor has succeeded in doing by plating the iron pot with a heavy coat of tin, or copper, or other cheap metal, by the battery process, after it has been lined. The surface is then brushed with strong revolving brushes to level down the high places and fill up the low ones. Smoothing and burnishing follows, and afterward plating the tin, copper, or other cheap metal used for the preparatory coating, with the finishing coat of tin, silver, or nickel, thus obtaining a smooth and even surface.

Improved Draft Equalizer.

Josiah Dodge, Grass Valley, Cal.—This is an improved double tree, so constructed as to give the horse which may get in the rear of the other and which is generally the weaker or slower, an advantage of leverage, so that he may be able to get even with the other horse while both horses are exerting their full strength, and without its being necessary to check or old back the forward horse. The invention consists in the arrangement the bolt or hammer hole of a double tree in the rear of its axis, and in e iron strap or plate attached to the rear edge of the double tree to susain the draft strain.

Improved Anchor.

Alphonso H. Cobb, Detroit, Mich.—This anchor has a joint in the shank, near the arms. The latter, the flukes, and the stock are all turned in the same plane. It is claimed that the anchor will hold in whatever position it is dropped. The stock can be laid parallel or detached; the arms may be laid parallel, or, by taking out the pin, the parts may be separately stowed or shipped, and afterward joined with but little trouble.

Improved Pen Holder.

George W. Jolly, Knoxville, Iowa.—There is a clip in the shape of a truncated triangle, two sides of which are bent in tubular form. Through one tube passes the pen holder, and through the other a guide staff. The plate is formed on the angle necessary to give the inclination of the guide staff required for carrying it forward of the pen sufficiently to control the hand properly and hold the pen in proper position. The staff slides up and down in the clip to regulate the extension of it below the point of connection of the pen holder to suit the particular case in hand. A ring on the holder is slipped on the fore finger as near to the upper joint as may be, and the staff is placed between the second and third fingers below the pen holder, and over the thumb above the holder, for using the apparatus. The essential effects of the attachment are: holding the hand up to the proper level; holding the fingers so as to compel the movement of the fore arm to work the pen; and keeping the wrist off the paper, so that the arm only rests upon the table on the muscle or fleshy part a little forward of the elbow.

Improved Bob Sled.

William L. Moshier, Mauston, Wis.—The cast iron knee, which rests on the top of the runner, is held in place on the runner by long bolts, extending from the shoe of the runner up on the top of the rave, along grooves in the sides. These grooves it is proposed to make wider, from the bottom upward for a short distance, than the bolt, so that the foot may shift a little laterally when the sled lurches heavily, and thus ease the effect on the bolts. The runners also are arranged to rise up at the front end independently of each other, to pass over objects or irregular ground without straining the joints.

Improved Cultivator.

Alexander P. Carnagy, Summer Bridge, Del.—The upper ends of the teeth are inserted in sockets, attached in proper positions to the under side of the beams, where they are secured in place by the wedge bolts, which are inserted in the cavity of the teeth, pass up through the beams, and are drawn up into place and held by nuts screwed upon their upper ends. By this construction the teeth will be firmly held, and at the same time may be readily detached when desired.

Improved Telegraph Key.

Randall W. Walker, Oxford, N. Y.—This is a combined telegraph key, by which a dispatch may be sent over two or more lines at the same time, or over one or more separate lines, as desired. The invention consists of a telegraph key made of as many insulated plates as there are lines to be worked, which plates are provided with sidewise projecting lugs for attachment to the connecting wire. Any one or more lines may be worked separately for transmitting dispatches by cutting the remaining wires out by circuit closers.

Improved Car Ventilating Apparatus.

Henry A. Gouge, New York city.—The inlet devices are placed at the alternate angles of the car. Each is made in two parts, with funnel-shaped mouths, the mouth of the one part being forward, and that of the other part rearward. The parts of the device unite into a single tube, which passes down through the roof of the car, and its upper part is divided into two passages, one for each mouth, by a partition, which extends a little below the roof. In the sides of the car, just below the roof, are formed openings leading into the tube. By this arrangement, as the car moves in either direction, the air passes in through the forward mouths of the devices, and passes down through the tube, which induces a strong current of air through the openings. Suitable arrangement enables the air to be heated before being introduced into the car; and by other devices, the forward movement of the car will induce an upward current of air through the device which draws the impure air from the car. By this construction also, a downward wind cannot blow into the car, but will only induce an upward draft through the device.

Improved Glove Fastening.

Isaac Hermann, New York city.—Each button is made of an upper plate and a lower plate, which are connected through a small perforation of the glove by means of a central screw bolt of the top plate, turning into a threaded socket of the lower plate. The firm position of both plates is secured by prongs of the top plate, which penetrate partly into the leather of the glove, and clamp it rigidly on screwing on the socket plate. The top plate of one button is provided with a small ring, while the top plate of the opposite button has a common or swivel hook soldered thereto. The connecting chain is attached to the hook, passed then through the ring and back to the hook, to be adjusted to the length required. This seems to be a useful improvement over the ordinary glove button or hook, as it can be made in ornamental form of precious metal, and transferred from one glove to another as the articles wear out.

Improved Portable Fare Box.

Henry R. Gillingham, Baltimore, Md.—This invention relates to boxes which are carried by conductors with them through horse cars while collecting the fares from passengers, and consists in certain means whereby each fare will be separately dropped into the box, and a registry thereof made for the inspection of the railroad superintendent, while, at the same time, a gong is sounded to notify and acknowledge the receipt of fare to each passenger.

Improved Harness Saddle Tree and Harness Saddle.

Samuel E. Tompkins, Sing Sing, N. Y.—The first of these inventions consists of the terret nuts, fastened to the back band, in combination with the upper elevated and lower depressed bridges of the tree, instead of being fastened to the upper bridge or to the under bearing plates, as they have heretofore been arranged. The object is to enable the saddles to be made and kept in store ready for sale without fitting on the terret mountings, to allow the purchaser to select the mountings to his taste, also to preserve the mountings better until sold by keeping them in their packages. The invention also consists of an improved construction of the crupper loop, whereby it can be removed at any time and another put in place without removing the filling or middle piece of leather usually placed between the seat and the frame where the crupper loop is attached. The same inventor has also devised an improved method of constructing harness saddles so that the back bands and terret nuts can be readily applied and removed after the saddle is completed, to allow of the application of terret mountings to suit the fancy of the purchaser. In this invention the essential features are a short tree with a bridge extending nearly the whole length of each side, having screw holes in the margin, at the lower end, for use in certain kinds of saddles, for screwing on the under plate from the lower side; also nail holes in the margin of a flat tree for fastening the flap when put on the top side; and also a metal plate attached to the upper end of the back band, having a socket for holding the terret nut, and a covering plate for the socket, to secure the nut without being fastened to the plate by rivets or screws. The covering plate is pivoted at one end to the socket plate, so as to swing forward and back to open and close the socket when the back band is not connected to the saddle, and be kept in place to secure the nut by the saddle when the back band is connected.

Improved Plow Supporter.

Francis M. Shields, Hashuqua, Miss., assignor to himself and John C. Holmes, same place.—The supporter is made of cast iron, with a flange, which receives the shank of the shovel. The under side is hollowed out to fit the stock, and the edges of the hollowed inner surface are provided with a series of points which penetrate the wood and hold the supporter in place. There is a slot hole through the supporter, a bolt which passes through the stock, the slot hole, and the plow, by which means the plow is held firmly to the stock. The slot allows the supporter to be raised or lowered on the stock, so as to fit the share. In this kind of improvement a variety of plows or shares is employed, to adapt it to various crops and soils, varying in form as may be found necessary, and each used as may be required, but all fitting the supporter and fastened in the same manner.

Improved Lathe.

Benjamin B. Ockington and Andrew J. Ockington, Stratford Hollow, N.H. There is a double stationary holder for the blanks in the middle portion of the machine, into which the blocks are dropped on each side behind guards, and upon rests, to be taken therefrom by the lathe centers. Said lathes are mounted on a frame which slides forward and backward on the ways, being actuated by a cam and bar. The lathes are arranged on opposite sides of the blank holder, so that, when one moves up to it, the other moves away from it. In front of each lathe is a shaping cutter, so fixed on the upper end of a swinging frame that, when the blank is moved outward, it will come against the cutter and be reduced to the required shape by it, the cutter being the whole length of the blank, and, after the blank comes against it, moving back with it during the time it operates on the blank, and until the frame carrying the lathes arrives at the end of its movement. The frame carrying the cutter is then engaged by the spring catch and held back while the lathe returns.

Apparatus for Destroying Animal and Vegetable Life.

John M. McGehee, Milton, Fla.—This is a box which is turned bottom upwards on the ground and provided with tubes which enter the latter for a foot. Steam is forced into the device through the top, and its heat kills animal or vegetable life over the surface included.

Improved Process for Baiting and Cleansing Hides.

William Stack, Sussex, Canada.—In a vat containing water is placed bran, oil vitriol, and salt, and in this mixture the skins are allowed to remain for several hours. The skins are next placed in another vat, commonly the one called the pool, with sufficient water to cover them, and tar water and soda is added. This completes the process, and makes the hides ready for the tan liquors.

Improved Carpet Stretcher.

Pulaski Hays, Cool Bank Station, Ill.—The heads are made three feet in length, and have forward edges provided with hooks, upon which the edges of the carpet are hooked to be stretched. The heads are strengthened by braces and have guard blocks attached to their ends, which keep the heads at such distance from the walls that the carpet can be conveniently tacked. To the middle parts of the heads are attached the outer ends of bars. One bar is slotted longitudinally to receive others. The latter bar is made in sections hinged to each other, so that the stretcher may be more conveniently handled. To the upper side of the bar are attached spurs for the engaging end of a pawl to take hold of in applying power to the stretcher. A small block fits into a compartment to act as a pawl to hold the bars in place while the pawl is being drawn back for another purchase.

Improved Car Wheel.

George W. Miltimore, Janesville, Wis.—A tubular bushing has a flange that fits against the outside end of a wheel hub, and also a nut that screws against the other end of a wheel hub, and on the inwardly projecting threaded end of the bushing. Between the tubular bushing and the inside of the hub is located a rubber ring that takes up the shock with great efficiency, while it may be readily applied or removed. In order to prevent the possibility of rotation in the bushing and nut independently of the wheel, a perforation is made transversely through the nut, and at right angles thereto a groove, through the former of which passes an arm, and in the latter of which lies the arm of a right angled key. In the bushing is a slot that receives one arm, while in the hub is an aperture that receives the other. As one arm is in the open slot of that face of the nut that fits against the shoulder of the axle, the key cannot come out unless the wheel is removed from the journal.

Improved Cork Sole for Boots and Shoes.

Edwin A. Brooks, New York city.—Making the cork in two parts or layers prevents the dampness from passing through, however thin or thick the cork may be. A band of sole leather is pasted around the edges of the cork, and is covered with a strip of fine French calfskin. The cover and the upper edge of the sole leather band are sewn in with the upper to the inner insole. To the middle sole, the upper, the lower edge of the sole leather band, the cover, and the welt are sewn by a second seam. The upper is taken up in both seams, which gives great firmness and strength to the sole. The outer sole is sewn to the welt by a third seam in the ordinary manner.

Improved Bridle Snap.

John Kennedy, Osage Mission, Kan.—The shank of the hook has transverse rear slot and circular top flange. The latter fo s a groove n which slides a snap having from its point a sloping-upward extension or thumb piece. This slide is slotted to allow it to move upon the guide pin and against the tension of a spring. The point of the slide is held by the spring against the end of the hook, thus effectually preventing its escape from the bridle ring. By simply pressing the usual iron ring upon the inclined surface of the thumb piece, the slide will recede and allow of the entrance of the ring within the concavity of the hook.

Improved Machine for Raising and Smoothing Panels.

Jacob P. Beck, James F. Shoemaker, and John H. Weaver, Lock Haven, Pa.—Cutters clamped between washers are arranged for cornering or grooving out the edge of a panel at the same time that it is sand-papered. The sand paper is attached to pads which fit in apertures in the same disk to which the cutters are secured.

Improved Boiler Washing Machine.

Franklin H. Biesecker, Cashtown, Pa.—The wash boiler is of cylindrical shape, and on a flange near the bottom is a second false bottom. Below the false bottom, and also near the top, are perforations which are connected by hot water channels tapering from the bottom toward the top for the purpose of discharging the hot water forced up by the generation of steam in the lower part of the boiler with considerable force on the clothes in the upper part. The false bottom has also a central tube through which the water is discharged in connection with a cylindrical cap attached to the under side of the false bottom, and extending to the real bottom of the boiler. The cap is perforated at the side for admitting freely the water, and forming thereby a kind of secondary chamber for developing steam and forcing up the boiling water. The false bottom has apertures closed by valves hinged to the lower side. A rubber block is placed, by its central hollow shaft, over the central hot water tube, the upper solid end of shaft fitting closely into the lid or cover of the boiler. The rubber block placed over the central hot water tube has radial arms and is rotated by a lever handle, keeping thereby the clothes in continual motion and constantly exposed to the action of the boiling water.

Improved Breast Collar for Harness.

George P. Cole, Johnstown, N. Y., assignor to himself, Michael D. Murray, and James F. Murray, same place.—This is a neck strap consisting of an elliptical piece, top piece, bottom piece, and internal spring, the last serving to prevent the breast and neck strap from doubling short in the middle, and also to distribute the pressure evenly.

Improved Dental Coffer Dam Clamp.

Clarkson Bancroft, Brooklyn, N. Y., assignor to Samuel S. White, Philadelphia, Pa.—The jaws of the clamp for griping the tooth and binding the rubber coffer dam upon it are formed on the edges of steel plates about as wide as will allow of applying to teeth of different sizes, and widening each way from the clamp backward a suitable distance for strength. The ends of the outer edges are connected by bow springs, which rise sufficiently high to extend over the top of the teeth; also to allow of introducing the tool under them to work at the tooth if necessary; and they are also sufficiently wide apart to allow of applying the tool between them when necessary. The jaws, springs, and the tongue guard are all made of a single plate of spring steel. The tongue guard is also adapted for holding a small mouth mirror to aid the operator, the mirror being fastened on it by a clamp of any kind.

Improved Machine for Cutting Soap.

Joseph Seibert, New York city.—The object of this invention is to furnish to soap factories an improved machine for cutting large soap blocks into smaller pieces of any required marketable size by the successive operations of the machine without passing any part of the block a second time through the machine. The main frame supports on its lower part the laterally slotted base piece on which the soap blocks are placed for cutting. The cutting wires of the frame are firmly stretched at the required distance by stretching devices, and extend across the base piece in the lateral slots thereof below the surface. The soap block is placed thereon and firmly secured in position by a clamping plate adjusted by a hand wheel and screw at the top of the frame. The horizontal cutting frame is then slowly raised by the hoisting mechanism, dividing the soap block into lateral parallelopipedons until arrived below the clamping plate, which is screwed up to give space for the suspension of the horizontal frame below the top of the main frame. A check pawl secures the position of the frame until detached therefrom for lowering the frame for cutting the next block. The crank shaft is then thrown into gear with the cog wheels of the feeding mechanism, to intermesh with toothed racks, which are guided on suitable friction rollers in longitudinal direction, and firmly applied with their fore ends to socket plates of a follower block, imparting to the same motion in either direction, according as the crank is turned. The follower carries the vertically divided soap block between side guide plates toward the vertical frames. The vertical cutting frames are made up with varying width of wires, to be readily interchanged, according to the size of the pieces to be cut. By forcing the soap block through the vertical cutting frames, the same is cut into the pieces required, which are carried on to a table or platform to be taken off for further storage or use.

Improved Device for Sharpening Stone Tools.

Enoch L. Moore, Steuben, Me.—There is an iron plate on the back of the device to which the other parts are attached, and upon which the movable part of the swage slides. The swage is formed of two parts. The lower and stationary part is placed in a hole in the anvil, and supports the instrument in an upright position, where it is fastened by means of a key. This stationary part of the swage is confined to the plate by a clip. Between the stationary part and the under side of the clip is a forming swage, to upset and give the proper bevel to drills. The movable part of the swage is also kept in position by a clip. There is an opening between the beveled ends of the two parts of the swage in which the tool is placed to be swaged and sharpened. Blows with the hammer are struck upon the end of the movable part, and the chisel or drill is readily brought to the form or bevel of the opening, leaving the sides of the chisel smooth and uniform in shape.

Improved Combined Locket and Smelling Bottle.

Fridrich Wächter, New York city.—The body is divided by a partition plate into two sections, of which one is arranged in the usual manner as a locket with a hinged cover. The other part forms a space around the locket back of the partition plate, and connects, by a top aperture, with a neck, which is provided with a hinged cap having rubber lining for producing the hermetical closing of this part, to be used as a smelling bottle. Any desired perfume may be placed into this space, and the whole device be finished in any desired artistic design and corresponding ornamentation.

Improved Extension Roller.

Wilhelm Valentin, College Point, N. Y.—This invention consists in hinging a series of leaves together and folding them on a larger base leaf, which is applied to a central supporting foot or pillar by a socket plate, so that the pillar may turn therein. A quick screw thread at the lower end of the pillar turns in a female threaded socket with legs, and raises or lowers the leaves, as required. The pillar is placed centrally to the main frame of the table, and forms the support for the table.

Improved Boot and Shoe Nailing Machine.

Lemuel R. Mears, Brooklyn, N. Y.—The object of this invention is to provide a power machine for nailing on the soles of boots and shoes, and at the same time automatically feeding the shoe or boot and supplying the nails. For the nails it is proposed to use the kind made in the form of a long comb, and now used with hand-nailing machines, the nails being connected together by the heads, so as to feed into the machine like a bar, and be detached, one by one, as they are driven. The invention consists of a nail driver and a bender, arranged together in a stock, and geared by rock levers with cams for operating them; also automatic feed mechanism, for feeding the nails to the driver, and also automatic feed mechanism, for feeding the boot or shoe, all so combined and arranged that the nail bar and the boot or shoe feed along simultaneously; and immediately after each feed movement, the bender moves down a little in advance of the driver to adjust the nail to the driving channel, and then the driver moves down and drives the nail into the shoe.

Business and Personal.

Charge for Insertion under this head is $1 a Line.

S. will find directions for making a gutta percha varnish on p. 379, vol. 30.—H. C. H. will find instructions for frosting window glass on p. 264, vol. 30.—X. Y. Z. will find a recipe for lemon sugar on p. 379, vol. 30.—O. F. will find directions for making starch polish on p. 71, vol. 30.—W. P. P. will find a recipe for taking stains out of marble on p. 58, vol. 30.—A. W. and A. P. should refer to some good work on the dog; one was published by the late Mr. Butler, the famous dog fancier.—C. M. will find directions for making an aquarium on the editorial pages of this issue.

J. M. D. says: In No. 15, vol. 30, I saw a recipe for making fulminating powder. I followed the directions given, but failed. The mercury, instead of being dissolved in the acid, formed a white sediment. What was the fault? A. To prepare fulminating mercury, 1 oz. of mercury is dissolved in 8½ ozs., by measure, of nitric acid, by the aid of a gentle heat. The acid should be of specific gravity 1·4. Pour the solution into 10 measured ozs. of alcohol of specific gravity 0·830; action soon ensues, with the evolution of copious white fumes, and the fulminate separates in white crystalline grains, which are washed in cold water and dried at a very gentle heat. If this recipe be followed and your acids are pure, there can be no further trouble.

J. C. H. asks: 1. How can I make steel to cut iron, and what kind of acid is used with it? A. The steel is made in the usual way, and is forged and repeatedly hardened and tempered. Acid is not used. 2. How is fulminating silver made? A. When nitrous vapor is passed into a solution of nitrate of silver in alcohol, the fulminate of silver is deposited and forms delicate white crystals, which explode with terrible violence by friction with any hard body, even under water. It should be thoroughly washed and dried with very gentle heat. Your other questions are business matters.

J. E. D. asks: 1. How can I preserve a nickel-plated pistol clean, and save it from rusting? A. In cases like this, where the plating has partly worn or chipped off, or oxidized, because of the thinness or an imperfection in the covering, the best method that we can recommend is that of re-plating. It might also be lacquered. 2. Did M. Coggia discover the comet at Marseilles, or Versailles, France? A. Marseilles.

O. F. M. asks: 1. How can I make a galvanic battery for electrotyping? A. Several Smee cells would answer your purpose, and may be constructed as follows: Take two plates of zinc, about 3x5 inches, and one of carbon, of about the same dimensions. The zinc must face the carbon, which is supported by a piece of dry wood that at the same time serves to separate or insulate it from the zinc. The zincs are held in position by a brass clamp. Place the elements, thus arranged, in a glass or earthenjar nearly filled with a solution of dilute sulphuric acid and bichromate of potash. 2. How could I restore the color of the backs of books, bound in cloth or leather, which has faded under the light of the sun? A. This cannot be practically accomplished; and if it could, the process in no two cases would be similar. 3. What would be a good cement for holding together the edges of 5 pieces of squarely cut glass for making a tank about 7 x 10 inches? The cement must be watertight and not be destroyed by acids. A. Try diamond cement.

B. F. M. says. 1. In your last issue, C. D.S., in his reply to J. H. P., says there is no trace of glacial action in the tropics. Is it not well established by the researches of Professor Agassiz that there has been such action in the valley of the Amazon? A. The theory of glacial action in the Valley of the Amazon has been a subject of dispute. Humboldt said that the geological formations of the valley belonged to the old red sandstone period. Martius attributed them to the new red; Agassiz called them drift, or the glacial deposit brought from the Andes. The latter claimed that they were all fresh water formations, that there were no evidences of marine origin, no marine shells or fossils, and no tertiary deposits. Against this, Professor Orton, who conducted an expedition up the Amazon in 1868-69, brings opposing evidence. He found a fossiliferous bed intercalated between the variegated clays which are peculiar to the Amazon, that was crowded with marine tertiary shells. From this he concludes of course that the deposits are tertiary and of marine or salt water origin. This bed was found about 200 miles farther up the river than Agassiz went. It would seem as though the conclusion of Agassiz, that, because he saw no fossils in the formation, it was not of marine origin, was a rash one. Professor Orton states, as further proof against the glacial theory, that seams of a highly bituminous lignite are found interstratified with the clay deposits; these seams were traced for a distance of 400 miles. Agassiz acknowledged that he failed to find many of those proofs which we are accustomed to regard even in temperate latitudes as essential to demonstrate the former existence of glaciers where none exist now. He found no glaciated pebbles, no far-transported angular blocks with polished and striated sides, no extensive surface of rock, smooth and traversed by straight and parallel grooves. Mr. Charles Darwin, who travelled in the valley of the Amazon, also opposes the idea of Agassiz in regard to glacial action. Professor Orton says of the geology of the valley: "Around the rim of the basin are the outcroppings of the cretaceous deposit. This rests on mesozoic and palæozoic strata which form the ribs of the Andes. Above it, covering the whole basin from New Granada to the Argentine Republic, are the following formations: first a stratified accumulation of sand; second, a series of laminated clays of different colors, without a pebble; third, a compact sandstone; fourth, a coarse porous sandstone, very ferruginous; fifth, over the sandstone an ochraceous, unstratified sandy clay." The fourth deposit was originally 1,000 feet thick. But in all the region covered by his travels, Professor Orton nowhere found the evidence necessary for the support of the theory that these formations are the result of glacial action.

2. In one of your issues I notice a statement to the effect that steam or oxygen and hydrogen dissociated, was present in the atmosphere of the sun. In other works I have seen it stated that the spectroscope had never revealed oxygen in that body. Will you please tell me and your readers if it is present? A. Of all the elements known as metalloids, hydrogen is the only one which the spectroscope reveals to us as existing in the sun. At the same time no one who has been engaged in spectrum analysis is ready to pronounce definitely upon the absence of the rest of these elements; but on the other hand, such men as Lockyer, Norton, and Angström fully believe in their existence in the sun, and have each advanced plausible reasons to account for their not being detected by the spectroscope. The following, in substance, are the conclusions of Angström, as put forth in a memoir on the subject in 1869. The temperature of the sun is on the one hand too high to permit of such combinations as carburetted hydrogen, cyanogen, etc., being formed, and on the other hand too low to allow of carbon being converted into a gaseous state, so as to form its spectrum or to produce the spectra of oxygen and nitrogen. These conclusions were mainly based upon the results of investigations on the spectrum of the atmosphere and of carbon with the electric current.

H. L. asks: Is there a vortex called the Maelstrom, and where is it? A. Yes, on the coast of Norway.

2. Can a monkey swim? A. Yes.

3. I have noticed, when cutting out stock for cabinet making, that planks are often winding, and that eight out of ten are winding the one way. My opinion is that it is caused by the heat of the sun on the tree always being on the one side, causing the tree to twist in growing; therefore trees growing in the southern temperate zone would wind in the opposite way. Am I right? A. Trees are unquestionably affected in this way, particularly those standing in exposed positions.

J. E. F. asks: Of what are the red and green stars, used in Roman candles and similar fireworks, made? A. Make a solution of isinglass ¼ oz., camphor ½ oz., alcohol ¾ oz. For red stars add: 61 per cent chlorate of potash, 16 sulphur, 23 carbonate of strontia. For green, 73 per cent chlorate of potash, 17 sulphur, and 10 boracic acid. For dark blue, 60 per cent chlorate of potash, 16 sulphur, 22 carbonate of copper, 12 alum. For yellow, 61 per cent chlorate of potash, 16 sulphur, 23 dry soda. Make into balls of the requisite size, roll in gunpowder, and dry in the sun.

J. H. D. asks: 1. Does a heavy cannonade cause a rainfall? A. There have been many discussions on this subject, but as yet nothing definite has been arrived at.

2. Is there any society connected with aerostatics? A. There is at present no society of this kind in this country. We shall be pleased to receive the paper you speak of.

J. P. N. asks: In making vinegar from cider, sirup, or alcohol, how can I ascertain when the acetic fermentation is finished, the whole of the alcohol having been changed to vinegar? A. By testing, and seeing whether the percentage of alcohol has decreased, or that of acetic acid increased.

A. R. asks: What is the quickest way to cure moss, to turn it black? A. Oak moss is treated in the following manner: Bury underground until the outside fiber has rotted, then cleanse, dry, and dye.

S. W. J. asks: Is there any preparation of sulphur, not containing mercury, of a light vermilion color? A. A vermilion color cannot be made of any other sulphide but vermilion. Oxysulphide of antimony, or red antimony ore, is of red color.

W. D. S. asks: 1. A neighbor maintains that a cask with a vacuum formed therein will be more buoyant on the water than if filled with air. I say that the vacuum will have no effect as regards the buoyancy. Which is right? A. The cask would certainly be lighter after the air had been exhausted than before, for the reason that air has weight.

2. Are the compartments in ships airtight chambers, or are they rooms that are used for other purposes, such as storage, etc.? A. Airtight chambers.

W. L. D. asks: 1. What can I use to fill the hole in a flower pot, so that it can be used for a battery? A. Fire clay, rubber, paraffined wood, etc.

2. What is the cost of a strip of platinum, such as is used in a Grove battery? A. It depends upon the size of cell. Platinum is worth about 28 cents per gramme, or between 2 and 3 cents a grain.

M. V. & Co. ask: How is an electro-magnet made? How many times must the insulated wire be wrapped around the soft iron? A. This depends wholly upon the size of the magnet.

2. What kind of wire should it be? A. Copper wire is the only kind used.

3. How should it be insulated? A. By winding it closely with silk or cotton.

4. How must the wire be wrapped around the iron? A. In the same direction throughout.

G. G. G. asks: What sized gasometer would it require to contain gas enough to supply 4 burners or lights for 24 hours, allowing the pressure that is usually required to supply small cities with gas? A. You fail to mention the size of the burner to be used. If one consuming three feet per hour be used, you will require a gasometer about 8 feet in diameter and 6 feet high.

M. N. M. asks: 1. How are elastic india rubber stamps made? A. A number of manufacturers have been visited, who decline to describe their processes. 2. How can brass be deposited by the battery? A. We believe this has never been satisfactorily accomplished. 3. I burnished a piece of steel, washed with cream of tartar, and rinsed in running (Potomac) water, taking care not to touch it with my hands. I deposited a heavy coat of nickel by the battery. While burnishing, the nickel all peeled off. I never failed before. Can you suggest the cause of my non-success? A. After cleansing thoroughly as before, coat with copper by dipping for a moment into a solution of blue vitriol (sulphate of copper).

A. H. McK. asks: 1. How do electro-platers charge for plating? Do they charge by weight or by surface? A. In gold or silver plating, the charges are gaged by the acquired weight. Some nickel plating establishments estimate the surface and charge by the square inch. 2. What do they put in the plating solution to make the bright appearance and high polish? A. The metal after being removed from the bath is burnished. 3. What makes the silver peel off? Is the battery too strong? Sometimes it will not stick at all. What would be a good amalgam or preparation to put on the article to make the silver (and gold stick)? A. Articles of copper, brass, and German silver should be first thoroughly scoured with white sand, and then dipped into dilute acid to remove all oxidation, etc. They are then washed in clear water. If these directions are faithfully observed, your trouble will probably disappear.

J. G. C. asks: How many feet of No. 32 wire will be required to produce the electric light with carbon points, using two Grove's cells? A. You cannot obtain a satisfactory light in the way you mention, although with a large coil you might obtain a very lon spark.

W. S. H. asks: Is there any way to prepare a copper-plating solution from the pure metal? A. Sulphate of copper is a solution of the metal (or oxide of the metal) in boiling sulphuric acid. A solution of the crystals in water forms the copper bath most generally used in electro-copper plating. It will be much cheaper for you to buy the salt than to attempt to make it.

H. H. P. asks: How can I clean a cask that has contained varnish, so that it would be fit for root beer? A. If the cask contained shellac varnish, it would probably be necessary to use alcohol; other varnishes are mostly solvent in turpentine. However cleansed, we think the cask would not be fit for your purpose.

F. H. B. asks: 1. What is the best mode of purifying butter? How can I make patent butter? I have seen a preparation for this purpose which looks like finely pulverized sugar. A. See p. 119, vol. 30 of the SCIENTIFIC AMERICAN, and p. 190, *Science Record* for 1874. 2. How can I take mildew out of cotton? A. Wet the spots with a solution of chloride of lime (bleaching powder). Wash out at once with warm water. 3. What can I use in place of rennet liquid that will answer the same purpose? A. Various substances can be used, as pure curd, agreeable old cheese, and extract of malt. Curd can be prepared as follows: Heat a quantity of milk which has stood 5 or 6 hours, cool it and separate cream completely. Add to the milk a little vinegar and heat gently, pour off whey, wash and knead with water repeatedly. Then press and dry for use. 4. What will restore colors on carpets, caused by water that has run the colors together? A. Nothing but a process of bleaching and re-dying.

F. R. says: I have an ice box 20 feet long, 12 feet high, and 8 feet wide, double walled and packed with fine charcoal, and lined throughout with galvanized iron. I have reduced the ventilation from 4 inches to ½ inch, and covered the ice with blankets; and still I cannot keep the ice. Its capacity is 3½ tuns, which lasts from 7 to 10 days. It has 3 divisions, each with a door 3 feet by 7 feet, packed with charcoal and lined with galvanized iron also. The ice is overhead, in a large pan (6 x 14 feet) of galvanized iron. The large ventilator is at the top and runs into a flue in the chimney. The waste pipe runs out of the wall into the cistern, and at the bottom of the pipe I have a cup that fits over the waste pipe, keeping the hot air from going up in the top of the ice box. Can you tell me how to make the thing work? A. The cooling power of the refrigerator depends on the melting of the ice, therefore if your box is kept cool the ice must melt. If your ice pan overhead has an open space each side of it, the following arrangement might be adopted to provide a circulation without any ventilating holes: Place a thin partition parallel to and 10 or 12 inches from the back, so as to make the cold air descend in this narrow space, and pass under the bottom of the partition. In the space between the ice pan and front wall, place a box of wire gauze filled with charcoal. Increase the hight also of the front side of the ice pan. Then the air entering at the bottom of the apartment, becoming slightly warmed, will rise, but, having to pass through the charcoal box, it will be freed from impurities. There will always be some circulation, and it will be increased when the door is opened.

C. A. H. asks: 1. What is the cheapest mode of making oxygen gas in quantity? A. The method of obtaining the gas from chlorate of potash, mixed with one quarter its weight of black oxide of manganese, and strongly heated in a retort, is perhaps best and in the end cheapest, because of the large volume of nearly pure gas obtained in a short time and with simple apparatus. 2. Is there any cheaper mode of making hydrogen gas than by using sulphuric acid and iron? A. If nearly pure hydrogen is desired, perhaps this will be the cheapest method. Large quantities of hydrogen may be obtained by passing steam through a red hot iron tube filled with iron filings. Charcoal or coke may be used instead of the filings, but the gas will have to be passed through a solution of caustic potash or lime to remove the carbonic acid. 3. If the armature of a permanent steel horseshoe magnet be rapidly detached and brought into juxtaposition, alternately, what will be the effect on the magnet? Will the portative force increase or decrease? What effect will the magneto-electric current produced have upon the magnetic fluid? A. Please state your question a little more explicitly.

W. C. B. says: A man says that he has invented a pump for condensing air which will condense air to 500 lbs. to the square inch without heating the air. Is not this contrary to the principles of natural philosophy? A. The greater number of substances are raised in temperature by compression; air is one of these. If, however, the compression is slow, the heat developed may be carried off by the cylinder in which it is compressed without being noticed. There may also be special contrivances arranged for abstracting the heat as fast as developed.

W. R. O.—A speaking tube will convey the voice 500 feet. The diameter of the pipe must be increased in accordance with the distance.

L. C. says: I have been told that tomatoes induce cancer. In view of the large quantity my family consume, that is to me an appalling statement, and I would like to hear on the subject from some of your medical correspondents. The world wants the best advice on cancers, and I know of no medium so sure as the SCIENTIFIC AMERICAN. A. It is well known that too free a use of raw tomatoes produces cankerous sores, but we call to mind no case of cancer thus induced. Perhaps some of our medical readers can give further information.

C. D. F. says: 1. In your vol. 26, p. 393, it is said that Professor Hough has found that if leather instead of clay is used for the porous cell in a Daniell's battery, the quantity of electricity is nearly doubled. What kind of leather is used, and how is it prepared? A. Common unoiled leather of moderate thickness. 2. About how many cells of Hill's or Calland's battery will it take to make a relay of ordinary resistance work satisfactorily on a line 500 feet in length? A. About 300 square inches of zinc. 3. How many feet and what sized wire is used in a relay of 150 ohms resistance? A. About 800 yards of No. 28.

N. P. J. asks: What is a recipe for an axle grease with tallow for its basis? A. Water 1 gallon, clean tallow 3 lbs., palm oil 6 lbs., common soda ½ lb. The mixture should be heated to about 210° Fah., and well stirred till it cools down to 70°, when it is ready for use.

C. L. W. asks: 1. How can I find the amount of cyanogen in cyanide of potassium? A. The amount of cyanogen in cyanide of potassium is 38·83 per cent by weight. Thus, if you have 2 ozs. of the cyanide of potassium, 0·67 oz. is cyanogen.

2. I have tried to make a 3 gallon silver-plating solution for the battery process described by A. Watts. I used 3 one gallon cells. I find that the silver dissolves at the rate of 1 grain an hour. Can you inform me where the trouble is? A. If the recipe had been followed in detail, we think you would have had no trouble. Your failure may be due to impure chemicals.

J. W. B. asks: 1. Is alcohol a stimulant proper? A. Yes. Owing to its high diffusive power, it soon enters the blood and exerts a temporary stimulating power.

2. Does it increase nerve force? A. Temporarily, yes.

3. Does it increase the caloric of the human body? A. It decreases it. As the result of many experiments, it has been found that in moderate doses the fall is slight, not amounting to more than 0·4° or 0·6° Fah. But after poisonous doses, the depression in one instance reached 3°.

4. Is it in any sense a food? A. The formula for alcohol is C_2H_6O. When taken in proper quantity for the needs of the system, the carbon is set free and utilized by the body, acting as food.

5. Is it antagonistic to health and life? A. If taken in excess, yes. If not, no.

6. Does it weaken and thin the blood? A. Yes, if taken in excess, since the system exerts itself to throw off the poison, and the blood suffers from the temporary dilution caused by the high diffusive power of the alcohol.

7. Does it kill in the same manner as opium? A. It does not. It kills as chloroform and ether do, except that the first stage, that of stimulation, is longer, and greatly increased quantities of the poison are necessary to produce fatal results.

8. Is it an anæsthetic or a narcotic poison? A. An anæsthetic.

J. H. R. asks: 1. How can I apply paraffin to heavy manilla paper, or to wooden walls? A. Paraffin is readily soluble in naphtha, to form paraffin varnish.

2. Is it to be put on cold, with a brush, like paint, or melted and applied hot, as pitch? A. It may be applied with a brush.

G. G. M. says: I. It is said that nations living largely on potatoes deteriorate in brain. If so, why? A. The saying is not true.

2. Why does alcohol evaporate faster than water? A. Because of its greater volatility.

3. Is a person who drinks a great deal of water more inclined to have the dropsy than one who drinks but little? A. No.

K. asks: 1. What sort of water colors are used in the coloring of fashion plates, etc.? A. Fashion plates are all printed by a process known as chromo lithography. Barnard's "Theory and Practice of the Art of Painting in Water Colors" will give you full instructions.

2. Has a rifled piece a greater range than a smooth bore, and why? It appears reasonable that the furrows should to some extent diminish the speed of the projectile; and still all modern small arms are rifled, with an increase of range. A. Yes, because of the motion given to the ball on its emerging from the gun, which gives it additional energy to overcome the resistance of the air.

M. H. R. asks: In making a large aquarium, would it be of any use to coat the cement over the joints inside with liquid glass? The frame being of wood, would it be better to cover the rabbet, where the bottom and side glass meet, with liquid glass or paint? A. Use paint; liquid glass dissolves in water.

W. N. W. asks: Please give me a formula for making carvacrol. A. Carvacrol ($C_{10}H_{14}O$) is obtained by treating oil of caraway with potash, or again by treating the same oil with iodine, cohobating several times, and washing the product with potash; as thus obtained, however, it is mixed with carvene. Carvacrol is also found among the products of the action of iodine on camphor. It is, when pure, a colorless, viscid oil, lighter than water and soluble in water to a small amount. It has an unpleasant odor, and an acrid, very persistent taste. It boils at 450° Fah, giving off vapors which irritate the organs of respiration. It burns with a bright, very smoky flame.

A. V. N. asks: What is the power of a coiled spring that is ¼ inch thick, 3 inches wide, and 16 feet long? A. The power of coiled springs depends on the number and diameters of the coils, the quality of the steel, and the degree and evenness of the temper, and is, under any circumstances, variable in sizes so large as you describe.

J. J. H. S. S. says: I have a good spring 1-16 inch thick, 1¼ inches wide, and 6 feet long; this spring I have permanently fixed to, or near to, one extremity of a round steel bar or axle one foot long. About midway between both ends of this axle or steel bar, I have fixed or attached a toothed wheel, which plays into another (5 times smaller) toothed wheel. This smaller toothed wheel is fixed on to another steel axle about 9 inches long, at the left hand extremity of which is a proportionate fly wheel, and on the right hand extremity a belt wheel. How many pounds can I make this machine lift when once put in motion? A. There is no rule by which the power of springs, such as you here describe, can be calculated; experiment with the individual spring must be depended upon, because no two such springs, though of equal proportions, would give a like result. The power given out by the spring will, however, always be an exact equivalent to the power required to wind it up, less the friction of the working parts of the mechanical device to which it is attached. See our answer to A. V. N., on this page.

J. H. asks: How is gelatin rendered sensitive to light, so that it still retains its normal appearance? A. We have seen the following given as one method of sensitizing gelatin: Take 26 ozs. gelatin and 14¼ ozs. bichromate potash, dissolved in 8 ozs. warm water; when cooled to 110° Fah. add 2 ozs. albumen from perfectly fresh eggs, and mix the whole well. Coat sheets of paper on one side and hang up in a dark room to dry; when dry, glaze them by pressure if desired.

W. F. B. asks: How can fabrics be rendered waterproof by paraffin? A. By saturating them with the varnish, a solution of paraffin in naphtha.

W. M. asks: How can emery wheels be softened, so that they can be turned? A. Emery wheels are not softened to turn them; some may be turned by simply wetting them as they run, others are turned with a piece of red hot iron, still others are turned with a diamond tool. You had better consult the maker of the wheels, who will probably instruct you as to the method of turning your particular kind of wheel.

A. W. P. asks: 1. Can you give me a good recipe for removing fly specks off picture frames and other gilt woodwork? A. Use tepid water and a fine sponge.

2. Can you tell me how engraving on wood is done, and what are the principal tools? A. There are only four kinds of tools necessary in wood engraving, namely: gravers, tint tools, gouges or scoopers, and flat tools or chisels. The graver is used for nearly all kinds of work except for series of parallel lines, technically called "tints;" tint tools are chiefly used to cut parallel lines, forming an even and uniform tint, such as is usually seen in the representation of a clear sky in wood cuts. Gouges of different sizes are used for scooping out the wood near the center of the block; while flat tools or chisels are chiefly employed in cutting away the wood towards the edges. Refer to some good work on the subject.

D. D. D. asks: 1. What is meant by the swing of a lathe? A. The swing of a lathe means twice the distance from the center to the nearest edge of the bed, or, what is the same thing, the diameter of the largest piece of work the lathe will take in.

2. Joshua Rose says: "All screw-cutting tools, such as taps, dies, etc., reamers, and cutters, should be tempered to a brown color, drills to a bright purple, and chipping chisels to a blue. How are the different colors imparted to the tools? A. A piece of steel made red hot and dipped in water is hardened right out; if it is then placed on a piece of hot iron or in a tube, as explained in No. 2, current volume, the colors will come on the steel of themselves, beginning with straw color and ending with blue. After the steel has been dipped, clean one face bright with a piece of grindstone or with emery paper, to make the colors show brightly. As to binding the SCIENTIFIC AMERICAN, suit your own convenience.

W. P. B. asks: 1. Why is white harder to see in the dark than any other color? A. You have evidently made a mistake. White may be perceived in a dark room in which all the other colors and tints are invisible, for the reason that it is the presence of all the colors. In a room which is perfectly dark, no color or object whatever is visible.

2. Does the moon affect the growth of plants during the night? A. No.

3. How are the common toy torpedoes made? A. Fulminate of mercury is mixed with a quantity of small pebbles or coarse sand.

L. A. H. asks: 1. What are the properties of the Conte crayon? A. The Conte crayon is principally composed of carbon.

2. Does it act as a preserver when thoroughly rubbed into the material upon which the drawing is made? A. No.

3. Is the Conte crayon drawing known to be absolutely durable, and incapable of fading or changing as pictures of other material are known to be? A. Yes; carbon is affected by acids, gases, or sunlight.

4. Will the material alluded to crack or scale off? A. Not if properly cared for.

S. asks: Has the art of photography ever been brought to a degree of perfection, such as to enable an artist to take the photograph of a span of horses while drawing a sleigh at the rate of ten miles per hour? A. Yes. Instantaneous photographs may be taken of all kinds of objects in motion.

W. A. B. asks: 1. Will the copper injure the silver solution, when using a coin silver anode? A. Yes. 2. How can I separate the copper from the nickel in the five cent piece? When separated, how shall I make it into nickel solution without melting it? A. By precipitating the copper as a sulphide from a solution in nitric acid. 3. Will a nickel five cent piece, hammered out, do for an anode in nickeling small articles? A. Yes. 4. How can I change Ag Cl into metallic silver without melting it? A. By placing it with a small piece of zinc in dilute sulphuric acid. The silver will be found at the bottom of the vessel in a very minutely divided condition. 5. Can a regular gold 18 carat plate be thrown on by electricity? A. Yes, but we cannot give you the process. Send a specimen of your platinum silver, and we shall have it analyzed for you.

T. C. H. says: While walking along a railroad track on a cold, windy day, I observed a strange shimmering or hazy appearance of the telegraph poles whenever I approached one on the windward side. These poles were of cypress, stripped of the bark, very smooth and straight. They looked as if the wind, in striking them, would divide and pour off on each side in a stream that was clearly visible at a distance of 20 yards. Pursuing the subject further, I took a polished hand saw and held it up by the handle, the blade pointing up towards the sky and the side inclined to the wind at an angle of about 45°; then, by sighting along the back, I could see a perfectly transparent substance (like pure water) flowing upon the blade and trailing to leeward for 2 inches or more. Any inequality or obstruction on the blade would show a corresponding ripple in the stream. This way of "seeing the wind" is entirely new to me; and I have never read anything that explains the phenomenon. A. When the wind strikes against an object, as a tall pole, it becomes divided, pouring off on each side; there is thus a slight condensation of the air as it streams off. Behind the pole there is a slight rarification. Something analogous may be seen as a vessel plows through the water. On each side of the prow the water is heaped up, while at the stern the vacancy left by the moving vessel is immediately filled by water rushing in. Now the two strata of air, just behind the pole, being of different densities, there is a reflection of light from their bounding surfaces which is sensible to the eye. This, we think, is the phenomenon you observed.

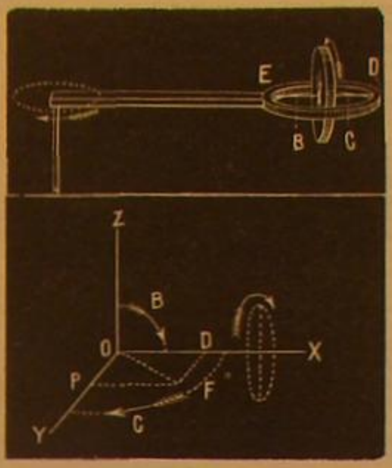
T. A. H. says: 1. I have a small magneto-electric machine, such as is used for medical purposes, and I wish to use the current to produce an electro-magnet, but have not succeeded thus far. Please let me know what length of coil to use, and how to apply it. A. You could not possibly use such a machine as you speak of in making an electro-magnet; you have evidently made a mistake. 2. What motions would be produced in a mass of iron filings resting on a bar of wood that passed through a galvanic coil? A. Your bar of wood would probably take no part in influencing the arrangement of the filings, although they might form on the wood something resembling magnetic curves, due to the induction from the coil itself.

M. R. S. asks: Will it kill shade trees (soft maple) to fill around them to the depth of 18 inches? They are filling in the street in front of my house, and I do not wish to lose the trees, which are large ones, 25 years old. Would you box them for a short distance around the trunk? A. Our attention has often been called to this subject; and we have noticed, in cases where hundreds of trees were partially buried in a similar manner, that in no instance was the result injurious to the tree.

H. B. asks: 1. How many divisions or points are there in a mariner's compass? A. The face of the compass has a star with 32 branches marking the eight points or rhumbs of the wind, the semi-rhumbs, and the quarters.

2. Can you give me a simple way to tell the weight of atmosphere by barometer? A. Weigh an amount of mercury precisely equal to the column of mercury in the barometer, that is, an amount of mercury contained in a tube of the same bore and of equal length as the barometric column. The weight found will be the weight of that much of the atmosphere which presses upon an area equal to the bore of the tube.

3. Can you give me a theory of the gyroscope? A. Suppose all motions of rotation in the direction of the arrows to be positive. Suppose the axis of the



wheel of gyroscope to coincide with the axis of X, taken horizontally. Let the standard coincide with the axis of Z. Set the wheel in motion, and leave it to the action of gravity. During the first instant, the force of gravity will give it a positive rotation around Y. Let v = angular velocity of wheel about X. Let v′ = velocity of wheel about Y. Lay off, on X, O D = v and on Y, O P = v′, and complete the parallelogram. Then will O F represent the resultant axis of revolution and the angular velocity. In moving to its new position, the axis has a retrograde orbital motion about the axis of Z. To construct the resultant axis for the second instant, we must compound these angular velocities. Lay off on a perpendicular to O F and O Z, the angular velocity due to gravity, on O Z the angular velocity in the orbit, and on O F the angular velocity of the wheel. Construct a parallelopipedon on the three velocities and draw its diagonal through O. This diagonal will represent the axis for the second instant. For the next and succeeding instants, proceed as before. Since in each case the diagonal is greater than either of its components, it follows that the angular velocity will continually increase; and were there no hurtful resistances, this increase would go on indefinitely. The effect of gravity is continually exerted to depress the center of gravity of the instrument, while the effect of the orbital rotation is to elevate it. When the latter prevails, the axis of the gyroscope rises; when the former prevails, the gyroscope descends. Whether one or the other of these conditions is fulfilled depends on the velocity of wheel and position of center of gravity of the instrument. If the center of gravity were over the pivot, there would be no orbital motion, nor would the instrument rise or fall. Were the center of gravity on the opposite side of the pivot, the rotation due to gravity would be negative and the orbital motion would be direct.

4. What is the medicine called moxa? I cannot find it in a medical work. A. Moxa is a term employed to designate small masses of combustible matter, burnt on the skin for the ordinary purposes of a cautery. The Chinese moxa is made from leaves of wormwood. Linen, cotton, and spunk from the agaric of the oak is sometimes used for the purpose. The fibers, of whatever kind, may be saturated with combustible matter to further the end.

5. I make a cement for sticking felt and wood together made from shellac and acetic acid. For what purpose is the acetic acid used in this connection? A. With a view, probably, of preventing the action of the air upon the varnish.

6. Why is it that some steel will not harden? A. If the metal is really steel, it will harden. If all the carbon has been removed, it is not steel but wrought iron, and in that case is not capable of being hardened, or at least but very slightly.

7. What is aluminum, its symbol, melting point, and specific gravity? A. Aluminum is one of a group known as metals of the earths. It is a white malleable metal, nearly resembling zinc in color and hardness. It may be rolled into very thin foil and drawn out to fine wire. It conducts electricity nearly as well as silver. It is remarkably sonorous, and emits a clear musical sound when struck with a hard body. It may be heated intensely in a current of air without undergoing more than a superficial oxidation, and is only slowly oxidized when heated to redness in an atmosphere of steam. The symbol of aluminum is Al. The melting point of aluminum is somewhat lower than that of silver. Silver melts at 1873° Fah. Its specific gravity is from 2·5 to 2·67. The price of aluminum is $3 per ounce.

8. What is chloral hydrate, and has it any other name? A. Chloral is a thin colorless oil, greasy to the touch, making grease spots on paper, which, however, soon disappear. Its specific gravity is 1·502. Mixed with a small quantity of water, it solidifies, forming hydrate of chloral = $C_2\,H\,Cl_3\,O,\,H_2\,O$.

W. H. says: I have a recipe for a waterproof glue made by soaking glue in water just sufficient to soften it, then dissolving in linseed oil; it does not mix thoroughly; the glue settles to the bottom. I tried dissolving in oil without softening, but it will not dissolve. What shall I do? A. Cut 5 parts India rubber into small pieces, and dissolve by heat and agitation in 34 parts cold naphtha, chloroform, or benzine; add to this 64 parts of powdered shellac, and heat the whole with constant stirring until the shellac is dissolved; then pour it while hot on metal plates, to form sheets. When used it must be heated to 248° Fah., and applied with a brush.

A. J. J. asks: 1. What are the complexion, color of the hair, eyes, and general appearance of a person who is of a sanguine bilious temperament? A. Complexion florid, hair auburn to red, eyes gray to blue, form finely developed and muscular. 2. What are the lost arts? A. They have never been catalogued. Many relics of antiquity show peculiarities of structure and color which moderns are unable to imitate.

T. W. P. asks: 1. Will you give me a description of the Sargasso or weedy sea? A. Where the Gulf Stream is deflected from the banks of Newfoundland eastward and sends off its more southern branch toward the Azores, is situated the Sargasso sea, "that great bank of weeds which so vividly occupied the imagination of Christopher Columbus, and which Oviedo calls the seaweed meadows." (Humboldt). This Sargasso sea is simply a floating mass of sea weeds of the genus *sargassum*, two species of which are found (*s. vulgare* and *s. bacciferum*) floating in various parts of the Atlantic, Pacific, and Indian Oceans. They are tropical plants, but are often carried about by the winds and currents. The frond is very long and furnished with distinct, stalked, nerved leaves, and simple axillary stalked air vessels. The receptacles are linear in small axillary clusters or racemes. The genus has only been found floating, but there is reason to believe that it is first attached to the bottom in shallow parts of the sea. It floats in large fields, or more frequently in long yellow lines, in the direction of the wind. In crossing the Atlantic, its presence is regarded as a sure indication of the Gulf Stream, by which it is carried north and east. The quantity of weed is often so great as to impede the progress of vessels. Multitudes of small marine animals accompany it, with fishes ready to prey upon them. 2. In rowing, should the right hand cross above the left, or *vice versa*? A. The right above the left.

E. L. S. asks: 1. How can I mount a map so as to have it proof against flies, etc.? A. Common flour paste may be used, to which add ¼ its weight of flour of powdered resin. After it has dried, it should be varnished with either dammar or mastic. From the surface so prepared the specks may be washed with tepid water and soft sponge.

2. Could I convert the whole thing, with its printing and coloring, into parchment paper without injury to the map? A. This could not be done. As to your other question, address the Smithsonian Institute.

W. V. W. says: In reading your article on the *dionea muscipula*, I am led to ask this question in regard to the *helianthus*: What causes it to follow the sun during the day, then, during the night, to return to the east in anticipation of the sun's rising? A. This is a popular notion which, examined into thoroughly, will disprove itself. Several years ago a gentleman of great culture planted an immense number of seeds in shady, sunny, woody, and wet places, to prove or disprove this idea. The majority of the plants faced the sun, and it would be natural for any other plant to do the same. A large number faced to the north, some were bent facing the earth, and the rest faced at different points of the compass. In every instance it was proved that the flower did not move or change its inclination after the bud was formed. Those facing the north never saw the sun, and the others only partially, and they were as healthy as those that faced the sun. Whoever will carefully examine the inclination of a number of sunflowers will find that the heads do not vary from the position in which they first appear, that that position indiscriminately points in every direction, and that the rigid, unyielding, fibrous stalks remain uncontracted by the heat of the sun, and possess no elasticity whatever.

M. G. P. asks: 1. How can I make a kaleidoscope? A. Take two strips of glass 8 or 10 inches long, 1 to 1¼ inches broad at one end and about ½ as broad at the other. Blacken one side of each with black varnish. Put two smooth straight edges together and form a hinge by gluing a strip of cloth over the two edges. Make the angle between the strips of glass an aliquot part of 180°, as 30°, 20°, or 45°. Cover the open side of the triangular prism with black velvet. Place in a tin or pasteboard tube so that the angle of the smaller end of prism is nearly in the center. Cover top of tube with clear glass and cover this with paper except a small hole in center. In bottom of tube form a cell by placing two pieces of glass ¼ inch apart (the lower one of ground glass). In this cell place fragments of broken colored glass, beads, etc. They must be capable of free movement in the cell, when the tube is turned in the hand.

2. Is there any substance which becomes phosphorescent when a galvanic current is passed through it? A. Yes, mercury for instance.

3. How is champagne cider made? A. By bottling before fermentation is complete.

C. H. C. asks: 1. How can I center the lenses of a telescope correctly? How can I tell when they are right? A. Direct your telescope to a star. Place the eyepiece inside of the focus; if in collimation or line with the objective, the light of the star will be arranged in a series of concentric rings; if not in collimation the rings will appear nearer on one side than on the other. Now see that the tail piece of the instrument is as nearly in line as possible with the tube, and then adjust the objective, not interfering with the eyepiece until the rings appear perfectly concentric. 2. Is the rising and setting of the sun reckoned from the middle or the edge? A. From edge to edge measured from the western edge in rising and the eastern edge in setting.

J. M. says, in answer to L. A. G., who asks how he shall build his cistern: Having had some twenty-five years of experience in that business, I would not recommend you to undertake to build a cheap one, as it will be only a waste of time and material. The proper way is to dig your hole in a circular form not exceeding 12 feet in diameter, and deep enough to hold the quantity of water you wish to have in store. Take care to put your hole down as straight as possible, so that when your wall comes to be laid up, all the intervening space between bank and wall may be filled up solid leaving no place to give from the pressure of the water. If there are large spaces that require filling with earth, you should ram it down tightly. Your wall should be at least nine inches thick. Your mortar should be one half bushel of cement to two bushels of good lime mortar, with the joints laid as closely as can be in order to have a good job. A cistern of the diameter I mention can be built without a pier to support the crown; after being finished, it should have a good coat of cement mortar, which I generally make of one half cement to one half of good sharp sand. Your crown and bottom should be equal to the thickness of the sides, unless you have sand to contend with, in that case your bottom should be four inches more.

A. L. G. says, in reply to T. H. R., who asked how to wash a chamois shirt without shrinking or injuring it: Wash in the same way as flannel. Avoid wringing or twisting, and rub between the hands occasionally while drying. Buckskin and sheepskin should also be treated in this manner.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined with the results stated:

W. T.—It is selenite, or naturally crystallized gypsum.—G. A. C.—The substance contains organic matter silica, and a trace of iron.

A. D. B. asks: How can I make cement gravel walks?—J. A. J. asks: How can I kill or drive away house flies?—J. P. A. asks: What effect will a daily application of tincture of ammonia and rain water have on the hair? Is it injurious thereto?—J. W. asks: 1. Can you recommend any practical work on the manufacture of writing inks? 2. Can any of your readers give me the formula of the British government for manufacturing a black, gall ink? 3. Is it better to dissolve aniline crystals and extract of logwood at a boiling or lower temperature? 4. What, if any, is the advantage of adding gum or acetic acid to aniline inks?

COMMUNICATIONS RECEIVED.

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

On Steam Cars. By F. G. W.

On a Cöoperative Restaurant. By G. H. K.

On the Benefits of Using Steam Expansively. By F. C.

Also enquiries and answers from the following:

G. T. U.—H. A. H.—D. J. B.—T. W. P.—L. B. S.—L. B.—L. C.

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.

Enquiries 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 enquiries analogous to the following are sent: "Please to inform me where I can buy sheet lead, and the price? Where can I purchase a good brick machine? Whose steam engine and boiler would you recommend? Which churn is considered the best? Who makes the best mucilage? Where can I buy the best style of windmills?" All such personal enquiries 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

July 7, 1874,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Aerated liquids, fountain for, J. Matthews	152,856
Air pump, C. Perks	152,765
Awning frame, W. H. Wilson	152,891
Bags, etc., wire tie for, J. H. Parkhurst	152,860
Bale tie, cotton, W. C. Banks	152,823
Barge for coal, etc., J. N. Snowdon	152,877
Bed bottom, spring, G. E. Burt	152,723
Boats, construction of, C. G. Johnsen	152,751
Boiler flue cleaner, Priest et al.	152,766
Boiler, steam, P. T. Brownell	152,791
Bolt works for safe doors, W. B. Avery	152,819
Boot heels, trimming, G. B. Dunham	152,732
Boots, nailing, Knowlton & Shepherd	152,847
Boot stretcher, T. Winship	152,785
Boot soles, trimming, Davis & Howe	152,728
Bosom board, C. N. Brainerd	152,824
Bottle, syringe, and stopper, R. S. L. Walsh	152,885
Bouquet holder, button hole, J. A. Kimball	152,804
Bridge top chord, Coolidge & Hemberle	152,798
Bucket, slop, W. T. Gardner	152,837
Burner, lamp, G. R. Lyon	152,852
Cans, device for heading, G. A. Marsh	152,797
Candle holder, W. Ulrick	152,817
Car brake, D. H. Dotterer	152,831
Car, grain, F. W. Wright	152,787
Car spring, J. C. Pickels	152,864
Car hoisting apparatus, Skinner & Gifford	152,873
Car switch attachment, J. B. Stamour	152,878
Caustic alkalies, Juron & Imbert	152,845
Chuck, F. Van Fleet	152,779
Clamp holder, G. C. Converse	152,830
Clothes pin, P. Mutter	152,762
Clothes wringer, E. M. Stevens (r)	5,964
Collar, G. E. Thomas, Sr.	152,816
Cooler, milk, Graves & Powers	152,743
Corn dropper, R. P. Montague	152,806
Corn picking machine, C. McDermott	152,858
Cultivator, J. C. Elliott	152,834
Cultivator, A. C. Tower	152,778
Damper, M. Howles	152,800
Dental impression, Teague & Parker	152,815
Ditching machine, T. F. Cocke	152,792
Door button, E. J. Steele	152,774
Door securer, O. F. Fagerstrom	152,835
Doors, bolt work for safe, W. B. Avery	152,819
Drawer and label holder, Kiedaisch & Wallace	152,754
Elevating cup, grain, Nordyke & Marmon	152,859
Elevator, hay, E. V. R. Gardner	152,838
Elevator, hay and grain, D. Morey	152,760
End gate, J. Sinn	152,773
Equaliser, draft, J. Elder	152,733
Excavator, T. T. Strode	152,882
Explosive compound, C. A. & I. S. Browne	152,790
Fence wire tightener, Westenhaver & Adair	152,781
Fertilizer, antiseptic, R. A. Chesebrough	152,725
File, L. W. Stockwell	152,776
Fire extinguisher, chemical, Lee & Kley	152,850
Fountain, self-acting parlor, G. J. Wenck	152,782
Fruit dryer, J. Allen	152,878
Funnel, S. H. Whitley	152,889
Furnace, hot air, B. T. Babbitt	152,820
Gas fittings, etc., tapping, L. W. Stockwell	152,775
Gas retort, A. C. Rand	152,867
Gas purifying hurdle or tray, G. W. Day	152,729
Gas purifier, deodorizing, Mackenzie & Isbell	152,853
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Governer, valve, and cut-off, A. Johnston	152,750
Grain in the sack, moving, Kenyon et al.	152,753
Grate bar, A. C. Fletcher	152,736
Gun lock, J. M. Garfield	152,839
Harrow and cultivator teeth, S. J. Nason	152,807
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Indicator, C. A. Stebbins	152,879
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Lamp explosions, illustrating, S. C. & C. B. Mann	152,855
Lamp reflector, C. M. Murch	152,761
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Meat cutting machine, C. Schwager	152,768
Medical compound, J. P. Dyer	152,833
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Metal surfaces, ornamenting, K. Goddard	152,741
Motor, electro-magnetic, W. S. Sims	152,772
Nail blank, lasting, W. E. Fischer	152,735
Nails, machine for assorting, J. D. Baird	152,821
Nippers, police, A. P. Baldwin	152,822
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Oil, treatment of cod liver, J. G. Hava	152,746
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Plow, T. L. Webster	152,887
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Pocket book, F. H. Smith	152,875, 152,875
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Press, cotton, J. H. Simonsin	152,812
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Punching machine, G. H. Perkins	152,862
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Railroad gate and signal, W. E. Prall	152,865
Railroad joint, G. H. and W. P. Hall, Jr.	152,745
Railroad rail, V. D. Beach	152,720
Railroad rail, L. A. Perrot	152,863
Railroad signal, J. A. Rose	152,870
Range chimney bottom plate, H. C. Garwood	152,796
Register, air-purifying, J. S. Griffith	152,744
Ring, finger, J. Annin	152,789
Sash fastener, G. Erkson	152,734
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Saw mill head block, S. S. Grannis	152,840
Saw mill head block, W. G. Hearn	152,748
Saws, device for hammering, C. T. Shoemaker	152,872
Separator, grain, K. Schwab	152,767
Sewing machine, H. A. Blanchard	152,721
Sewing machine, D. H. Coles	162,829
Sewing machine, S. H. Hall	152,798
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Sewing machine treadle, R. K. Macadam	152,756
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Spinning frame, J. M. Stone	152,881
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Stencil plate, G. M. Wood	152,736
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Stove leg, K. Evans	152,795
Sugar and cane juice, treating, J. Duncan	152,832
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Table fan attachment, H. T. Tustin	152,884
Table, ironing, Lorenz & Poggendorff	152,755
Table, ironing, W. W. Shallus	152,871
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Thill coupling, M. W. St. John	152,880
Tile machine, J. Whitehead	152,890
Trace carrier, J. Crawford	152,727
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Type distributing machine, J. A. Reynolds	152,869
Type setting machine, J. A. Reynolds	152,868
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Vehicle spring, A. W. Hall	152,841
Vehicle wheel, H. K. Haslett	152,747
Veneer, artificial, D. Holmes (r)	5,960
Wagon seat, W. A. Lamb	152,848
Wagon clothes, apparatus for, K. Jacobi	152,843
Washing machine, J. M. Addleburger	152,818
Washing machine, J. S. Heagen	152,799
Washing machine, Newell & Stallings	152,808
Water wheel, T. Flinn	152,738
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Weighing machine, registering, J. F. Keeler	152,752
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Work holder, W. W. Tunis	152,883
Yacht, etc., after hull of, E. E. Middleton	152,805

APPLICATIONS FOR EXTENSIONS.

Applications have been duly filed and are now pending for the extension of the following Letters Patent. Hearings upon the respective applications are appointed for the days hereinafter mentioned:

30,290.—ORE SEPARATOR.—W. O. Bourne. Sept. 23.
30,297.—REFLECTING LANTERN.—R. Cathcart. Sept. 23.
30,345.—IRON CHIMNEY TOP.—J. Pettengill. Sept. 23.
30,357.—PLOW.—M. G. Slemmons. Sept. 23.
30,371.—WASH BENCH.—S. Wiswell. Sept. 23.
30,358.—CUTTING BOOT HEELS.—E. T. Green. Sept. 23.
30,400.—SOCKET COUPLING.—E. P. Gleason. Sept. 30.
30,442.—FILING GIN SAWS.—S. Yeatman. Sept. 30.
30,446.—MAGAZINE FIREARM.—B. T. Henry. Sept. 30.
30,480.—PUMP.—W. J. Johnson. Oct. 7.

EXTENSION GRANTED.

29,005.—CENTER BOARD VESSEL.—C. E. Ketchum et al.

DESIGNS PATENTED.

7,525 and 7,526.—CARPETS.—J. Hill, Philadelphia, Pa.
7,527.—NON-CONDUCTING PLATFORM.—H. L. Palmer, Brooklyn, N. Y.
7,528 to 7,530.—CARPETS.—T. J. Stearns, Saxonville, Mass.
7,531 to 7,533.—SHAWLS.—C. H. Landenberger, Phila, Pa.
7,534.—IRON CORNICE, ETC.—J. A. Niman, Mansfield, O.

TRADE MARKS REGISTERED.

1,862.—HAIR DRESSING.—D. Benliss, New York city.
1,863.—STOVES.—Burdett & Co., Troy, N. Y.
1,864.—OLEINE SOAP.—W. Conway, Philadelphia, Pa.
1,865 and 1,866.—FAMILY FLOUR.—Day & Co., Minneapolis, Minn.
1,867.—COLOGNE WATER.—F. F. Drexel & Co., Baltimore, Md.
1,868.—OATMEAL.—A. M. Johnston & Co., Rockford, Ill.
1,869.—BOTTLED BRANDY.—H. B. Kirk & Co., N. Y. city.
1,870.—CIGARS.—Seidenberg & Co., New York city.
1,871.—CANDLES.—W. H. Woods & Co., Cincinnati, O.

SCHEDULE OF PATENT FEES.

On each Caveat	$10
On each Trade Mark	$25
On filing each application for a Patent (17 years)	$15
On issuing each original Patent	$20
On appeal to Examiners-in-Chief	$10
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On an application for Design (3½ years)	$10
On application for Design (7 years)	$15
On application for Design (14 years)	$30

CANADIAN PATENTS.

LIST OF PATENTS GRANTED IN CANADA

JULY 8 TO 16, 1874.

3,613.—F. Paterson, Kingston, Frontenac county, Ont. Improvements on portable apparatus for loading and unloading vessels, called "Paterson's Portable Loader and Unloader." July 8, 1874.

3,614.—F. Paterson, Kingston, Frontenac county, Ont. Improvements on steamboats, called "Paterson's Steamboat." July 8, 1874.

3,615.—R. M. Caffall, Alton, Hants county, England. Improvements on appliances for and means of automatically preventing the back rush of gas from gasometers for purifying the gas, and for improving the brilliancy of the lights or flames of gas, called "Caffall's Self Acting Safety Valve." July 8, 1874.

3,616.—J. Scott and A. Scott, Richmond, District of St. Francis, P. Q. Improvements on force pumps for elevating water, etc., and also adapted to fire engines, called "Scott's Improved Pump." July 8, 1874."

3,617.—R. M. Caffall and A. Thomas, London, England. Improvements on apparatus or movable extension pieces for sealing and unsealing dip pipes in gas hydraulic mains when required, called "Caffall & Thomas's Movable Seal for Gas Dip Pipes." July 8, 1874.

3,618.—J. S. Perry and A. Dickey, Albany, Albany county, N. Y., U. S. Improvements on heating stoves, called "Improvements on Heating Stoves." July 8, 1874.

3,619.—G. M. Hinkley, Milwaukee, Milwaukee county, Wis., U. S. Improvements on saw guides, called "Hinkley's Saw Guide." July 8, 1874.

3,620.—T. Robertson, Toronto, York county, Ont. Improvements in lozenge-making machines, called "Robertson's Lozenge Machine." July 8, 1874.

3,621.—S. P. M. Tasker, Philadelphia, Philadelphia county, Pa. Improvements on a metallurgical furnace, called "Tasker's Metallurgical Furnace." July 8, 1874.

3,622.—H. Strait, Troy, Rensselaer county, N. Y., U. S. Improvement on potato diggers and gatherers, called "Strait's Potato Digger and Gatherer." July 8, 1874.

3,623.—A. Strange and E. H. Cornish, London, England. Improvement on machinery for preparing spinning or throwing and doubling cotton, silk, wool, and other fibrous or filamentous substances, called "Strange & Cornish's Spinning Apparatus." July 8, 1874.

3,624.—T. Barnes and R. H. Hudgin, township of Harwick, Kent county, Ont. Improvements on farm and carriage gates, called "Barnes & Hudgin's Farm and Carriage Gate." July 8, 1874.

3,625.—J. H. Wentworth, Boston, Suffolk county, Mass., U. S., assignee of B. Simpson, same place. Improvements in stoves, called "The Improved Stove." July 8, 1874.

3,626.—B. Scott, Brighton, Beaver county, Pa., U. S. Improvements on rail joint for railways, called "Scott's Clamp Truss Joint." July 8, 1874.

3,627.—H. Sweitzer (administrator of the late W. Sweitzer), township of Stephen, Huron county, Ont. Improvements on fanning mills, called "Sweitzer's Improved Labor Saving Fanning Mill." July 9, 1874.

3,628.—J. Hedges, West Wareham, Plymouth county, Mass., U. S. Améliorations aux ravaudeurs de boyaux, dit "Ravaudeur amélioré de boyau." (Improvements in hose.) July 9, 1874.

3,629.—H. M. Welch, Cowansville, Missisquoi county, P. Q. Improvements on steam cooking apparatus, called "Welch & Lewis' Steam Cooker." July 13, 1874.

3,630.—T. H. Price, Lafayette, Tippecanoe county, Ind., U. S. Improvements on heating apparatus for sleighs and carriages, called "Price's Heating Apparatus for Sleighs and Carriages." July 13, 1874.

3,631.—G. Walkey, Toronto, York county, Ont. Improvements in refrigerators, called "Walkey's Refrigerator." July 13, 1874.

3,632.—Levi Sutton, Ottawa, Putnam county, O., U. S. Improvements in automatic car couplings, called "Sutton's Automatic Car Coupling." July 16, 1874.

3,633.—John Noyes, Barnston, Stanstead county, Quebec, assignee of H. A. Cook, Boston Suffolk county, Mass., U. S. Improvements on artificial stone, called "Noyes' Artificial Stone." July 16, 1874.

3,634.—J. J. Lappin, Toronto, Ont. Improvements on car couplers, called "Lappin's Improved Self Acting Car Coupler." July 16, 1874.

3,635.—J. Vivian, London, Ont., assignee of C. Luxton, Hudson City, N. J., U. S. Improvements on peat machines, called "Luxton's Cutting, Compressing and Filtering Peat Machine." July 16, 1874.

3,636.—A. Walker, Mornington, Perth county, Ont. Improvements on broadcast seed sowers, called "Walker's Broadcast Seed Sower." July 16, 1874.

3,637.—J. Milton House, Orillia, Simcoe county, Ont. Improvements on shingle and heading machines, called "House's Shingle Machine." July 16, 1874.

3,638.—H. Thorne, assignee of P. Oakley, Toronto, York county, Ont. Extension of No. 8, called "Oakley's Lock Washer." July 16, 1874.

3,639.—J. Lott, Liverpool, Lancaster county, England. Improvements on an apparatus for trimming the edges of straps, called "Lott's Strap Trimmer." July 16, 1874.

3,640.—J. G. Scott, St. Thomas, Montmagny county, Quebec. Improvements in brakes for stopping railway cars and generally to arrest the revolution of wheels, called "Scott's Patent Brake." July 16, 1874.

3,641.—H. Henika, M. F. Carder and O. M. Allen, Kalamazoo, Kalamazoo county, Mich., U. S. Improvements on burial caskets, called "Henika & Carder's Globe Burial Casket." July 16, 1874.

3,642.—G. F. Simonds and J. A. Farson. Improvements in tempering and forming articles of steel and steel mixed with iron, called "Simonds & Farson's Improved Process for Tempering and Forming Articles of Steel." July 16, 1874.

3,643.—J. E. Landers, New Bedford, Bristol county, Mass., U. S. Improvements in flower pots, called "Lander's Improved Double Interlocking Flower Pot." July 16, 1874.

3,644.—W. Duchemin, Boston, Suffolk county, Mass. U. S. Improvements in turned shoes, called "Duchemin's Improvement on Turned Shoes." July 16, 1874.

3,645.—A. D. Cable, assignee of T. Gill, Montreal, P. Q. Improvements on faucets, called "The Dominion Compression Valve Cock." July 16, 1874.

3,646.—J. Prince and M. D. Martin, North Troy, Orleans county, Vt., U. S. Improvements on milk pans, called "Prince & Martin's Milk Pans." July 16, 1874.

3,647.—C. Robinson, Cambridge, Middlesex county, Mass. U. S.—Improvements on combined washing and wringing machines, called "Robinson's Combined Washer and Wringer." July 16, 1874.

3,648.—R. M. Wanzer, assignee of J. B. McCune, Hamilton, Wentworth county, Ont. Improvement in sewing machine, called "McCune's Reversed Feed for Sewing Machine." July 16, 1874.

3,649.—L. Harrington, Brooklyn, Kings county, N. Y. U. S. Composition of oleaginous substances and improvement in the art or process of preparing the same for the manufacture of artificial butter, called "Harrington's Manufacture of Artificial Butter." July 16, 1874.

3,650.—D. N. B. Coffin, Jr., Newton, Mass., U. S. Improvements on screws for imparting motion to machinery, called "Improvements on Screws for Imparting Motion to Machinery." July 16, 1874.

3,651.—A. Anstead, Gananogue, Leeds county, and R. Cross, Lansdowne township, Leeds county, Ont., Machine for holding the bar of reapers and mowers when being ground, called "Anstead & Cross' Holder for Grinding Reapers and Mowers." July 16, 1874.

3,652.—S. W. Shorey, Boston, Suffolk county, Mass., U. S. Improvements on cutting and trimming attachments for sewing machines, called "Shorey's Cutting and Trimming Attachment for Sewing Machines." July 16, 1874.

3,653.—A. Gould, Bangor city, Penobscot county, Me., U. S. Improvements on machines for cutting and embossing leather, etc., called "Gould's Leather Cutting and Embossing Machine." July 16, 1874.

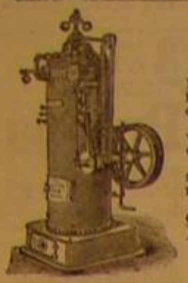
3,654.—D. V. Wood, Hoboken, N. J., U. S. Improvements on steam hammers, called "Wood's Steam Hammer." July 16, 1874.

3,655.—W. Hamilton, Erie, Erie county, Pa., U. S. Improvements on lubricators, called "Hamilton's Steam Needle Lubricator." July 16, 1874.

3,656.—J. Newhall, Hunterstown, Muskinonge county, P. Q. Improvements on attachments for wash boilers, called "Newhall's Adjustable Attachment for Wash Boilers." July 16, 1874.

3,657.—T. D. Hodgens, London, Middlesex county, Ont. Improvements on gas generators for manufacturing gas, called "The Hodgens Improved Gas Generator. July 16, 1874.

THE
TRADE ENGINE.



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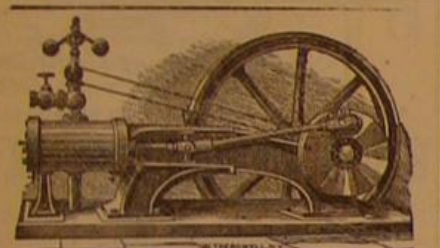

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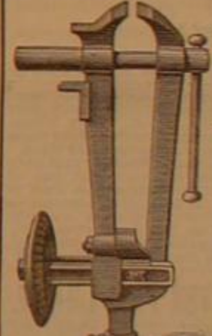

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