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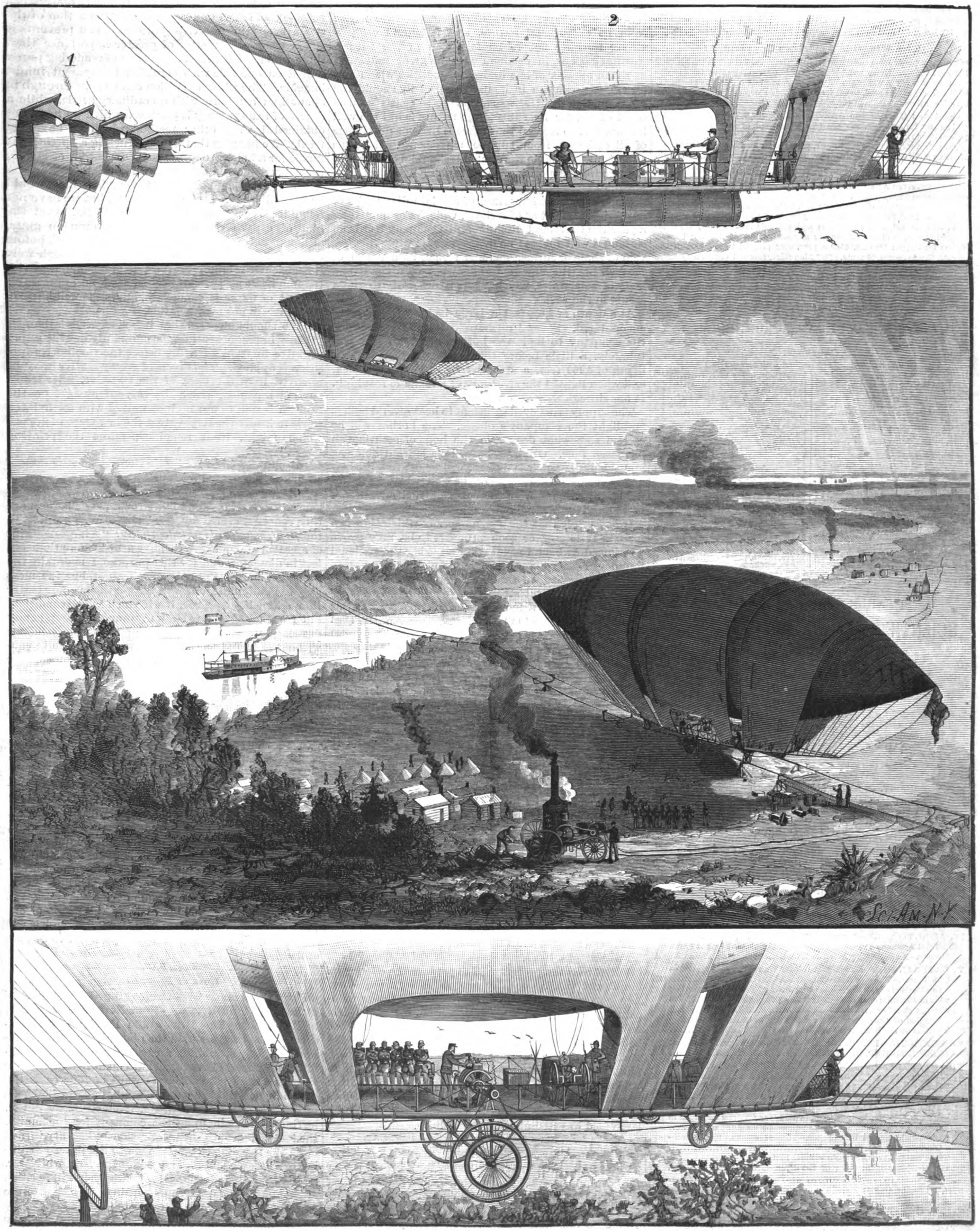

GEN. THAYER'S DIRIGIBLE BALLOONS.—[See page 405.]

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NEW YORK, SATURDAY, DECEMBER 26, 1885.

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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 521,

For the Week Ending December 26, 1885.

Price 10 cents. For sale by all newsdealers.

NATURAL GAS NOTES.

The Allegheny River was recently the scene of a serious accident, occasioned by the collision of the tugboat Iron City with the natural gas main crossing the stream. When the boat struck the pipe, a leak was made, and the natural gas forced the water twenty feet into the air. This was quickly followed by an explosion, and the whole hull of the boat from stem to stern was torn to pieces. The gas came up on both sides of the vessel, and filled the hold. As soon as it reached the engine room it became ignited, and the explosion followed. The flame of the burning gas hissed and roared around the boat, and had the wind not carried it down stream, none of the crew could have escaped. As it was, they were all, with one exception, more or less seriously injured. This accident deserves notice from its exceptional nature, and it should carry a strong warning not to be forgotten in the future. Natural gas has, in common with its great industrial merits, a number of less desirable qualities which call for extreme caution in its use. Especially should the pipes used in its transportation be so constructed as not to leak, for its suffocating nature is but too well known, and so located that there is little or no chance of disturbance from surface movements. It seems almost inexplainable that a main should be placed in so unguarded a position as to make a river collision possible.

Among the most important of the late discoveries of natural gas is that at Cleveland, Ohio. For more than a year the Cleveland Rolling Mill Company has been sinking a well for gas on a lot near its wire mills. A vein of shale or surface gas was struck at a depth of 750 feet, but the flow was almost cut off by a strong body of salt water, which made it necessary to put a casing in the well.

At a depth of 2,050 feet a large bed of rock salt was encountered. Several mishaps occurred, and decided the company to limit the boring to 3,200 feet. Fortunately, a little before this point was reached, at a depth of 3,160 feet, a strong vein of gas was struck, and when lighted the stream gave a flame 18 feet high. It has since decreased to ten feet.

The supply is believed sufficient to heat several boilers and light the company's offices. The boring will be carried somewhat deeper, in the hope of securing an increased flow. Other wells will be started at once, and the discovery, it is hoped, will be of great importance to the iron industries of the city, which have undoubtedly suffered from the superior fuel advantages of Pennsylvania localities.

It is possible that the gas monopoly which is in full force in Pittsburg, or soon promises to be, may prove a serious drawback to that city, securing the national foundry for ordnance. The Philadelphia Gas Co., which has control of the greater portion of the city's supply, has a capital stock of five millions, and is already regarded as a monopoly almost as powerful as that of the Standard Oil Company. Mr. Andrew Carnegie, our author ironmaster, has associated several leading firms with him in a scheme for building the largest steel plant yet known in America, and it is their ambition to make themselves the only firm in the country able to cast the great guns wanted by the Government. The proposed plant consists of a pair of open-hearth furnaces, two seventeen ton Bessemer converters, and hydraulic machinery capable of forging the heaviest armor plating needed. Mr. Randall, however, looks with disfavor upon the gas monopoly, and while he admits the advantages of natural gas, he sees a power which may at any time make it more expensive than coal. He has expressed himself as believing that this consideration will seriously interfere with Pittsburg's prospect of securing the national contracts.

Mr. Westinghouse, the patentee of the famous compressed air brake, and other gentlemen identified with the natural gas interests, have been experimenting with the Flannery process of making water gas. There are already one hundred and fifty cities in the United States which use this gas as their sole illuminant. The gas has strong heating qualities, but needs carbureting before it can be used as an illuminant.

Natural gas has almost the same defects, and it is believed that the process used to prepare the one for an illuminant will be equally successful with the other. The contract for the erection of the necessary machinery for carrying this proposition into effect has now been made, and it is expected that the plant will be ready for operation some time in January. The inventor of the process, Mr. Jos. Flannery, of Philadelphia, has taken out a number of patents, and claims to be able to produce an excellent illuminant free from impurities and smoke. Should his claims be substantiated by the practical test, the illuminant will find a large field in Pittsburg and the vicinity.

PHOTOGRAPHIC NOTES.

Rendering Paper Negatives Transparent.—Castor oil is generally recommended to be used in making paper transparent, but, as it soon drys out in spots, its value is only temporary; a more permanent method we find recommended in the *Photographic News* is as follows:

"A mixture of one part of lubricating paraffine is made with three or four parts of vaseline. This is thickly smeared on the back of the negative, and the front of this latter is held in the steam issuing from the spout of an ordinary kettle, at a distance from it of about an inch. Almost instantly the back of the negative turns white opposite to where the steam is playing. This is always a sign that the material used has sunk into the paper, and that when the negative has become cool it will be transparent. The action of the steam keeps the negative quite limp, and prevents it from curling up, a matter of greater importance than those who have not tried the process of rendering paper coated on one side with emulsion transparent might imagine. The whole operation can be gone through in about half a minute with an ordinary kettle, while a degree of transparency is produced which we have not obtained by any other method which we have yet tried. We imagine that by constructing a special flat nozzle for a kettle, so as to produce a flat jet of steam, the operation could be performed in a few seconds.

"It might be supposed that the emulsion films would be melted by the heat of the steam, but we have not found it so. Indeed, a jet of steam will not affect the film of a pyro developed negative, even on glass, although in this case water enough is condensed, before the glass is heated, to melt the film readily enough were it sufficiently soluble. In the case of a paper negative the film heats so instantaneously that no appreciable amount of water is condensed, and, as is well known, dry heat will not melt gelatine.

"We should mention that it is always advisable, especially in damp weather, to thoroughly dry the paper negative in front of a fire before the vaseline composition is applied. The excess of greasy matter may be removed from the back of the negative, after transparency is gained, with a dry rag. If any get on the front, it is well to use a cloth wetted with methylated spirit to insure the removal of the last trace of grease, which might, if it remained, affect the printing paper."

The oil referred to is heavier than ordinary paraffine, and is such as is used for lubricating purposes.

Directions for Working a Four-wick Oil Lantern.—The advantages of an oil light for a magic lantern are thus concisely stated by Mr. Thomas W. Thornton in the *British Journal of Photography:* "A large majority of amateurs do not care to have a disk more than ten feet in diameter, and for this purpose I maintain the four-wick lamp is not only the cheapest, but the most easy to manipulate, and will answer the purpose better than a lime light. True, it will smell in bad condition, but I will undertake to show my four-wick lamp in any drawing room in the presence of the most fastidious without causing them the least inconvenience in consequence of the smell or dirt. My method of working is as follows:

"First and foremost, clean your lamp yourself, and after every exhibition pour out the oil into a bottle, take out the wicks, carefully dry them, and cut the tops into a very flat arc or segment of a circle; when the lamp is again required, pour in the oil very carefully, so as not to spill on to the lamp, and, as an extra precaution after filling, wipe it thoroughly with a dry duster, and then polish with a wash-leather; by keeping the lamp scrupulously clean, any slight trace of dirt or drop of oil is readily seen and as easily removed. Then light your wicks, turning them down very low, and allowing them to burn at least ten minutes before they are turned up full. If this is done, the lamp will burn for at least two hours and a half without attention, or smell, or dirt, and give a brilliantly illuminated ten foot disk, with the minimum of cost, and work, and worry. But let the lamp get into the hands of one who does not understand its peculiarities, and it will smell and fume until it drives its possessor to the use of bad language or worse."

Loss of Plate Glass.

Upon the steamer Critic were shipped eight cases of plate glass for conveyance from Newcastle, England, to New York. The British and Foreign Marine Insurance Company insured the plate glass against damage caused by stranding, fire, shifting of cargo, or contact with water. The voyage was made in tempestuous weather, and by the tilting forward of four cases the glass in them was broken, although the cargo had been properly stored. The owners, Semon, Bache & Co., having made claim upon the company for indemnity, the loss being $816.26, the question of liability turned upon the meaning to be attached to the phrase "shifting of the cargo." Ex-Judge Fancher, as arbitrator, has decided that the change of five inches in position of the tops of the cases came within the meaning of the clause, the language to be taken most strongly against the party using it, and that the claim for the insurance money was valid.

ASPECTS OF THE PLANETS FOR JANUARY.

VENUS

is evening star, and easily wins the first place on the January record, for during the month she takes on her brightest phase. On the 13th, at noon-day, she reaches her period of greatest brilliancy as evening star. There are two of these periods. One occurs thirty-six days before inferior conjunction, when she is evening star, as at present. The other occurs thirty-six days after inferior conjunction, when she is morning star. On these occasions, she is 40° distant from the sun, and appears as a waning crescent, with about one-fourth of her disk illuminated. Before the period of greatest brilliancy, her increasing diameter as she approaches the earth more than counterbalances the loss of light as less and less of her illumined face is turned toward us and her light increases. After this period, the loss of light more than counterbalances the increasing diameter, and her light grows dim. When she first becomes evening star, her diameter is 10″. When she closes her course, her diameter is about 64″.

There is no necessity for calling attention to this beautiful star during the month, for no one can look at the western sky in the early evening without feeling the spell of her presence, and wishing to imprison her there forever. This fascinating planet will repay close attention under her present conditions for observation. For, when most brilliant, she casts a perceptible shadow, as may be easily seen. She is also visible at noon-day to the naked eye, when her position is known, and the atmosphere is clear and calm, appearing like an intense white point in the sky. She is most lovely in the telescope when seen in daylight as a crescent of pearly luster growing larger, sharper, and thinner as she pursues her course. The fact of her approach to the sun may be easily verified by intelligent observers who watch her position night after night, and note the lessening time of her stay above the horizon. Her light will be lost in the evening sky, 36 days after she glows in her brightest colors, and 20 months must pass before she comes round again to her present position in the heavens. Venus lacks but one element for making her conditions for observation as perfect as possible. She is not in her highest northern declination, although she is turning her steps rapidly northward.

The right ascension of Venus on the 1st is 21 h. 53 m.; her declination is 13° 4′ south; her diameter is 34″; and she is in the constellation Capricornus.

Venus sets on the 1st soon after 8 o'clock in the evening; on the 31st she sets about a quarter after 7 o'clock.

SATURN

is evening star. He wins the second place on the monthly record, for he is the sole planet visible in the early evening sky in the eastern portion of the heavens. He is almost bright enough to dispute the starry sovereignty with his fairer rival, who holds her court in the west. He has this advantage, for while Venus sinks below the horizon a few hours after sunset, Saturn graces the sky the livelong night, serenely shining among the brilliant galaxy of stars that sparkle in the winter sky. He is one among them, but not of them, for while they pierce the star depths with their own inherent light, his light is borrowed from a sun far less in size than many of the bright points sparkling around him. Saturn is still beautiful to behold; though perihelion and opposition have passed, he has not yet reached his highest northern declination. He scarcely changes his position during the month, though slowly retrograding in his course.

On the 10th, Saturn occults Mu Geminorum, a star of the third magnitude. Unfortunately, the phenomenon occurs at 5 o'clock in the morning, when Saturn is too near the western horizon for observation; star and planet will, however, be near each other during the night. The occultation of a large star by a planet is a rare occurrence, and observers may thank their stars if they are so situated as to see the sight.

The right ascension of Saturn on the 1st is 6 h. 19 m.; his declination is 22° 32′ north; his diameter is 19·4″; and he is in the constellation Gemini.

Saturn sets on the 1st a quarter before 7 o'clock in the morning; on the 31st he sets soon after half past 4 o'clock.

JUPITER

is morning star. Those who watch the breaking of the dawn will find him a superb object in the morning sky, brightly glimmering in the rosy or golden light that heralds the sun's approach from his high position in the zenith.

Jupiter and Uranus, who have long been near each other, meet and pass on the celestial road. The conjunction takes place on the 24th, at 8 o'clock in the morning, Jupiter being at the time 1° 51′ northwest of Uranus.

Jupiter is becoming more favorably situated for observation as he approaches the earth. Astronomers have already begun to take advantage of the improved conditions. Mr. Denning, a specialist in Jovian interpretation, observed the famous red spot on the morning of the 25th of October. He describes it as plainer than it was when seen on the 8th of July—his latest observation before the conjunction of the planet—though not so dark as the equatorial belt, nor nearly so conspicuous as it was five or six years ago. The spot was distinctly outlined, notwithstanding the low altitude of Jupiter, and retained nearly the same size and shape as when previously seen. This marking has now been observed for seven years, and its present aspect seems to foretell that its existence will be indefinitely prolonged. It may therefore be regarded as a feature of singular permanency. The prospect is that during the coming opposition the red spot will attract general observation. Astronomers have always the excitement that something unexpected may reward their patient work. It is not impossible that during the present year light may dawn upon the meaning of the mysterious red spot, so long an unsolved problem. Amateur observers sometimes find prizes where scientists fail; astronomical triumphs are gained by those who have not yet won their laurels.

The right ascension of Jupiter on the 1st is 12 h. 22 m.; his declination is 0° 58′ south; his diameter is 35·8″; and he is in the constellation Virgo.

Jupiter rises on the 1st about a quarter past 11 o'clock in the evening; on the 31st he rises about half past 9 o'clock.

MARS

is morning star. He keeps on his monotonous course, meeting with nothing of importance on his way, but growing larger and taking on a more ruddy tint as he draws near the earth.

The right ascension of Mars on the 1st is 11 h. 35 m.; his declination is 5° 48′; his diameter is 9·6″; and he is in the constellation Virgo.

Mars rises on the 1st soon after 10 o'clock in the evening; on the 31st he rises about half past 8 o'clock.

MERCURY

is morning star. He is at his greatest western elongation on the 8th, at 7 o'clock in the morning. He is then 23° 26′ west of the sun. If it were not for his great southern declination, he would be visible to the naked eye, at and near elongation, in the morning sky before sunrise. A sharp-eyed observer who knows his exact position may succeed in finding him.

The right ascension of Mercury on the 1st is 17 h. 18 m.; his declination is 20° 32′ south; his diameter is 7·6″; and he is in the constellation Scorpio.

Mercury rises on the 1st at half past 5 o'clock in the morning; on the 31st he rises about a quarter past 6 o'clock.

URANUS

is morning star. His conjunction with Jupiter on the 24th has already been referred to.

The right ascension of Uranus on the 1st is 12 h. 29 m.; his declination is 2° 22′ south; his diameter is 3·6″; and he is in the constellation Virgo.

Uranus rises on the 1st about half past 11 o'clock in the evening; on the 31st he rises about half past 9 o'clock.

NEPTUNE

is evening star. At the close of the month, Neptune, Saturn, and Venus are on the western side of the sun, and are evening stars. Mars, Jupiter, Uranus, and Mercury are on the eastern side of the sun, and are morning stars.

The right ascension of Neptune on the 1st is 3 h. 24 m.; his declination is 16° 50′ north; his diameter is 2·6″; and he is in the constellation Taurus.

Neptune sets on the 1st about half past 3 o'clock in the morning; on the 31st he sets about half past 1 o'clock.

THE MOON.

The January moon fulls on the 20th, at 2 h. 45 m. A. M. The waning moon is in conjunction with Mercury on the 3d, at 1 h. 40 m. A.M., being 2° 34′ north. A close conjunction between the moon and Venus takes place on the 9th, at 1 h. 45 m. in the morning, the moon being 38′ north. Moon and planet are invisible at the time of conjunction, but the three days' old crescent and the evening star will make a charming picture on the evening of the 8th, as they approach their nearest point. On the 15th, the moon pays her respects to Neptune, at 11 h. 36 m. A.M., being 2° 58′ south. On the 18th, she is at her nearest point to Saturn at 7 h. 59 m. A.M., being 4° 8′ south. On the 23d, she is in conjunction with Mars, at 8 h. 43 m. P.M., being 2° 56′ south. On the 24th, 48 m. after noonday, she is very near Jupiter, being 17′ north. On the 24th, she is also near Uranus, at 3 h. 5 m. P.M., being 1° 9′ north.

OCCULTATIONS.

The moon occults both Jupiter and Uranus on the same day for the enjoyment of some favored mortals on the earth's crust. The occultation of Jupiter takes place on the 24th, 48 m. after noonday; that of Uranus on the same day at 3 h. 5 m. P.M., Washington mean time. Observers whose position corresponds with the position of the moon, as seen from the center of the earth, if they are on the dark side of the earth, and between the limiting parallels of 52° north and 20° south, may see the occultation of Jupiter. Under the same conditions the occultation of Uranus will be visible between the limiting parallels of 88° and 36° north. Observers in this vicinity will find on the evening of the 24th that Jupiter has survived the occultation, and is shining with his usual luster, near the moon. The moon also occults Aldebaran. The occultation occurs on the 16th, at 2 h. 4 m. P.M., Washington mean time, an unfavorable hour for our side of the earth.

JANUARY

bears testimony to a quiescent condition of the sun's family. All days are not field days, and our celestial brothers pursue their tireless course with but few meetings and partings on the road. Those who follow the movements of the planets learn to take warm personal interest in these celestial wanderers, feel for them a kind of reverential friendship, a personal ownership as it were. Especially is this the case with the three planets that will brightly shine in the January sky. Venus, to lovers of the star, is the queen, the fairest of the stars. Jupiter is the symbol of royalty, and Saturn is the magnificent potentate among the brotherhood. Venus in the west, Saturn in the east in the early evening, and Jupiter looking down from the zenith in the early dawn, will crown the star-lit beauty of moonless nights throughout the first month of the new year.

Driving at Night.

How to illuminate a road in front of the horses in driving at night is an important matter.

The usual side lamps on carriages, or the attaching of a lantern to the dash board, fail to reflect the light where it is most wanted, and the suspending of a lantern to the front axle is objectionable for many reasons, but it is the best plan for shedding the light where it is the most needed that we have seen tried.

But a Philadelphia physician suggests the attaching of the lantern to the breast collar of the harness, which he says he has tried with perfect satisfaction; and he has evidently had some experience with the ordinary methods of lighting, for he says the various forms of dash lights are pretty much the same, in that they put the light just where it is not wanted, illuminating the horse's tail and hips and the buggy thills with a brilliance quite unnecessary, which intensifies the blackness of the shadow cast by them just where one most wishes to see clearly.

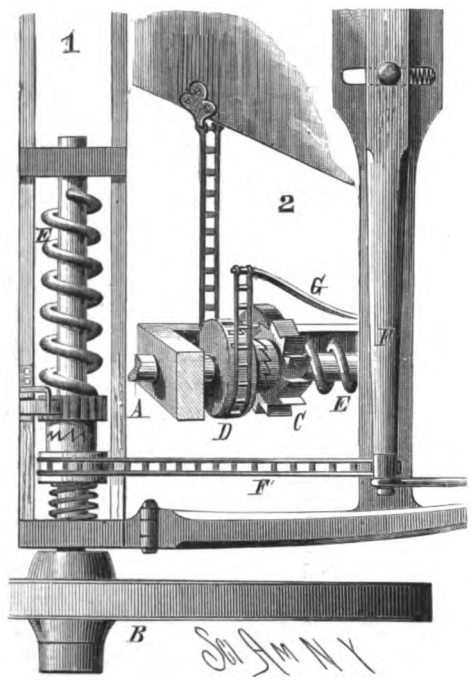
"My light is a common tubular lantern, with a reflector, and a spring for attachment to the dash. In place of putting it on the dash, I slipped the spring over the middle of the breast collar, directly in front of the horse. Every part of the road in front of me was plainly seen, so I could drive with as much confidence as in broad daylight. The conditions necessary for success are a level headed horse, with fair breadth of chest, and a shoulder strap attached to the check hook, to prevent the lantern sagging down between the horse's legs when for any reason the traces slack. It would be well to have a short strap sewed to the inside of the breast collar, to slip the spring through, so as to prevent any lateral motion.

To Make Translucent Paper.

Take a negative on the paper and pin it, paper side up, on a board. Apply butter (cold) all over it, with the fingers; put on plenty. Then hold the negative over a paraffine stove, with the flame turned low. The butter will at once begin to melt. While it is melting, hold it in the left hand, and with the fingers of the right keep the melting butter moving over the less greased portions, and with the left hand move the negative about. Continue till an even surface is obtained, which will be in about five minutes or less, depending on the size of the negative. Then lay, paper side still up, on a board or cloth, and, while warm, rub off the surplus butter with tufts of cotton wool; it will probably be necessary to rewarm the negative several times during this operation. Should any butter, by chance, get on the film side of the negative, warm it and rub it with cotton wool, and it will at once come off. Give a final rub with cotton wool dipped in alcohol, and the negative is ready to print from, and has a fine ground-glass appearance.—*J. Ville, Photo. News.*

DRAUGHT DEVICE FOR VEHICLES.

The device herewith illustrated is designed to assist the draught of vehicles of all kinds by utilizing the jars of draught and the jolting of such vehicles to accumulate power on the axle, in order to give such part a forward motion. The wheels, B, are fixed to stub axles, A, journaled in bearings, as shown in Fig. 1. On each axle is a ratchet wheel, C, having peripheral teeth engaged by a pawl, and edge teeth engaged by what the inventor for convenience terms a "second



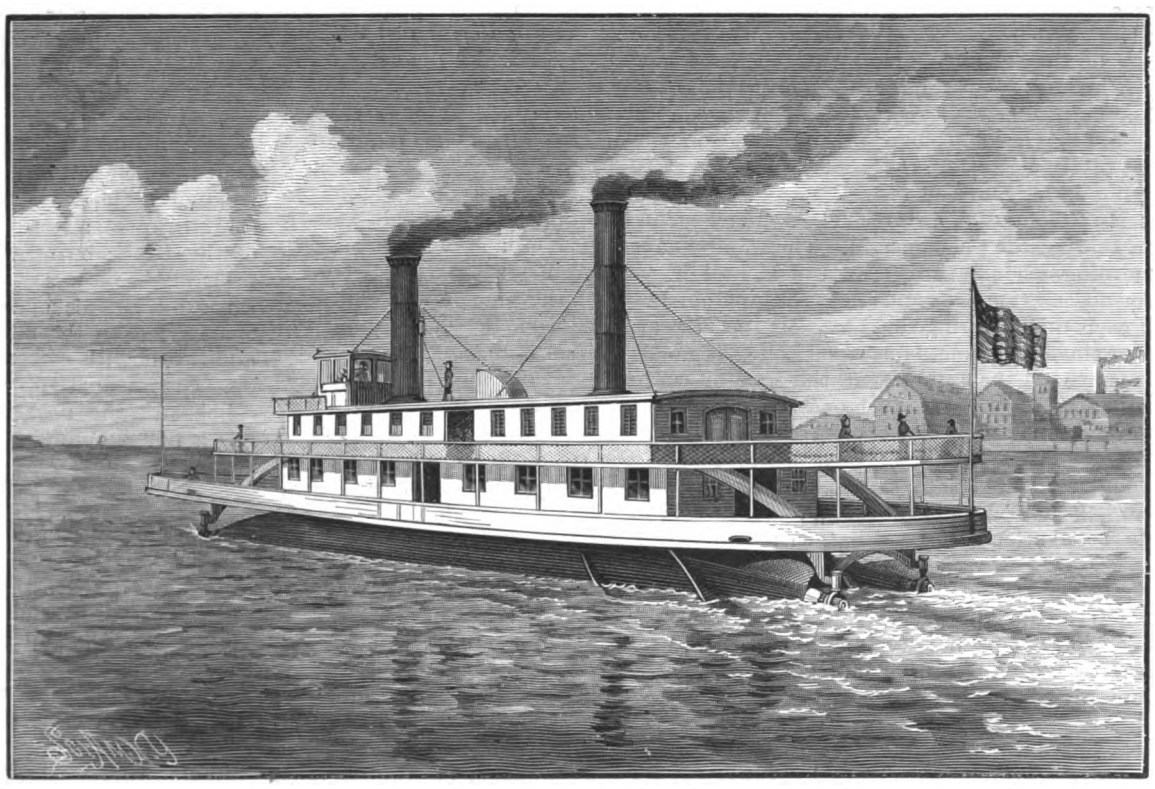
PAESSLER'S DRAUGHT DEVICE FOR VEHICLES.

wheel," D. The whiffletree, F, is pivoted in a slot supplied with a spring to ease the forward motion, as will be understood. From each end of the whiffletree a cog band, F', passes back around the second wheel, and is secured at its rear end to a spring supported by the framing. When the whiffletree is drawn forward, the band turns the second wheel, which also turns the ratchet wheel and contracts the spiral spring, E. The pawl holds the wheel at the point to which it is moved, and the axle is given a forward impulse by the action of the spring seeking to relax itself. The band is drawn back by its spring, when the draught is released by the stopping of the horse or other cause. This backward and forward motion of the connections alternately tightens and permits the spiral spring to impart a forward motion to the axle. In the construction shown in Fig. 2 the chain is connected at one end to the body, and after passing under the second wheel is secured to the spring, G; in this case the operation of the second wheel depends on jolts to depress the body, which in rising will revolve the second wheel.

The inventor of this device, Mr. T. H. Paessler, of Malvern, Ohio, claims that it would be of great use where heavy hauling is done with drays, lumber wagons, etc., and that its use would greatly reduce the labor of running a bicycle or tricycle.

BUOYANT PROPELLER FOR STEAMBOATS.

The two hollow cylindrical floats that support the body of the boat are preferably made cigar-shaped, and each is placed upon a central shaft journaled at their ends in uprights attached to the body, so that the floats may be revolved for propelling the boat. For this purpose the floats are provided with spiral blades at their rear ends. It will be noticed that these blades are only formed for a short distance from the ends of the floats—about one-third of the length—so that the water will not be ruffled directly under, but only in the rear of the float. The various means by which the floats can be revolved will vary according to the shape of the body, which may be in the form of a flat boat decked, as shown in the engraving. One arrangement for operating the floats consists of a crank shaft carrying a gear wheel meshing with a pinion of the float shaft; this gear wheel is connected by an intermediate gear with a pinion on the second float shaft. This invention has been patented by Mr. Wm. Hall, of 178 Bank St., Waterbury, Ct.

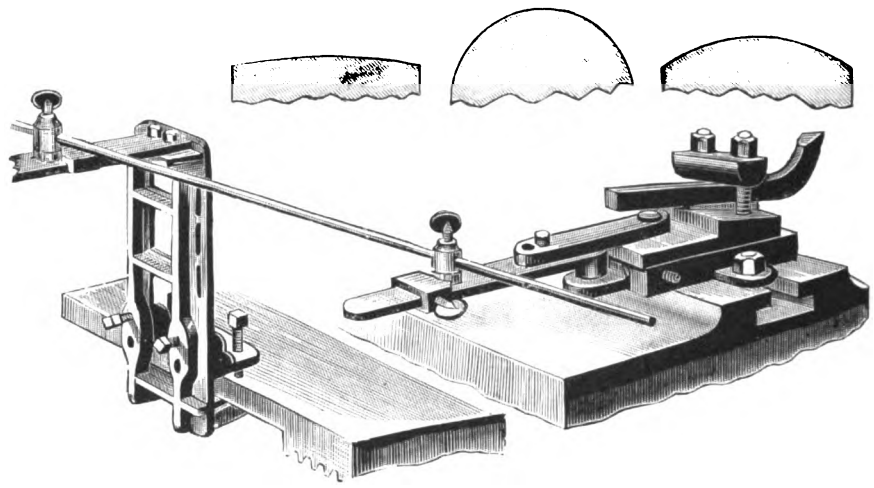


HALL'S BUOYANT PROPELLER FOR STEAMBOATS.

AUTOMATIC PULLEY TURNING ATTACHMENT FOR LATHES.

This attachment consists of a tool holder bolted to an ordinary lathe carriage in place of the tool post. A stand is fastened to bed piece of lathe near the head stock. A small rod from this stand connects with a lever on the attachment. As lathe carriage feeds along, this device causes the tool to describe the segment of a circle. By simply moving the slide on the lever to or from the tool, it will turn all the shapes shown in sections, or any desired shape from a flat to a round face. The attachment will give correct shape to face of pulleys up to 36 inches wide.

As lathe centers do not have to be set over out of line, it will take a heavy chip, and increase the capacity of the lathe from one-third to one-half. It is a simple, practical, and positive working tool. It is manufactured by American Twist Drill Company, Meredith, N. H.



AUTOMATIC PULLEY TURNING ATTACHMENT FOR LATHES.

M. Bartholdi in America.

The eminent sculptor, M. Bartholdi, who has just returned to France, after a visit of a few weeks in America, had several interviews during his stay in this country with the Secretary of War and other members of the committee who are to decide upon the design for the statue of Lafayette soon to be erected at Washington. While no definite contract has yet been made, it is understood that M. Bartholdi will in all probability be the artist selected for the execution of the work. His models are considered by far superior to those submitted by any of the competing artists.

The erection of the statue of Liberty naturally engrossed much of the sculptor's attention. The pedestal cannot be completed before midwinter; and as the statue is of such great size, and must be put up slowly and with the greatest care, the entire work can hardly be completed under about five months. M. Bartholdi proposes that the dedication shall take place on the 3d of next September, the anniversary of the signing of the treaty of Versailles, which secured peace after the war of the Revolution, and guaranteed the recognition of the American republic.

Underground Wires.

The Standard Underground Cable Company, of Pittsburg, have lately laid in this city an experimental electrical cable, connecting the headquarters of the Police and Fire departments. A trench about 4 feet deep was dug along the gutter on the north side of Houston Street, in which a wooden box to contain the cables will be laid. The cables consist of six insulated copper wires pressed in a malleable lead pipe and laid side by side in the boxes. The latter when closed up are to be covered with roofing pitch. All the wires of the fire alarm telegraph running out of the headquarters in Mercer Street are to be removed from the tall masts in front of the building and connected with the underground cables, and the police telegraph wires are to be similarly treated.

Power of an Ocean Wave.

In a paper by the Rev. Philip Neale, late British Chaplain at Batavia, in *Leisure Hour*, speaking of the great inundation from the sea caused by the Krakatoa earthquake, Java, he says: "One of the most remarkable facts concerning the inundation remains to be told. As we walked or scrambled along, we were much surprised to find great masses of white coral lying at the side of our path in every direction. Some of these were of immense size, and had been cast up more than two or three miles from the seashore. It was evident, as they were of coral formation, that these immense blocks of solid rock had been torn up from their ocean bed in the midst of the Sunda Straits, borne inland by the gigantic wave, and finally left on the land several miles from the shore. Any one who had not seen the sight would scarcely credit the story. The feat seems almost an impossible one. How these great masses could have been carried so far into the interior is a mystery, and bears out what I have said in previous papers as to the height of this terrible wave. Many of these rocks were from twenty to thirty tons in weight, and some of the largest must have been nearly double. Lloyd's agent, who was with me, agreed in thinking that we could not be mistaken if we put down the largest block of coral rock that we passed as weighing not less than fifty tons.

Improvement in the Manufacture of Mineral Wool.

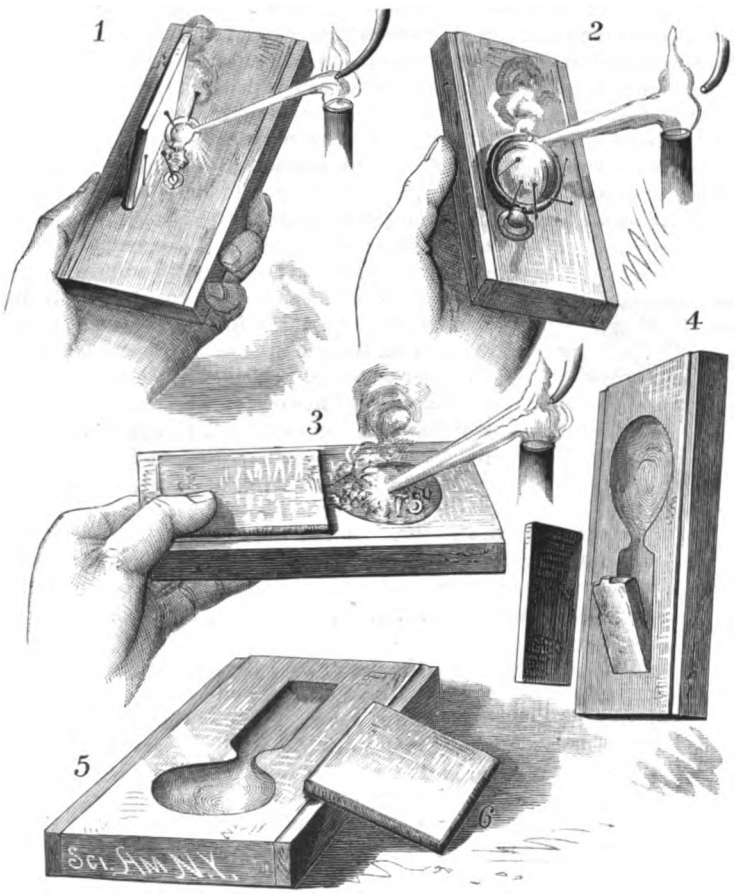
This highly useful product from blast furnace slag was first made practically available by a German inventor some ten years ago, but several subsequent improvements have been made in its manufacture, improving the average quality and lessening the cost. Perhaps the most important of these is that covered by the recent patent of a Pennsylvania inventor. The wool is usually made by blowing jets of steam or air against a small stream of molten slag, converting the latter into fine vitrified fibers; but in this process, as heretofore conducted, only a part of the slag is converted into fiber, the rest forming hard granules or shot, which it has been difficult to separate from the fiber, the operation having a tendency to break up the fibers and make several inferior grades of mineral wool. By the recent improvement, the stream of molten slag falls into a space in front of a central steam jet pipe, with flattened orifice, tending to throw the stream of slag in fan-like shape; side jets are arranged to then meet the spreading stream of slag and force it inward and upward, where it is again met by other jets, giving it a swirling or twisting motion, but all the time under the action of the steam jets, until the stream of molten slag is discharged in conical shape, and enters the end of the receiving chamber. By this means, it is claimed, the entire product of the blow is what is known as No. 1 wool, the product being light and soft, uniform in quality, and free from granules or shot. This mineral wool is adaptable to so many purposes, more particularly in building, and, among engineers, as a non-conductor of heat, and it can be so cheaply made, that we are not surprised to learn of its coming into extensive use.

A CONVENIENT BLOCK FOR BLOWPIPE WORK.

Those who have heretofore used a piece of charcoal on which to melt small specimens of metal with the blowpipe will see at a glance the advantages of the improved soldering, melting, and ingot block herewith illustrated. It is made of homogeneous asbestos, with a narrow strip of wood on each side to protect the hands from the heat, and with a thin coating of whiting in the bowl to prevent borax or other flux from adhering. The asbestos is not only itself almost entirely unaffected by the heat, but it is so poor a conductor that one can hold this little block, about six inches long, in the hand for a sufficient time to conduct any ordinary melting without inconvenience from the block becoming too hot to hold. It is also so porous that an article can be readily fixed on the block in any desired position with pins or other fastening, as shown in Figs. 1 and 2, where a ring and watch case are shown affixed in convenient position for an ordinary soldering operation, as the work is done by jewelers.

Fig 3 shows scraps of metal in the bowl with the blowpipe flame directed upon them, and Figs. 4 and 5 give the block itself in different positions. Connected with the bowl by a narrow inlet is a shallow depression, into which, on holding the block vertically, with a small asbestos cover pressed down by the thumb over this depression, the melted metal will run, and form an ingot. Fig. 4 shows such an ingot as being removed, and the other views clearly illustrate the varying details, Fig. 1 showing the asbestos cover set vertically just beyond the apex of the flame, to better concentrate the heat on the work. Asbestos board has heretofore been used to a considerable extent by jewelers, several thicknesses being united to form a base on which to melt metals by the blowpipe; but the different layers did not make a compact and homogeneous mass, and so would curl up and separate, which is not possible with this form of melting block. The many uses to which this little device is applicable are so obvious that a detailed reference thereto is hardly necessary.

Apart from its applicability in the trade of the jeweler and silversmith, and in various other kinds of fine soldering work, chemists and mineralogists will at once see in it an extremely convenient means of making many tests which have heretofore been possible only in a much more roundabout way, with more complicated apparatus, and generally at considerable expense. It is so simple a thing to fit up a blowpipe, with which fragments of almost all the metals may be melted with the heat from even a common tallow or wax candle, that there is no more convenient way of making many most interesting and valuable experiments. The ordinary blowpipe is a light brass or tin tube, about ten or twelve inches long, one-fourth or one-half inch in diameter at one end for the mouth, and one-sixteenth inch or thereabout at the jet end, the latter having generally a platinum point, to resist the heat, and being slightly curved, so that the flame will be thrown sidewise upon the object, so that the effect will thus be more readily observable by the operator. With a little practice one can, with this device, keep up a constant stream of air directing the flame, which it is best at first to hold in rather large volume over the entire object to be heated, and then in an extremely fine point of the inner blue flame on the part where the metal is desired first to yield. By putting a piece of charcoal over the bowl containing the fragments to be melted, the heat will be confined and the operation facilitated. By the old way of using the blowpipe on metals on a flat or scooped-out piece of charcoal, the melted metal was hard to manage and pour into moulds as desired, difficulties which this device entirely obviates. This invention is the subject of an application for a patent on account of the Chalmers-Spence Company of 419 Eighth Street, New York city.



BLOCK FOR BLOWPIPE WORK.

Remarkable Pigeon Flight.

The return to the loft of A. P. Baldwin, Newark, N. J., from Pensacola, Fla., about 1,000 miles, September 26, was the blue checker, Reg. 1,035, since named Arnoux. The bird is bred from a bird imported by Louis Offermans from one of the best lofts in Antwerp; was a winner of many prizes in club races and in two government races open to all Belgium. The journeys of the bird Arnoux this year include the distance from Morgantown, N. C., 535 miles, and a month later from Bristol, Tenn., 510 miles. These, with the previous flies in club races and the later journey from Pensacola, give a distance of 3,153 miles as the season's work—the greatest known to have been covered by a homing pigeon in a single season.—*Homing Pigeon.*

ICE VELOCIPEDE.

The frame upon which the runners are mounted consists of two bars united to a vertical standard at their forward ends, and at their rear ends curved downward, in order that the runners may be secured to them. The shank of the forward runner, the turning of which serves to guide the machine, is journaled in the vertical standard, and is operated by a lever within convenient reach of the right hand of the rider. The drive wheel frame is pivoted upon a cross rod joining the sides of the main frame; the shaft of the wheel is journaled in the rear free ends of this frame. The driving wheel has sharp points on its periphery, and is centrally fixed upon the shaft, which carries a sprocket wheel driven by a chain passing around a larger sprocket wheel on a crank shaft provided with the ordinary form of pedals. By means of the left hand lever arm, the wheel may be raised clear of the ice or pressed downward with considerable force. When this lever is thrown forward to elevate the wheel, the points of two brakes, one attached to each of the rear ends of the main frame, are lowered so as to scrape along the ice. Both of the brakes and the wheel can be held just clear of the ice, by placing the lever in a notch in a rod projecting forward from the seat bar. A spring is so arranged that it may be made to vary the pressure of the wheel upon the ice. This ice velocipede is the invention of Mr. Joseph Hussong, of Camden, N. J.

HUSSONG'S ICE VELOCIPEDE.

THE Liverpool Custom House has levied a duty of about $200 on the challenge cups won by Sir Richard Sutton with the Genesta. The case will probably be appealed.

Every Man His Own Postal Clerk.

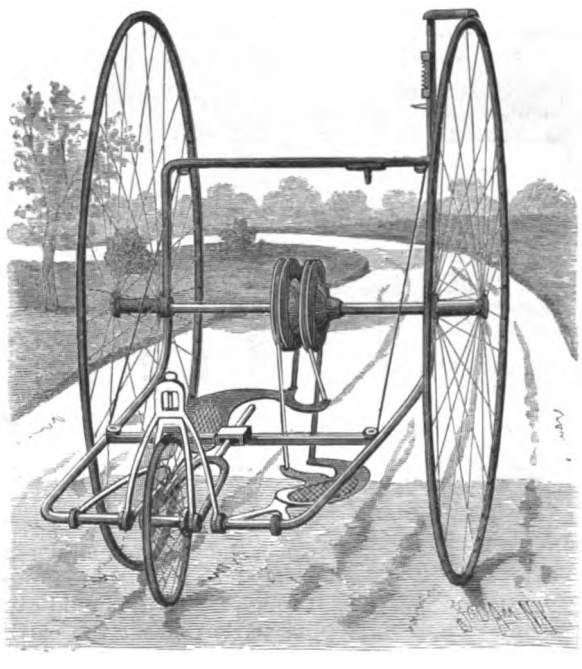
An English invention is designed to do away with complaints about a want of post office agents for the sale of stamps, especially in large cities, and also with the complaints of those storekeepers who, without profit to themselves, feel obliged to sell postal cards and stamps to accommodate customers. The apparatus is a mechanical box which automatically transacts the business of selling stamps, etc., and may be put up on lamp-posts like the letter boxes. It contains a supply of postal cards, stamped envelopes and paper, and has apertures like a child's savings bank, through which to drop pennies. If a citizen wants to buy a postal card, he drops a penny in the box; this releases the lock and allows him to open a drawer in which he will find one postal card. If he wants a stamped envelope and sheet of paper, he drops two pennies into two other slits, and a stamped envelope and sheet of paper are delivered to him in the same way. If the supply runs out, a plate rises with the word empty engraved on it, and at the same time the corresponding slit is covered so that a coin cannot be dropped into it. The top of each box serves as a writing desk. They cost less than twenty-five dollars each, and it is estimated that if they sell only two stamped envelopes and five postal cards a day, they will yield eleven per cent interest.

IMPROVED VELOCIPEDE.

The invention herewith illustrated—patented by Mr. James M. Dillon, of Jackson, Tenn.—relates to improvements in the driving of velocipedes, such as tricycles, quadricycles, etc., either for railways or ordinary roadways. The two driving wheels are rigidly mounted on the ends of an axle journaled in a U-shaped frame, which has an upwardly projecting part in its rear cross piece, in which the steering wheel is journaled. A fork projects toward the front from the lower ends of the fork carrying the small wheel; on the front end of this fork is a pin, which passes loosely through a block sliding on a bar uniting the side pieces of the frame.

This block is operated by a wire guided to and along the front upper cross bar of the frame; by moving a ball or handle secured to the rope at the cross bar, the wheel can be turned to steer the machine. On the axle is rigidly mounted a double ratchet wheel—one having two ratchet rings—and at each side of the wheel is a loosely mounted pulley. Properly arranged pawls on the pulleys engage with the ratchet teeth. Pivoted to the frame at each side of the steering wheel is a foot lever; the swinging end of each lever is provided with two prongs. Over each pulley is passed a metal band secured at the middle of its length to the rim of its pulley. The front end of one band is secured to a prong of one lever, and the other end to a prong of the other lever. The other band is secured to the levers in the same way. A brake is arranged above the rim of one wheel.

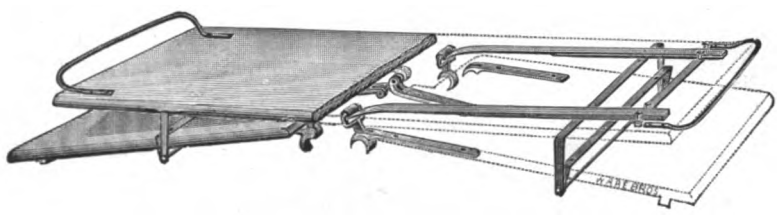
The operator depresses the treadles alternately. When one lever is pressed down, the front part of a band is pulled down; this turns the pulley and ratchet wheel, and revolves the driving wheels. At the same time, the rear part of the band raises the other lever with which it is connected. This method of propelling velocipedes utilizes nearly all the rider's weight, and reduces the friction to a minimum. It will be seen that this construction is applicable to the driving of various machines, such as coffee grinders, feed cutters, lathes, etc., in which cranks are used. If necessary, a saddle-like seat could be used with this device.



DILLON'S IMPROVED VELOCIPEDE.

AN IMPROVED SPRING SEAT FOR VEHICLES.

In the illustration herewith, the seat is shown with its top board broken away for one-half the length of the seat, in order to show the arrangement of the springs, which is the same on both sides. The seat has lower boards, one on each side, pivoted centrally in hangers below the seat board, the lower boards having cleats to hold the seat upon the wagon box; the inner ends of these lower boards are connected with the ends of flat steel springs, by links and hooks, the other ends of these springs being secured by clips or bolts to the under surface of the seat board. The connection of these springs with the inclined lower board by hooks is such that one, two, or more of the springs may be easily detached from the boards, according to the weight or number of the persons to



VAN HORN'S ADJUSTABLE SPRING SEAT.

ride upon the seat. The object of this construction is to provide a seat that may be adjusted to ride as easily with one as with two or more persons, having no endwise or lateral pitch, but always a level up and down movement.

This invention has been patented by Mr. Charles Van Horn, of Bethlehem, Pa.

American Shipping.

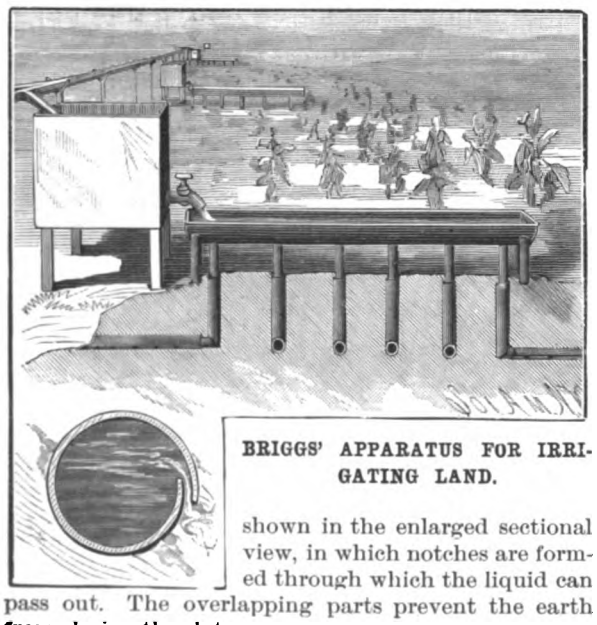
The seventeenth annual list of merchant vessels of the United States, as prepared by the Commissioner of Navigation, shows as follows as compared with the list of previous fiscal years:

Number of	1882.	1883.	1884.	1885.
Sailing vessels	16,459	17,528	17,598	17,167
Steam vessels	5,626	5,825	6,111	5,705
Unrigged vessels	2,648	2,784	2,921	2,640
Total merchant vessels	24,733	26,137	26,630	25,513

It is stated that the decrease in the number of vessels is more apparent than real, as is evidenced by the fact that there were many vessels on the list of 1884 which had been lost or sold to foreign traders. That they were retained on the list is due to a failure on the part of their owners or masters to report their loss or sale. It is estimated that the real decrease in the number of vessels owned in the United States during the last year was only about 200, and not 1,117, as shown in the table.

APPARATUS FOR IRRIGATING LAND.

The engraving represents an improved apparatus—the invention of Mr. Elias Briggs, of Coleman, Texas—for irrigating land in the most beneficial manner, and which is simple in construction and not apt to get out of order. The tank for receiving the water, liquid manure, etc., is provided with an outlet pipe having a valve; a screen or strainer prevents solid matter from passing out of the tank and into the irrigating pipes. Below the spout is a trough having a series of tubes extending downward, and connected by elbows with irrigating pipes running underground in different directions. The pipes are lapped at the sides to form slots, as



BRIGGS' APPARATUS FOR IRRIGATING LAND.

shown in the enlarged sectional view, in which notches are formed through which the liquid can pass out. The overlapping parts prevent the earth from closing the slot.

The pipes are placed at such a distance underground that they cannot be injured by plows or spades. The tops of those pipes through which it is not desired to lead the water can be closed by plugs. As the tank and trough are some distance above the surface, the water has sufficient pressure to keep the slots clean and to pass into the ground. Although this apparatus is shown constructed for sub-irrigation, it may be used as well for surface irrigation.

Pavements Here and Abroad.

French rock asphalt pavement in the city of London still holds its own; and while no asphalt has ever been taken up to replace it with wood, there have been cases where the wood has been taken up and replaced with asphalt. The asphalt is confined to "the city," however, where it was introduced to relieve the intolerable noise of stone pavements, and to get something cheaper than macadam, which under heavy traffic is the most expensive of all pavements, and always dusty or muddy. There are about eleven miles of asphalt in "the city," and two miles of it only in other parts of London. In the West End the new pavements are largely of wood, which is so noiseless and, while it lasts, so smooth that it is quite popular. It has to be replaced every six or seven years, and for the last two or three years of its life it is somewhat rough, but the Londoners seem willing to stand the expense and trouble of renewing it so often in order to do away with the racking noise and wear and tear of stone pavements. Nearly all the main lines of travel west from the Bank of England, and the principal cross streets, such as Regent Street and St. James Street, are paved with wood. The asphalt does not seem to have spread in the West End of London, as they are only familiar with the rock asphalt variety, which becomes very slippery under heavy traffic, and is quite different in this respect from the American or Trinidad variety.

In Paris nearly all the inner and the outer lines of boulevards are paved with wood, as well as a portion of the Avenue des Champs Elysees. The broad Place de la Concorde is now being paved with it. Nearly all of these have been laid in the last four years. The engineers of the Municipality decline to express any positive opinion as to its durability until it has had a longer trial. It is laid at a ruinous expense, under a system of annual payments (instead of cash down). These payments, in addition to the annual maintenance, make the cost about $1.10 per yard *per year*, and the contract runs for eighteen years. The asphalt in Paris, which is also of the rock variety, had got into very bad order in 1883, owing to failing contractors on the maintenance, and this and its slipperiness combined to make it unpopular, so that it has not been extended greatly, and remains about thirteen miles in extent, as it was five years ago. New contracts have been made for its maintenance with responsible companies at 33 cents per yard per year, and it is now in very fair order again, although somewhat wavy in places as well as slippery.

In Berlin the wood has been tried in the last three years, but has broken up very rapidly, and is pronounced a failure. The rock asphalt pavements have been largely introduced, and about ten miles have been laid in the last five years. Except for its slipperiness it is very popular, and is kept up for ten cents a yard a year, the traffic being very light in comparison with London and Paris.

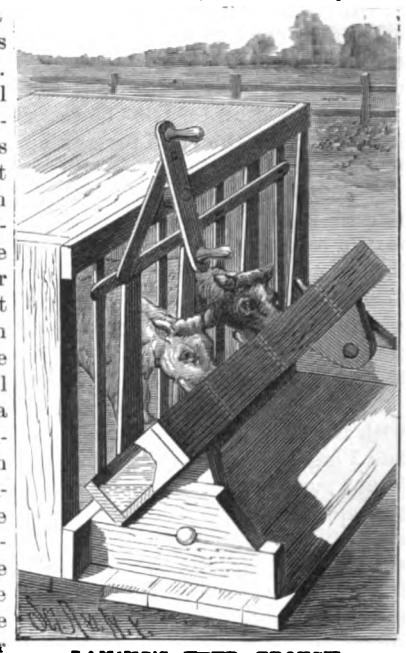
In all the great capitals of Europe it seems to be definitely established that they will not tolerate the roar of stone pavements, and that smooth and quiet pavements will be laid as fast as they have the money to lay them. Once laid, they take great pains to keep them in perfect order and perfectly clean. They are scrubbing, washing, cleaning, sprinkling, sanding them, and picking up manure at all hours of the day and night. There are only two cities in America that compare with the European cities in this respect—Washington and Buffalo. Washington has the most asphalt (sixty miles), but Buffalo has the cleanest streets, the amount of asphalt being about twenty miles. Omaha also has very good streets, having about eight miles of asphalt. All of this is the American asphalt, which was adopted and perfected in Washington after a great deal of study. In Boston it has been laid on streets in the heart of the business section, where the traffic is as heavy as anywhere in London or New York. To the surprise of most people, it has worn well and without any repairs for four years. This American variety has a large amount of sand in its composition, and is not so slippery as the French variety.—*N. Y. Tribune.*

The Temperature of the Atlantic.

The captain of the steamer Olympia has been accustomed for some time past to make daily observations of the temperature of the surface water of the ocean during his transatlantic voyages. On his last westward trip, in the early part of November, he found the average temperature of the Atlantic along the fortieth parallel to be about 72·5° from Gibraltar to 68° west longitude. In crossing the Gulf Stream, however, the warmth was considerably greater. In previous years the average temperature was only about 70° for the month of October, and considerably below this during November, so that this year the water seems to have been at least three degrees above the temperature of former years. This difference is slight, but it shows a backwardness in the approach of winter compensating in a measure for our tardy spring.

FEED TROUGH FOR ANIMALS.

By means of lugs projecting from the bottom of the trough, and pivoted to upright beveled boards, the trough can be swung back and forth upon the rear and front bevels. The trough is provided with cross partitions; between the ends of the partitions and one side of the trough is a slide which can be placed at different partitions, so that the trough can be adjusted for receiving a greater or less quantity of food. When but a small quantity is required, the slide is so adjusted that the food will be in one-half or one-third of the trough, the other part being shut off. The trough is placed at one end of a stall formed with a series of stanchions, between which the animals can poke their heads. Pivoted to the base between the stanchions are bars whose upper ends are joined to a cross bar connected with a handle piece as shown. The trough, having been filled with the milk or liquid food, is swung into the position shown in the cut. The heads of the animals are held between the stanchions and pivoted bars; by moving the handle in the right direction, the bars can be swung alongside of the stanchions, and the animals released.



LANING'S FEED TROUGH.

This invention has been patented by Mr. George Laning, of La Salle, Illinois.

Quinine Hair Tonic.

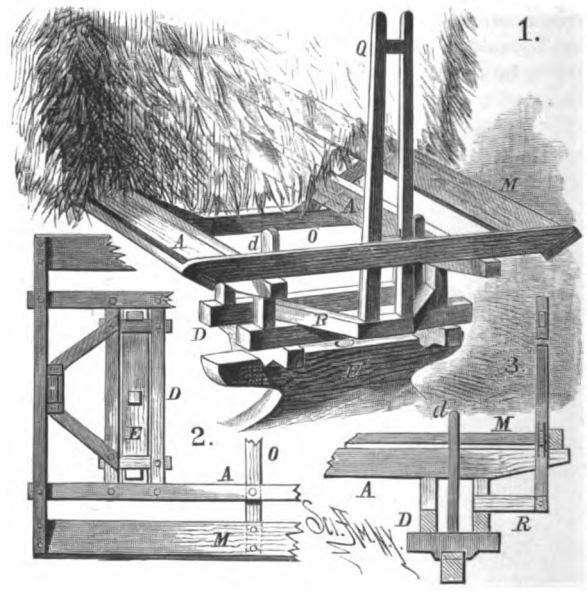
C. W. Peters (Fort Madison, Ia.) desires the formula for a preparation containing quinine to prevent falling out of the hair. The following is highly recommended:

Quinine sulphate	20 grains.
Glycerine	1 fl. oz.
Cologne	2 " "
Bay rum	2 " "
Rose water	11 " "

Rub the quinine with the glycerine, and add the other ingredients in order named. The addition of fluid extract of jaborandi is recommended to stimulate the growth.—*Western Druggist.*

AN IMPROVED WAGON HAY RACK.

The invention herewith illustrated shows a hay rack so made as to permit the front wheels of the wagon on which it is placed to turn under the rack to the wagon reach, so the wagon and rack may be turned in a small space. Fig. 1 is a perspective view, and Figs. 2 and 3 are sectional elevations, in which A represents the main timbers of the rack, supported



CONNELLY'S HAY RACK.

by bolsters, D, E, and held at their proper distances by stakes, *d*. O represents a crosspiece to brace and strengthen the rack, M M are sideboards, and R is a diagonally arranged frame to which the line support, Q, is hinged at its lower end. By this special construction, the rack, with its bolster supports or frames and main timbers, is arranged to come outside of the bolster stakes, so as to stand between the bolster stakes and the wheels of the wagon.

This invention has been patented by Mr. Hugh Connelly, of Colton, St. Lawrence County, N. Y.

GEN. THAYER'S DIRIGIBLE BALLOONS.

As Gen. Thayer's system of ballooning has attracted much attention in war circles, we present to our readers several illustrations of his inventions, and a description prepared from material kindly supplied by the inventor. It will be remembered that this system was presented in detail before a recent meeting of the Military Service Institution at Governor's Island, and that working models made by Gen. Thayer are now under consideration at the British War Office. These facts are of importance, since they give assurance that the invention has been worked out in sufficient detail to make it tangible for examination.

Although taking advantage of the experiments of Capt. Renard and M. Krebs and others, Gen. Thayer has planned a balloon which is quite novel in its principle of operation.

His attention has been directed chiefly to the use of the balloon in war. He has devised two systems of dirigible balloons, in the first of which the balloon moves at any level, and entirely independent of the earth, while in the second the plane of motion is determined by means of two wires, denominated by the inventor as the balloon-way, which guide the aerial craft, and by means of an electric current effect its propulsion. The first of these, the independent dirigible, is of much the greater importance.

In Gen. Thayer's balloon, the buoyant portion of the structure is made in the shape of a circular spindle, as shown, in which the longer axis is equal to three and two-thirds times the diameter amidships. This shape is found to give the least resistance to motion, to comply with the conditions of stable equilibrium, and to permit of easy steering. The ascending force, as usual, is obtained by the use of hydrogen. One of the motors for propelling the independent air-ship consists of a high speed air compressor, coupled directly to a specially devised carbonic acid gas engine. This is connected with a reservoir placed underneath the platform or deck on which the machinery is located. Compressed air is forced into this reservoir, or vapor is allowed to flow into it, until the required pressure per square inch is obtained. The rear end of the reservoir is so arranged that, at given intervals of time, the confined energy is suddenly released, thus producing a powerful forward thrust. By the use of the gas engine, the necessity of coal and water or other weighty appliances is obviated. The other motor consists of a powerful wheel, which effects the continuous discharge of a large volume of air through a nozzle pointed sternward. This develops a powerful propelling force. If a hollow truncated cone be placed over the nozzle, the discharge of the blast draws in outside air through the annular opening, and by imparting velocity to it increases the volume of the discharge, and decreases its velocity. The use of several such conical tubes, one outside the other, as shown in Figure 1, considerably increases the efficiency of the motor. In experiments with water, the addition of five cones to the discharge tube gave an increase of fifty per cent. The force of this motor is not true reaction, as usually interpreted, but the recoil action induced by the discharge of matter at a high velocity in an opposite direction.

The buoyant part of the balloon is made of superposed tissues of strong silk and rubber, and is at all times perfectly inflated, so as to be taut and rigid. Broad bands are used in preference to netting for the support of the deck. The discharge nozzle is fitted on a ball and socket joint, which permits it to be moved in any direction at pleasure. The man at the wheel, shown on duty in our illustration, controls the direction of the nozzle, and thus steers the balloon without the necessity of other rudder. In the interior of the buoyant portion of the structure is placed a large silk sack connected with the air compressor on the deck. A pipe leads from the exterior envelope to the tube leading to the nozzle at the stern. Both of these pipes are provided with cocks which can be opened or shut at pleasure.

Four cylinders filled with compressed hydrogen stand on the deck, and are connected with the interior of the exterior envelope. By withdrawing hydrogen from the exterior envelope and forcing air into the interior sack, the buoyancy of the balloon is diminished without altering its form, and the ship descends. The reverse of this operation—withdrawing air from the sack, and forcing hydrogen into the exterior envelope—increases the buoyancy, and causes the balloon to ascend.

This arrangement permits the balloon to travel at any desired elevation above the earth, and to ascend or descend without the use of ballast. It is claimed that a balloon constructed in the manner indicated could readily attain a speed of from 25 to 30 miles an hour. If found practicable its uses would be manifold. In times of war, it could lay an entire country under tribute. With dynamite bombs and other explosives, it could, under cover of the night, do an amount of damage that is simply inestimable.

In Gen. Thayer's second system of aerial navigation, the dependent dirigible balloon, the air-ship is directed by two wires or light cables stretched across the country on ordinary poles, with U-shaped iron arms on their tops. The balloon itself is similar in shape and design to that already described. The motive power, however, is electricity, generated at the end of the line and transmitted to a dynamo machine on the deck of the balloon through wheels, which are thus impelled along the cables and move the balloon. The buoyancy of the structure supports the entire weight, and the wires of the balloon-way simply transmit the power to the motor, and enable it to be applied for propulsion. It is stated that the balloon can travel at the rate of from 60 to 70 miles an hour, under ordinary conditions of weather. This system of transportation would be valuable in an unopened country, where the expense of laying a railroad would be out of the question. It can be put up very rapidly, crossing rivers, valleys, and swamps without the necessity of intermediate supports.

General Thayer states that such a road could be built at the rate of from three to four miles a day, and at a cost of about $1,500 per mile. So bulky a structure chained to so slight a support presents an appearance of unstability, but it is to be remembered that no weight is brought to bear upon the cables, and that their only mission is to direct the course of the balloon and convey the necessary motive power to its dynamo. General Thayer anticipates a large usefulness for this system, both in times of peace and war. It can run across a country in a direct line where it would be impossible to build a railway. Men and ammunition can be rapidly transferred from one point to another, and he suggests that as an army advances into an enemy's country, the balloon-way could be put up in its rear, and thus establish a line of communication with the base of supplies. Both systems of balloons have been illustrated by carefully constructed models, the independent dirigible being thirty feet in diameter. They have given such promise of success that it is much to be hoped that they may be reproduced in actual size, and their merits practically tested.

A Suggestion to Subscribers.

This issue closes another volume of this paper, and also another year of the SCIENTIFIC AMERICAN SUPPLEMENT.

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Export of Locomotives.

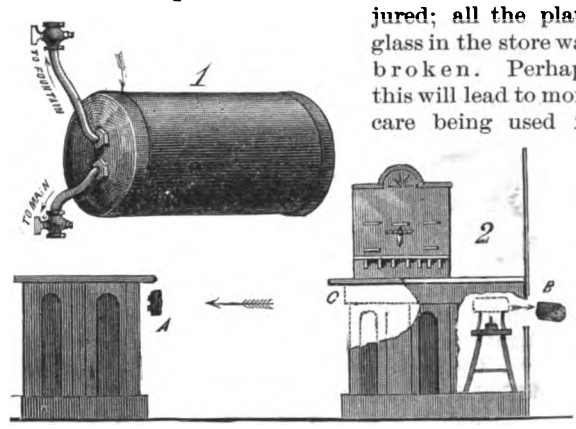
The United States is now sending abroad about $3,000,000 worth of locomotives per annum, the total value of those exported in the last fiscal year being $2,819,946. This, at an average of $10,000 each, represented about 290 engines. In the fiscal year ended June 30, 1882, the number of engines shipped did not exceed 133, the estimated value being $1,455,717. Of the 282 locomotives exported from the United States in 1883–84, 65 went to the Argentine Republic, 49 to the United States of Colombia and Panama, 34 to Mexico, 32 to Brazil, 27 to the Dominion of Canada, 19 to Chili, 14 to Australia, 13 to Central America, 14 to Cuba, 6 to Spain, 3 to San Domingo, 3 to Sweden, 2 to Venezuela, and 1 to England.

Correspondence.

EXPLOSION OF A SODA WATER FOUNTAIN BOILER.

To the Editor of the Scientific American:

An explosion occurred November 18, at 2 P. M., at Wilfert's drug store, northwest corner of Fourth and Walnut Streets, Cincinnati, Ohio. During the winter the firm sell "hot soda"; the water is heated in a copper boiler, 12 inches long, 7 inches diameter, about one-sixteenth inch thick, the end slapped and soldered on. The only vent the boiler had, was at the fountain faucets; it had no safety valve whatever. A little oil lamp was constantly alight under it, to keep it hot, and the pressure could accumulate to any extent. The result was an explosion. The front end was blown off to A, breaking the marble at C (1½ inches thick) in two, the main portion passing through a cupboard to B. Several persons were there, but no one was injured; all the plate glass in the store was broken. Perhaps this will lead to more care being used in



regard to such apparatus in the future; a safety valve is needed just as much as in a boiler. A. R. P.

Cincinnati, Ohio, November 19, 1885.

Link Movement for Reversible Engines.

To the Editor of the Scientific American:

In your issue of Nov. 7, you describe and illustrate a new link movement for reversible engine. I beg leave to state that an improved form of the link motion was devised by me in the year 1860–61. After making a working model, I found that I was anticipated even at that early date, as the Ardrossan Harbor Co., Ardrossin, Ayrshire, Scotland, had a steam crane with oscillating engines and the above link motion in use at their docks before that time; but by whom invented I cannot say.

I would respectfully call your attention to the following sentence in your description of the motion:

"The action of the link hastens the opening and closing of the ports, and the steam therefore works more expansively than when the ports are operated by an eccentric."

Now, this is not strictly correct. But for reasons exactly opposite, the above mentioned steam crane had its engines changed back to the old reliable eccentric.

DAVID L. KELLY.

97 Central Ave., East Buffalo, Nov. 16, 1885.

Improved Dog Muzzle Wanted.

To the Editor of the Scientific American:

Hydrophobia would appear just now to be almost epidemic in some sections of the country, and stringent measures are being called for to protect our citizens from this dreadful canine malady. Whatever may be the merits of M. Pasteur's system of treatment, prevention in this, as in all other cases, is better than cure. That the disease is more prevalent in summer than in winter is an erroneous idea, and the enforcement of the dog laws only during three of the hot months in the year is little better than a farce. The recent casualty in this city, of three school children having been bitten by a rabid dog, has roused even our municipal authorities to discuss the propriety of either making the "dog pound" a permanent institution or of ordering the indiscriminate slaughter of all dogs running loose and unmuzzled in the streets. Certainly some protection ought to be afforded pedestrians from the many worthless curs that infest our thoroughfares, but let us not forget that the dog is both a noble and useful animal, the friend of man as he has been called, and there is no necessity to be cruel.

Dogs, like human beings, must have exercise to be healthy, and it is only an unhealthy dog, unless he be bitten by a rabid one, that goes mad. By all means, muzzle all dogs when running loose in the streets, but let it be done mercifully. The present muzzles in use are barbarous contrivances, and very difficult to apply. Cannot some of your readers devise a dog muzzle that, while giving all necessary protection, would be less cruel to the poor animal, and that could be more readily put on, without risk, than the muzzles now in the market? The demand for such a muzzle, or any other efficient means to take the place of a muzzle, would necessarily be very large, and it would be both a benevolent and a profitable invention.

CITIZEN.

Newark, N. J., Dec. 5, 1885.

Responsibility for Cars.

Judge Samuel Treat, in the United States Circuit Court, lately delivered an interesting opinion in the case of the Missouri Pacific Railway Company against the Chicago & Alton Railway Company, which throws light upon the vexed question of ownership of and responsibility for cars given to another road in the regular course of railroad traffic. Said the court:

It appears that the course of through traffic among railroads requires each to receive cars owned by other than the transporting road, and forward the same; and accepting the general principle stated in 109 Illinois Reports, 135, that each road as to said cars by it so received and forwarded to the next road is under the obligations of a common carrier, the case before the court shows that there were 10 cars to be delivered to the Advance Elevator, and received by the defendant for that purpose. Six of these were actually delivered, and were in possession of said elevator. Four of said 10, still in actual possession of the defendant, had been tendered to said elevator and remained in the custody of the defendant from the inability of the elevator to receive the same when so tendered.

All of these cars were destroyed by fire without any fault of the defendant. As to the six cars actually delivered and so destroyed, there evidently can be no recovery. The duties of the defendants as to the other four of said cars were simply those of a warehouseman. When a common carrier transports merchandise and delivers the same to the consignee, its obligations with respect thereto are at an end. If, however, the same are tendered to him, and through no fault of the carrier he does not, or will not, receive the same, the carrier can cause the same to be stored at the risk of the consignee or retain possession of the same simply as a warehouseman. Were this not so, the through traffic from one part to the other of this vast country would compel not only the breaking up, but the stoppage of trains, if at the intermediate points of delivery the consignee failed or refused to receive consignments.

In this case, if we treat the transportation of cars as if merchandise to be received and delivered to the consignee, it appears that these cars, with their contents, were to be delivered loaded with grain to the elevator. If both the cars and their contents are to be covered by the same rule, then the delivery of the cars with their contents terminates the obligations of the defendant.

The court is not prepared to say that where a railroad car, in the course of through transportation, is received to be delivered to another railroad, and has been so delivered, it is bound to cause the same to be returned either to the owner of the car or to the railroad from which the same was originally received; nor that it is under all circumstances entitled to recover in its own name from what may subsequently happen with respect thereto. In this case, as already stated, there can be no recovery as to the ten cars shipped to the Advance Elevator.

Two other cars were delivered to the defendant to be sent by it eastward, which were destroyed by the fire alluded to, the value of said cars being $602, $100 of the wrecked material having been received by the plaintiff. As to said two cars, the obligations of a common carrier existed, consequently the defendant is liable for the sum of $502, for which judgment is ordered.—*St. Louis Rep., Nov.* 7.

Marking Ink.

REIMANN gives the following recipe for a marking ink: 1·1 pts. nitrate of silver, 2·3 pts. spirit of ammonia, 2·2 pts. soda, 5 pts. gum arabic, 0·2 pt. sap-green, 2 or 3 pts. distilled water. After marking apply a hot flat-iron until the tracing is perfectly black.

A SUBMARINE TORPEDO BOAT.

The accompanying engravings represent a submarine torpedo boat, designed by Mr. J. L. Tuck, and built at the De Lamater Iron Works, this city. The boat is 30 feet long over all, 7½ feet broad, and 6 feet deep. The side frames are carried up and arched over the top to form the rounded deck, which completely covers the hold, except at the round hatch in the center. At this hatch is a well, provided with a door on one side leading into the hold. Placed at each side of the keel is enough lead to load the boat to the water's edge; and to sink the vessel below the surface there are several small compartments, which can be filled with water and emptied as required. Over these compartments, on each side and beneath the floor, are a number of 6 inch iron pipes, which can be filled with compressed air, to be liberated as the air within the boat grows foul. The propeller is turned by an ordinary dynamo run by storage batteries, which also furnish electricity for the incandescent lamps lighting the interior. A common rudder steers the boat to starboard or port, while a horizontal rudder, centrally hinged in a frame at each side of the stern, will elevate or depress the stern, and thereby guide the vessel further from or nearer to the surface, independent of the action of the water ballast pump.

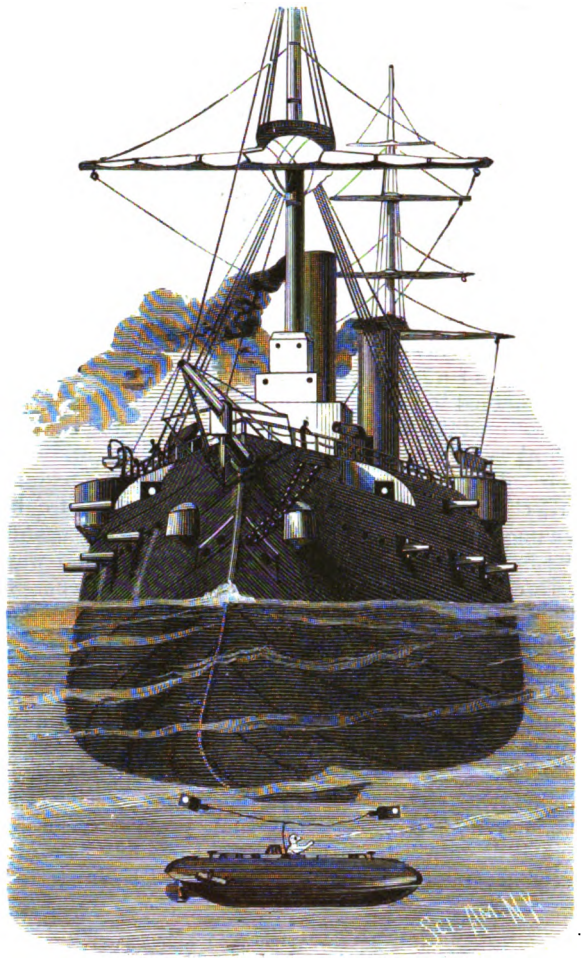


Fig. 1.—THE TORPEDO LEAVING THE VESSEL.

The well hole in the center of the deck is fitted with an air tight hatch, which can be removed from within. The individual wishing to go on deck when the boat is submerged dons an ordinary diver's suit, the air pipes of which connect with the interior, enters the well, closes the door behind him, and after the well has filled with water removes the hatch. In the well are suitable devices for directing those inside for elevating, lowering, and propelling the boat. When leaving the well, the hatch is closed and the water allowed to run into the water ballast compartments, when the door leading to the interior can be opened.

When used in warfare, it is designed to sink the torpedo boat to the proper depth, approach the vessel to be destroyed, and, as the torpedo passes beneath her, release a strong insulated wire carrying two cartridges —one at each end—filled with some powerful explosive and lightened with cork, so that they will rise against the bottom of the vessel. The torpedo is then run ahead to a safe distance, when the cartridges are exploded by electricity, through wires leading from the boat to the cartridges. Just astern of the hatch is a cupola, having glass windows. In the engravings, Fig. 2 shows the torpedo approaching the vessel, and Fig. 1 shows the torpedo passing away, the cartridges having been released. Fig. 3 is an enlarged view of the torpedo directly beneath the vessel.

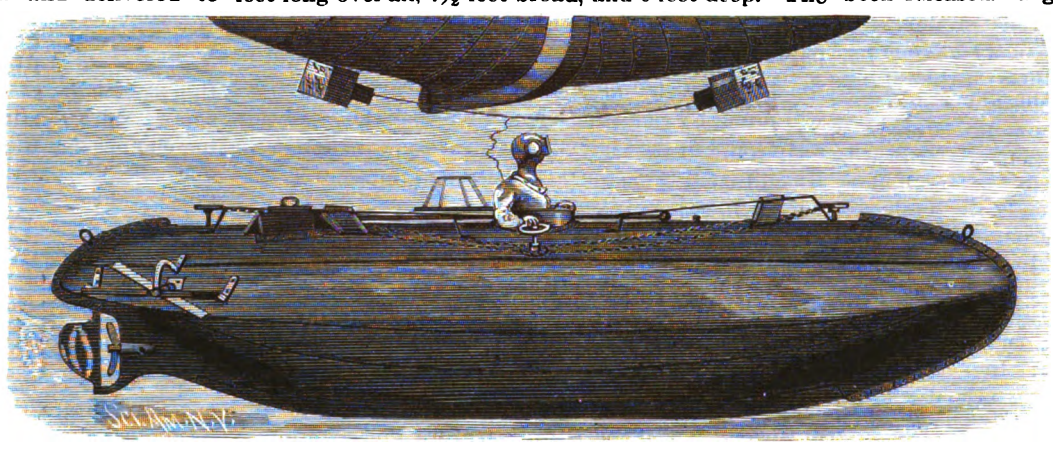


Fig. 3.—THE TORPEDO DIRECTLY BENEATH THE VESSEL.

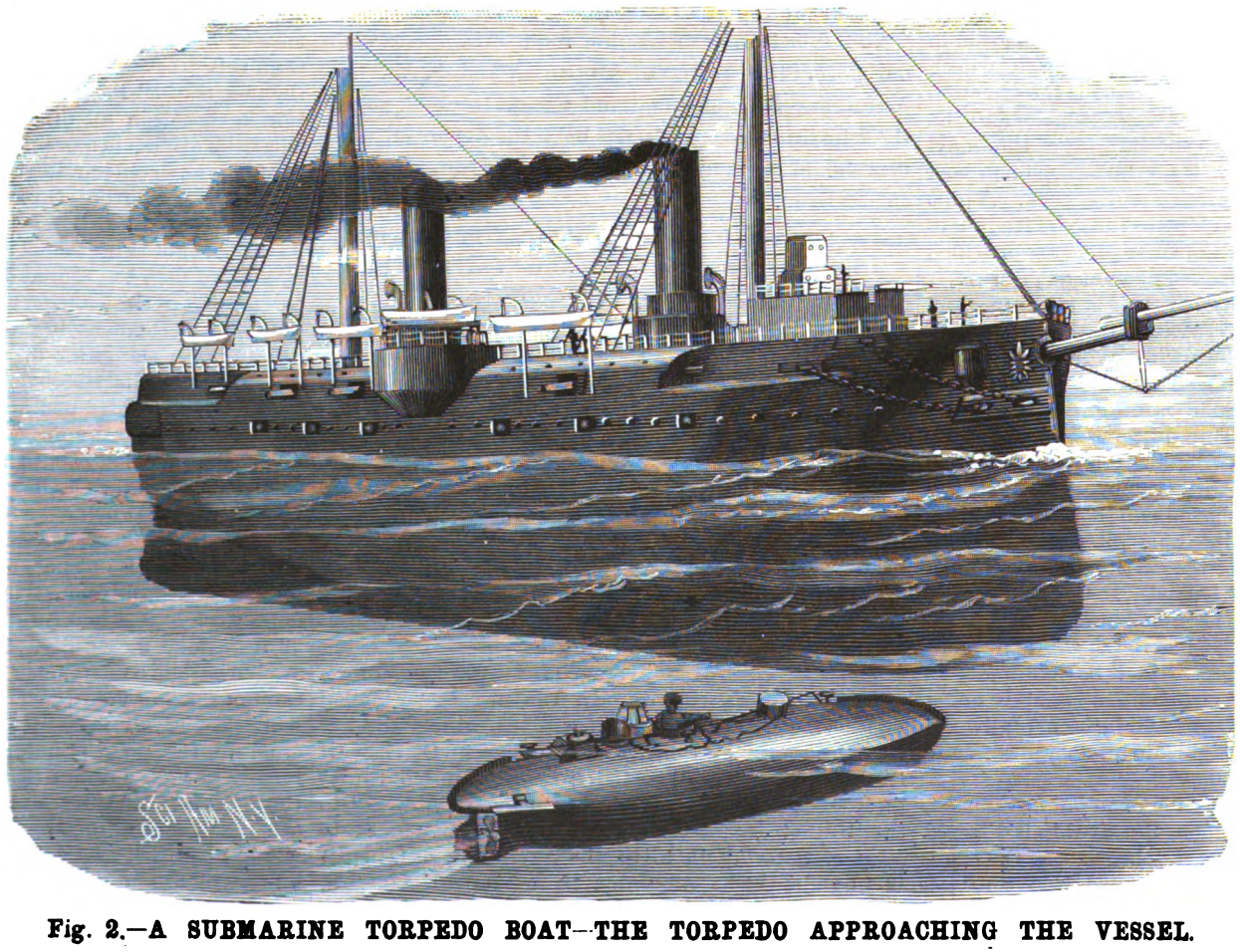


Fig. 2.—A SUBMARINE TORPEDO BOAT—THE TORPEDO APPROACHING THE VESSEL.

A Large Garnet.

While making the excavations for a sewer on 35th St. between 7th Ave. and Broadway, New York city, the workmen recently uncovered a large garnet which was inclosed in the gneiss about nine feet below the level of the street. The crystal was a well defined trapezohedron, having its angles truncated and beveled by the rhombic dodecahedron and the hexakisoctahedron, a combination quite characteristic of the garnet. The crystal had been a little mutilated by the workmen, but all of the upper octons were very well developed, and the lower ones for about half their distance. The owner of the mineral, Mr. J. J. King, determined its total weight, including a little quartz and serpentine attached to the lower portions, to be nine and a half pounds. The horizontal axes were six inches. The exterior of the crystal was slightly weathered, but a fresh fracture showed a fine red color.

Display of Meteors.

A grand display of meteors was witnessed by Mr. P. Benson, at Ishpeming, Mich., on the evening of Nov. 27th. They appeared, he says, with few exceptions, to radiate from a region bounded by the constellations Aries, Andromeda, Pegasus, Lyra Corona, Borealis, and Ursa Major. Between six and seven o'clock Mr. Benson counted as many as thirty in five minutes. The appearance of many of them was very striking, and all seemed moving in a westerly direction.

PORTABLE EASEL.

The North of England School Furnishing Company are issuing this under the name of the Darlington Academy Easel. The somewhat interesting portrait underneath shows its employment when the artist or writer is standing or walking. But its use is varied. It is valuable to the author who is frequently engaged in literary work while traveling by rail, road, or water; to the reporter when note taking at open air meetings, and when transcribing during the journeys from the scenes of his labor to the newspaper offices; to the tourist who records the experiences of his travels; and to every writer at the fireside who requires to lean back in an easy chair, instead of being compelled to bend the upper portion of the body over a table. The easel is entirely supported by the body, and moves with it, the right hand resting on it, and thus it always maintains the same position under very adverse conditions, even when the person using it is inside a fast going railway carriage or on the deck of a moving ship. The easel affords accommodation for drawing pads, pencils, pins, rubber, squares, etc., and when closed resembles a small flat box, less than one foot square by an inch and a half in depth, which can be carried after the manner of an opera glass. Its weight slightly exceeds a pound and a half. The two halves, which are folded together, are of equal thickness, and when opened out form the flat, firm easel represented in the engraving. In service it is firmly supported by the strap from the left shoulder, and the inner corner which presses on the right side is cut away, so as to allow it to fit the body. The easel is an exceedingly convenient one, and deserves a trial.

DARLINGTON ACADEMY EASEL.

CARNIVOROUS PARROTS.

In the region of New Zealand, like that of Australia in its singular fauna, there lives a large species of parrot, called by the English Nestor, and by the natives *kea*. The former name is applied to a small but remarkable group of parrots, all peculiar to this region. The type species was *Psittacus meridionalis*, of Gmelin, founded on a species described by Latham, and subsequently termed by him *P. Nestor* in allusion to its hoary head. It is now known as *Nestor meridionalis*, the specific name being transferred to the genus.

It is called *kaka* by the Maoris and the English settlers. It was at one time very abundant, and is now equally scarce.

Forster, who accompanied Cook in his second voyage, described this bird in his manuscript, in 1773, naming it *P. hypopolius*. It was found in both of the islands.

The general color of the species is an olive brown, nearly all the feathers being tipped with a darker shade, giving thereby a scaly appearance to the body. The crown is light gray, the ear coverts and nape a beautiful purplish hue, or bronze in the reflected light. The rump and abdomen are strikingly varied by a deep crimson, varied singularly by an orange, and sometimes by a brilliant yellow. The kaka is about the size of a crow. This is the familiar *Nestor* of the settlers and naturalists, and is the one generally indicated, by those not having accurate information concerning the subject, as having the curious carnivorous habits attributed to the Nestor of New Zealand.

The truth is, there is a species considerably larger than this, the *Nestor notabalis* of Gould, which is the veritable bird that has long since been arraigned and convicted of sheep killing. We say long since; the truth is, it is comparatively of late years since the actual verification by scientific authority.

In 1856, Mr. Walter Mantell, an English naturalist, well known as an authority in many important observations in New Zealand, particularly with reference to the natural history of the wonderful birds found indigenous to that region, discovered the bird in question, which he learned was called by the natives *kea*. Its discovery, like that of numerous others since become familiar, was the result of an exploration by his party of the higher interior mountain ranges, a section of country until then not attempted by explorers.

Like many other New Zealand forms, these parrots are so distinct they are regarded as entitled to constitute a separate family as *Nestoridæ*.

Their osteology seems fully to call for this distinction.

It appears by the history of this parrot, from observations made since the settlement of the country by English people, that nothing of a distinctly carnivorous habit was observed for a long period.

Its habits were somewhat those of the woodpeckers in addition to the love of fruit so common with many birds of the tropical countries. It was expert in pecking and extracting worms from under barks of trees; though one would judge that the enormous beak, and the strange diversity in the length of the two mandibles, would naturally prove clumsy features in an implement for such work. As will be seen in the figure here presented, the upper mandible is greatly elongated, and curves considerably; which, though a powerful weapon, appears but ill adapted for grasping in the manner of pincers, as seen so well developed in the woodpeckers.

It is difficult at times to account for the peculiarity of certain organs, which, judging as in this case, seem to be ill adapted for the purpose of exercising what seem to be their legitimate functions. These birds seem to have an abnormal growth of the upper mandible, and remind one of the long, undue growth of the incisors of some rodents.

It is well understood, we believe, that this species of Nestor has only since a comparatively late date shown a tendency to molest domestic animals; and it is now believed that the habit of attacking sheep has developed since the latter have been kept by the settlers. This circumstance has been looked upon with considerable wonder, and is cited as one of the few instances of change in habit among animals.

An error has crept into the newspapers, or has originated among them, regarding the size of the kea. A short notice of this carnivorous habit of the keas appeared lately in a country paper, in which the bird is described as a "small one, about the size of a thrush." On the contrary, as we have seen, it is one of the largest of the parrots.

A pair in the Museum of Natural History in Central Park are conspicuous for their size and their generally different aspect, both in shape and colors, while their long sickle bills are strikingly unlike those of other species. There are few parrots larger than the kea. The black cockatoo, from Australia, is much the largest, and has a bill nearer the latter in shape than others.

The Maoris claim that the carnivorous habit has been developed by the keas during cold seasons, when pressed by hunger. They will then alight upon the sheep, and, despite the most vigorous resistance, peck holes in the sides of the helpless creatures, often biting out the intestines, and thus deliberately killing them; then they feed upon the remains. The wounds are said to be so uniformly made in one place, or in parts most easily reached for disemboweling, that there can be no question as to the motive of the attack.

These birds are well known carrion eaters, in addition to their usual food, which consists of fruits and seeds, and the grubs of wood-destroying insects. To get at the latter, the bark is stripped from the trunk.

The amount of injury done by them in their raids on the sheep folds of New Zealand has been exaggerated, says Dr. Menzies, an authority on the subject, who states that "on one run, where the loss was unusually large, the proportion of sheep attacked was about 1 in 300. Those pasturing below the elevation of 2,000 feet are seldom disturbed."

Dr. Buller, an authority on this subject, states that "those that frequent the sheep stations appear to live almost exclusively on flesh.

"They claim the sheep's heads that are thrown out from the slaughter pen, and pick them perfectly clean, leaving nothing but the bones."

An eye witness has described this operation to Dr. Hector as follows: "Perching itself on the sheep's head or other offal, the bird proceeds to tear off the skin and flesh, devouring it piecemeal, after the manner of a hawk; at other times holding the meat down with one foot, and with the other grasping the portion it was eating, after the ordinary fashion of parrots."

Dr. Buller relates instances of tame parrots devouring their comrades in captivity; but the kea is the only parrot known to eat flesh when flying wild.

In 1864, Mr. Mantell told Mr. Gould, the celebrated author of "Australian Ornithology," that the natives claim that the bird has not been seen by them in Middle Island for a considerable length of time. They said the birds came usually to the coast during hard winters. The total length of the kea is 18 inches, the bill being 2½ inches.

CARNIVOROUS PARROTS.

Grass for Carp Ponds.

Dr. Rud. Hessel says that he has found carp eggs adhering in greater numbers to *Festuca fluitans* than to any other plant. "Its narrow, long, strap-shaped, thin leaves spread softly over the water's surface, as also its numerous branches in the water, affording to the fish the sought for opportunity to deposit its eggs upon the tender leaves."

This grass is known to American botanists as *Glyceria fluitans*. It is called *Glyceria* on account of the sweet taste of the seeds. This genus is known by the common name of manna grass. This species grows to a height of from 3 to 5 feet, and has leaves about 1 foot long. It grows in shallow water, and blossoms from June to August. Its spikelets contain from seven to thirteen flowers each. It is frequently found in the United States.

In addition to its usefulness in holding the eggs, it is valuable on account of the sweet seeds, which drop from it into the water and are eaten by the carp. Persons owning carp ponds can frequently find it growing wild, and transplant it to their ponds by securing the aid of some local botanist to identify it. In cases of uncertainty in regard to specimens supposed to be *Glyceria fluitans*, it would be well to send for identification a specimen containing leaves, flower, and fruit.—*Bulletin U. S. Fish Commission.*

Improved Bessemer Steel.

A recent improvement in the Bessemer steel process as carried out at the Edgar Thomson Steel Works, near Pittsburg, will have the effect, it is said, of making Bessemer steel equal in quality to the crucible product, and at only about one-tenth the price. The change consists in a thorough mixing of the spiegeleisen with the molten iron in a ladle, in such a manner as to make the carbonization much more uniform than at present. Bessemer steel can be produced at a cost of a cent to a cent and a half per pound, while that made in crucibles costs at least eleven cents a pound.

ENGINEERING INVENTIONS.

A locomotive valve gear has been patented by Mr. Wallace J. Lewis, of Tyler, Texas. It consists of a combination of rockers, shafts, arms, levers, links, and connecting rods, worked from the crosshead of the locomotive exclusively, and so arranged as to give the valve a correct motion.

A car truck has been patented by Mr. Charles L. Morehouse, of Brooklyn, N. Y. By this invention one set of wheels runs on the rails, the pressure of the car being transmitted to their axles by another set of wheels, whereby the friction is reduced to a minimum, and the construction is such that the wheels will not slip or grind at curves.

AGRICULTURAL INVENTIONS.

A sulky attachment for plows has been patented by Mr. Theodore Johnson, of Petersburg, Ind. Combined with a frame attached to upright arms of an arched axle are various novel features of construction and arrangement whereby the plow can be supported from the ground and readily drawn from place to place, and the operation of the plow can be easily regulated.

A revolving sulky hay rake has been patented by Mr. Byron Collins, of Galion, O. This invention covers a novel construction and combination of parts to promote convenience in operating and controlling revolving sulky hay rakes, in which the rake head is readily guided and adjusted by an upright lever on the carriage.

MISCELLANEOUS INVENTIONS.

A grain separator has been patented by Mr. Hezekiah Bailey, of St. Thomas, Ontario, Canada. It is constructed with the screen and the dampers of the fan blower connected by swinging bars, three-armed levers, and connecting rods, whereby the strength of the air blast will be automatically regulated by the quantity of material on the screen.

A stop motion for coloring machines has been patented by Mr. Frank P. Fitz Simons, of Clark's Mills, N. Y. It consists of a mechanism whereby the snarls and knots occurring in the yarn to be colored are made to stop the machine when they come to the guides, allowing the attendant to unravel the same, and thus prevent the breaking of the yarn.

A hansom cab has been patented by Mr. William Johnstone, of Edinburgh, Scotland. The top, or roof, and the sides and back panels are so jointed and fitted that the whole upper part of the vehicle can be folded down, to form an open phaeton, or the open carriage may be again transformed into a close hansom with very little trouble.

A handle cap fastening for hand bag frames has been patented by Mr. Louis B. Prahar, of Brooklyn, N. Y. The cap has perforations in its opposite sides, and the posts, rigidly attached to the frame and having their upper ends bent inward, are inserted in the perforations of the handle cap, thus securely hinging the handle cap to the frame.

A fire escape ladder has been patented by Mr. Alexander Rose, of Lawrence, Kan. It is made with a series of rounds connected to opposite side ropes or chains by tying or knotting the ropes or chains around the rounds, in connection with a metal bracket hanger, making a ladder that can be quickly adjusted, and will be strong and inexpensive.

A furnace has been patented by Messrs. John A. Topliff, Edward S. Cross, William S. Cox, and John A. McCollum. It has a fuel chamber located on the same level with the combustion chamber, and a heating drum above both, so arranged as to be specially adapted for burning soft coal, and consuming all of the smoke and gases.

An improvement in neckwear forms the subject of a patent issued to Mr. Edwin D. Smith, of New York city. This invention consists in an article of neckwear formed of a backing on which a series of layers of paper, fabric, etc., are held, the several layers being united loosely and detachably, so as to permit of tearing off the several layers successively.

A harness ring has been patented by Messrs. Quintus Cato and Charles A. Spaulding, of Estes Park, Col. It consists of a jointed bar ring, with a spring fastening for locking the ring closed, and made in such manner as to be especially adapted for use as a spreader for inside check lines, and also for keeping the lines from getting twisted.

A sash balance has been patented by Mr. Jacob Weber, of New York city. The weights have racks engaged by pinions engaging with the racks of the sashes, and there are guide plates, each cast or formed in one piece, with the walls of chambers receiving and guiding the weights, to dispense with cords and pulleys in the application of weights to window sashes.

A churn has been patented by Mr. Frank L. White, of Gainesville, Tex. The dasher wheel is operated by a driving mechanism connected with an upright standard on a base plate, and is so arranged that it can be readily removed from the churn to allow the latter to be taken from the base plate, with various other novel features.

A gold separator has been patented by Mr. Samuel C. Oliphant, of Novinger, Mo. It is especially adapted for working gold sands or gravels, and to secure the finer particles of gold with a minimum supply of water, using a main water tank and water filtering and receiving tanks, and having a plunger worked in the main tank by a jigger arm.

A tin roof cleat has been patented by Mr. Warren C. Rockwell, of Mount Carmel, Pa. It is formed of a flat piece of sheet metal having a square staple incorporated in a bend of its lower end, and with its upper end adapted to be folded and fastened in the bending operation in the seam, for conveniently and expeditiously attaching sheet metal to the roof sheathing.

A cotton gin has been patented by Messrs. John T. Nixon and Daniel N. Cress, of Lexington, Miss. This invention covers a novel construction and arrangement of parts whereby the inward movement of the bearing blocks of the brush shaft can be limited, and the brush can spring without binding, and the brush can be driven at a uniform velocity and up to its full speed.

A felt glove or mitten has been patented by Mr. Walter P. Hyatt, of Matteawan, N. Y. This invention covers a process of making seamless articles by placing between two bats of wool, cut out the required pattern, a layer of material which prevents the bats from coming in contact except at the edges, and then uniting the edges which are in contact by a hardening and fulling process.

A boot has been patented by Mr. James F. Shaw, of Jackson, Mich. It consists of a felt, knit, or wool foot piece, with a leg projected above the instep portion, and a leg proper or protector, of leather or similar material, fitted over the leg portion of the foot-piece, the leg extending in front down over the vamp to a point over the instep, and thus strengthening the boot at the point of greatest strain.

A fire escape has been patented by Jennie R. Fuller, of Toledo, O. This invention provides an escape bridge made of sail cloth or canvas, to be conveniently thrown across to a building on the opposite side of the street, while a rope ladder is also dropped down in the street at the side of the building, the entire device being adapted to fold in small space below a window sill on the interior.

A siding rest has been patented by Mr. John McDonald, of Central City, Neb. It is for holding siding in position against the studs, to be accurately and quickly scribed, and while being nailed, and consists of a rest and gauge made in one piece, having a rigid suspension point on one end, to be driven into a joist, and a step on the opposite end upon which the siding is to be supported.

A weighing apparatus has been patented by Mr. William F. Irvine, of Lampasas, Tex. Combined with a weighing pan in a suitable case is a series of independent shot holders pivoted and suspended around said pan, and so arranged that any one of the holders may be tilted and its contents discharged by pulling a knob on the outside of the case, the quantity being a dial in front of the case.

A necktie and collar fastener has been patented by Mr. Robert S. Coffey, of Waco, Texas. It consists of a spring adapted to fit inside the shirt band and next the neck, in combination with a hollow stud on the middle of the convex side, with a separable head, spring catches, and bent hook sections, to hold in proper relation to each other the shirt band, collar, and necktie.

A shutter for photographic cameras has been patented by Mr. William C. Hadden, of New York city. This invention relates to divided or double pivoted shutters, used for taking instantaneous pictures, and having a reciprocating action during the time of exposure, subject to control by a spring, providing a novel combination and arrangement of parts whereby great compactness and efficiency are obtained.

A churning device has been patented by Mr. Fountaine L. Foushee, of Batesville, Ark. It is so constructed that by rocking a lever up and down on a pivot a dasher shaft will be rotated quickly in reverse directions in the churn body, bringing the butter quickly, while the application of the power is very direct and effective, and the churn may be "knocked down" and packed in small space for shipment.

A nail extractor has been patented by Mr. Thomas M. Brintnall, of Maryville, Mo. Its construction is such that the base piece may be placed accurately alongside of the nail to be drawn, and prongs will hold it from slipping during the operation of the lever bar and swinging arm, there being a short leverage to start the nail and a long one to draw it, by which the nail may be drawn without bending it.

An armature for dynamo electric machines has been patented by Mr. Charles T. Jackson, of New York city. This invention consists of an armature formed of iron wires placed on disks on a shaft parallel with said shaft, the wire being bound together by wires placed circularly around them, and then covered with insulated copper wire, whereby an intense current may be obtained with a low speed without heating the armature.

A running gear for vehicles has been patented by Mr. John M. Bouck, of Gouverneur, N. Y. The invention consists principally in connecting the reach proper to the front axle and bolster by a sliding and laterally rocking attachment that permits the axle and bolster to have a back and forth and sidewise movement independently of the reach, so that the front bolster and axle will accommodate themselves to the load on the springs.

A sewing machine waxing device has been patented by Mr. Benjamin F. Landis, of St. Joseph, Mo. This invention provides for keeping a continuous stream of wax running from the reservoir to the needle cup, thence overflowing into a receptacle below by gravity, the wax being then strained of impurities, and mechanically returned to the reservoir, the shuttle race and needle dip cup being heated by the waste steam after it has warmed the reservoir.

A gate has been patented by Messrs. Josiah Austin and Rossco Chamberlain, of East Liberty, O. This invention covers improvements on three former patented inventions of the same inventors, and relates to automatic double gates; it has a cranked hinge that lifts the gate bodily, and as the gate is opened mechanically by being permitted to swing down at an incline, there are means provided for gradually overcoming the momentum acquired.

A sheet music holder has been patented by Mr. Gerard C. Scott, of Bradford, Pa. Combined with a back and two covers hinged thereto is a stepped strip held on one cover parallel with the free edge, with spring fingers projecting from the strip to hold sheets of various sizes in such way that they can be easily turned over or folded. A back for sheet music patented by the same inventor consists of a fabric strip, on one surface of which two gummed paper strips are secured longitudinally, the inner edges of the gummed strips being separated a short distance from each other, making a convenient means for uniting several sheets of music.

Special.

DIPHTHERIA ROBBED OF ITS TERRORS.

One of the oldest and most honored financial corporations in Boston is that which bears the somewhat peculiar name of "The Massachusetts Hospital Life Insurance Company." It was incorporated in 1818, and by thrifty and prosperous business has now outgrown its old office on State Street. The stately edifice which it is erecting, a few doors from the old place, is one of the most solid and beautiful of modern office buildings.

A few days ago our Boston correspondent had occasion to call on Samuel Keene, Esq., who has for many years been in the service of this company. They sat down in the old office, and talked over matters concerning health.

"That little girl of yours, Mr. Keene, who had diphtheria; you say she is entirely recovered?"

"Not only entirely, but speedily. I will tell you how it was. She was about eleven years old. The attack of diphtheria came on her suddenly, as I believe all such attacks do. It proceeded as far as to the appearance of the diphtheritic white spots in her throat. We cured it by a process very different from any in vogue among the old practitioners, but none the worse on that account."

"And may I ask what it was that thus surpassed the doses of the old doctors?"

"It was nothing more or less than 'Compound Oxygen.' I happened to have this in the house when the attack of diphtheria came on; for I had been using it for several years for other purposes. I gave it to my daughter as soon as her disease was distinctly defined. She inhaled it as hot as she could bear it, and the effect was manifest almost instantly. I have never known a case of diphtheria to yield to treatment as quickly as this did, or to be more thoroughly cured without leaving any unpleasant after-effects. You know that after an attack of diphtheria which is treated by the old remedies the throat is left in a weakened or irritated condition for months, and sometimes permanently."

"You had some experience with the Oxygen, then, in other cases, Mr. Keene?"

"Yes; my experience with it has been very pleasant. Several years ago it was recommended to me by my family physician. I took it repeatedly for severe colds. I have never seen anything which will break up a cold quicker or more successfully than this Oxygen. I do not believe in leaving a cold to take its chance of running out of itself. Too often it runs in, and settles on the lungs. My plan is to deal with it at once by means of Compound Oxygen; then it is gone in a day or two.

"I have two boys, one nine years old, the other eleven. I have found the Oxygen of great advantage to them, especially when they have had colds. The oldest boy had a decided tendency to catarrh. But the use of the Oxygen has checked that, so that I now have no fear that he will be afflicted with this odious disease.

"My wife, too, has been greatly benefited by Compound Oxygen. She was for years distressed with dyspepsia, and nothing but Compound Oxygen gave her relief. She is not yet entirely free from dyspeptic trouble, for her case is one of long standing. But she is in far better health than she ever could have been had it not been for the use of this wonderful remedy.

"Compound Oxygen is now all my physic, and all my physician. I get a 'Home Treatment' about once a year, and it generally lasts me and my family the year out; so you see we do not have a great deal of sickness now. I have recommended it to many friends, and they all speak well of it. Among others, I may mention Mr. G. A. Hilton, the lawyer, on Devonshire Street. He is a nephew of the president of this company, and is one of our rising young lawyers. He was troubled with lung weakness and symptoms of consumption, but is now entirely recovered. Say for me, if you choose, that Compound Oxygen is the best remedy I know of."

Truly wonderful it is how diseases of such diverse character as those above mentioned flee before the power of Compound Oxygen. And not only these, but many others, as will be seen by reading the interesting pamphlet treatise on the subject. Among these is one from Mrs. M. J. French, of Ludington, Mich., who tells her experience in the use of Compound Oxygen with one of her children in diphtheria. This will be mailed free of charge to all who send for it. Address DRS. STARKEY & PALEN, 1529 Arch Street, Philadelphia.

Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

The *Socialist*, a monthly magazine, is addressed to progressive men, who are not the slaves of old ideas. Specimen copy gratis. *Socialist*, 907 Walnut Street, Philadelphia.

To Engine Builders.—For Sale.—The American patents for a Gas Engine, in general use in England and on the Continent; not yet introduced in the U. S. Cheapest to build, most economical in gas, noiseless, and simple. Correspondence invited from established builders prepared to introduce the engine. C. F. Crosby, P. O. box 246, Boston, Mass.

Billings' Patent Breech-loading Single Barrel Shotgun. Billings & Spencer Co., Hartford, Conn.

Geo. E. Lloyd & Co., Electrotype and Stereotype Machinery, Folding Machines, etc. Send for catalogue. Chicago, Ill.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. $100 "*Little Wonder.*" A perfect Electro Plating Machine. Sole manufacturers of the new Dip Lacquer Kristaline. Complete outfit for plating, etc. Hanson, Van Winkle & Co., Newark, N. J., and 92 and 94 Liberty, St., New York.

Grimshaw.—Steam Engine Catechism. A series of thoroughly Practical Questions and Answers arranged so as to give to a Young Engineer just the information required to fit him for properly running an engine. By Robert Grimshaw. 18mo, cloth, $1.00. For sale by Munn & Co., 361 Broadway, N. Y.

The Knowles Steam Pump Works, 44 Washington St., Boston, and 93 Liberty St., New York, have just issued a new catalogue, in which are many new and improved forms of Pumping Machinery of the single and duplex, steam and power type. This catalogue will be mailed free of charge on application.

Haswell's Engineer's Pocket-Book. By Charles H. Haswell, Civil, Marine, and Mechanical Engineer. Giving Tables, Rules, and Formulas pertaining to Mechanics, Mathematics, and Physics, Architecture, Masonry, Steam Vessels, Mills, Limes, Mortars, Cements, etc. 900 pages, leather, pocket-book form, $4.00. For sale by Munn & Co., 361 Broadway, New York.

Air Compressors, Rock Drills. J. Clayton, 43 Dey st., N. Y.

Shafting, Couplings, Hangers, Pulleys. Edison Shafting Mfg. Co., 36 Goerck St., N. Y. Send for catalogue and prices.

Iron Planer, Lathe, Drill, and other machine tools of modern design. New Haven Mfg. Co., New Haven, Conn.

Wanted.—Patented articles or machinery to manufacture and introduce. Lexington Mfg. Co., Lexington, Ky.

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Machinery for Light Manufacturing on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

Send for Monthly Machinery List
to the George Place Machinery Company,
121 Chambers and 103 Reade Streets, New York.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, $40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN patent agency, 361 Broadway, New York.

Supplement Catalogue.—Persons in pursuit of information of any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

Send for descriptive circular on lubrication. Charles H. Besly & Co., North American Agents for Reisert's Celebrated Solid Oil, 175 & 177 Lake St., Chicago, Ill.

Send for catalogue of Scientific Books for sale by Munn & Co., 361 Broadway, N. Y. Free on application.

Keystone Steam Driller for all kinds of artesian wells. Keystone Driller Co., Limited, Box 32, Fallston, Pa.

Wood Working Machinery. Full line. Williamsport Machine Co., "Limited," 110 W. 3d St., Williamsport, Pa.

We are sole manufacturers of the Fibrous Asbestos Removable Pipe and Boiler Coverings. We make pure asbestos goods of all kinds. The Chalmers-Spence Co., 419 East 8th Street, New York.

Universal and Independent 2 Jaw Chucks for brass work, etc., both box and round body. Cushman Chuck Co., Hartford, Conn.

The Crescent Boiler Compound has no equal. Crescent Mfg. Co., Cleveland, O.

Curtis Steam Trap for condensation of steam pipes, high or low pressure. Curtis Regulator Works, Boston, Mass.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Emerson's ☞ Book of Saws free. Reduced prices for 1885. 50,000 Sawyers and Lumbermen. Address Emerson, Smith & Co., Limited, Beaver Falls, Pa.

Hoisting Engines, Friction Clutch Pulleys, Cut-off Couplings. D. Frisbie & Co., Philadelphia, Pa.

"How to Keep Boilers Clean." Send your address for free 88 page book. Jas. C. Hotchkiss, 36 John St., N. Y.

Barrel, Keg, Hogshead, Stave Mach'y. See adv. p. 76.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 46.

The "Improved Greene Engine" can be obtained only from the *sole builders*, Providence Steam Engine Co., R. I.

Timber Gaining Machine. All kinds Wood Working Machinery. C. B. Rogers & Co., Norwich, Conn.

Patent Elevators with Automatic Hatch Covers. Circular free. Tubbs & Humphreys, Cohoes, N. Y.

Brands cut in Wood, Pattern and Brand Letters. Vanderburgh, Wells & Co., 110 Fulton St., New York.

Brass and Iron Working Machinery, Die Sinkers, and Screw Machines. Warner & Swasey, Cleveland, O.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.
Special Written Information on matters of personal rather than general interest, cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Minerals sent for examination should be distinctly marked or labeled.

(1) C. H. C. asks: How much cheaper can a scientific education be obtained in France or Germany than in America, all things included, and what sum is needed to complete a four years' course? A. A scientific education would cost you about as much in Germany or France as it would in this country, supposing in both cases you set out to be economical in the matter. In some of the smaller German universities a student can live very comfortably and get a very thorough education for $35 to $40 per month and even less. Of the total cost, the tuition charges alone would be about $30 a year.

(2) J. I. K. asks: Will water colors mixed with ox gall do to color maps? A. If the maps are made on good drawing paper, the simple water colors will answer without any further addition. Ox gall is used in combination with water and water colors, in order that they may wash evenly over the surface, especially on such substances as tracing cloth, where the surface is apt to be greasy. We would advise you to purchase the preparation already made, as it is best to have it of the proper strength.

(3) N. G. B. asks: Can I heat an apartment with steam taken direct from a boiler above it, and carrying about 40 pounds pressure? Distance

from floor of the apartment to top of boiler being about 90 feet. Can I force the condensed water back into the boiler by using a steam trap, or must I exhaust into the air? I must carry the discharge pipe about 10 feet from floor to exhaust into the air. A. You can return the water of condensation to the boiler only by the use of a return steam trap. At the height you mention, even this would not always work satisfactorily. You can discharge the water at 10 feet above the coils by a small pipe with valve, but should provide means for draining all the water from the coils at night, to prevent freezing. The return steam trap is expensive, and is not recommended for a single apartment.

(4) H. B.—The newspaper account which you saw was entirely incorrect. Such a death from morphia would not be possible. The effect of morphia or other preparations of opium is at first stimulating, and subsequently stupefying. A dose sufficiently large to be fatal sometimes causes so much irritation of the stomach as to produce vomiting, and the life of the person may thus be saved. If the vomiting does not come within a short time, say an hour at the farthest, sleep follows, increasing in heaviness until it becomes torpor with perfect unconsciousness, which continues uninterruptedly till the moment of death. The struggling indicated in your question does not occur.

(5) J. B. S. asks: 1. What is the cause, also the cure, of a kind of boil coming on the face, and after coming to a head the skin still retaining the red color? A. A boil, after the active inflammation has passed away, always allows the redness of the skin to remain for quite a long time after the pain has ceased. Nothing is needed but time. 2. I have an electro magnet with a current breaker which did at one time furnish strong shocks, but lately has lost this property. What is the cause of this? A. This can scarcely be answered without direct examination. Various causes may exist for the failure of action.

(6) W. asks: 1. Is it healthy to work with my hands continually in the water? I have been working at it for four years, and have not increased in size or strength since I began. A. Your failure to increase in size and strength is, in all probability, due to other causes than that which you specify. The only effect likely to come from your hands being in the water would be your being chilled. If the water is not cold, it will do you no harm. 2. Is porter strengthening? I do not wish to take it if I can avoid it. A. Let the porter alone. You do not need it for any reason whatever. It will not give you strength.

(7) W. F. G.—The dipleidoscope or dipleioscope was invented by Bloxom in England, and consists of a triangular prism polished on three sides and silvered on two of them. One of the silvered sides must be adjusted to a horizontal plane. Its unsilvered face must be adjusted at right angles to the meridian. Then, upon observation of the sun or other object passing the meridian, a reflected image from the first surface and a double reflected image from the interior surface will approach each other when the object is approaching the meridian, coincide when on the meridian, and recede after the meridional passage. It is not an instrument of precision. Having no means of adjustment, other instruments have to be used; but when once fixed in its proper position, it affords an easy means of observing the meridional passages of celestial objects. It is not known to be made or in use in the United States. You will see it illustrated in the Supplement or 4th volume of Knight's Mechanical Dictionary. We consider it of no value.

(8) E. B. asks whether there is any cure for sweating of the hands. A. No remedies seem to have any great efficacy, except where the trouble is caused by some local difficulty. Application of sulphur ointment at night, to be washed off with very free use of soft soap in the morning, is one of the best modes of treatment.

(9) W. M. K. writes: Many of our cemetery lots are curbed by white cut stone. Placed on this curbing are iron posts to which are attached drooping chains. Rust from this iron has stained the stone seriously. Many say that there is no acid or preparation that will remove the rust. I believe there is, and that you can tell what it is. A. The stains of iron rust may be partially removed by washing the stone with hydrochloric acid diluted with 4 parts water. Then wash with clean water. If the stone is marble, use oxalic acid in solution of water. There is little use of removing stains without also removing the cause of the stains. Iron posts should be galvanized and set in the ground or in dark colored stone blocks. The chain should also be galvanized. Stone curbing should be made of red sandstone to wear well with iron railing or posts and chains.

(10) O. L.—1. A paint composed of black lead, lamp black, and boiled linseed oil, which you can make to suit your own taste as to proportions, makes a good durable paint for steam pipes. 2. Sulphur may be melted over a coal fire in an iron ladle large enough to hold, without spilling, the quantity for a single pouring. Lay a piece of sheet iron on the ladle for a cover; heat slowly so as not to take fire. If you can set the ladle into a hole in a piece of iron over the fire, it will be convenient and safe. It should not be heated so hot as to take fire by the vapor. 3. You can test a boiler with cold water by any means that will produce the required pressure. It matters little where the gauge is placed, so that it indicates the true pressure in the boiler. It should, however, be placed on a level with the water in the boiler, otherwise it might indicate a little more or less than the true pressure. 4. To post you on examination we recommend Roper's "Engineer's Handy Book," $3.50, and Roper's "Questions and Answers for Engineers," $3.00, which we can furnish.

(11) W. A. P. asks (1) how to color soft iron blue. A. The blue color of iron articles, as also gun barrels, is made by first cleaning the articles with an even finish with emery paper or other means. Then heat over a fire or in an oven until the desired color is obtained, when the articles are to be quenched in water, wiped, and dried, or may be cooled in an air blast. 2. Which is the hardest to ride—a high bicycle or a low one? A. A low one is the safest if you are inexperienced.

(12) L. N. C. writes: I desire to know what quality or mixture of cast iron to use in situations exposed to temperatures of from 750° to 800° Fah., and to alternations of temperature ranging from say 60° to 800° Fah. Also, what kind of cast iron would last longest and be least liable to fracture when used as above? Would like to have your reason in the selection of any particular kind of iron for this purpose. Iron to be used in cylinder 12 inches in diameter, and protected from direct action of fire by fire bricks. A. The hard iron No. 3 or 4 will stand the heat the best. If the cylinder is to be finished, the hardest iron cannot be used. There is no mixture of iron that will not fracture after long use at varying temperatures up to 800°, which is red in the dark. Very tough castings may be made with No. 3 and machinery scrap mixed, and if not to be dressed, No. 4 and machinery scrap make a good mixture.

(13) C. S. P. asks a receipt for making bakers' "stock yeast." A. Boil 12 ounces of good hops with 4 pails of water for about 5 minutes; then strain off enough of the liquid among 8 pounds of good sifted flour in a tub to render it into a stiff paste, working it up thoroughly with a clean stick; then add the rest of the liquid to the paste; let it stand till lukewarm, and pulverize any remaining lumps with your fingers. Now add about 8 pounds malt and stock yeast; allow it to work in a warm place till it rises and falls again, which will occupy from 8 to 12 hours; strain through a hair sieve and stand in a cool place. In warm weather 4 gallons cold water might be added to the above, previous to stocking away.

(14) J. M. G. writes: If a horizontal vacuum tube one thousand feet in length and ten feet diameter had transparent ends, could a person see through it, or would light pass from one end to the other? A. Yes, light passes through a vacuum.

(15) C. W. F. asks: In what can I dissolve old rubber so as to form a kind of rubber paint for cloth? A. Coal tar benzole.

(16) J. F.—Artificial limbs are generally made of wood or cork. If properly varnished or oiled, the weather should not affect their action.

(17) M. L. P. & Co. write: We have a man running a farm thrasher steam engine, who maintains that when the machine sits higher than the engine it requires more power to run it than it does when the machine is as low or lower than the engine, other things being equal. A. It does not.

(18) W. H. M. asks whether hydrogen peroxide or Naquet's bismuthic dye will permanently change the color of the hair. A. The compounds mentioned change the color of the hair that is treated permanently, but the new hair coming in will naturally be of the original color.

(19) Dr. A. E. F. asks about Chinese opium smoking, *i. e.*, what kind of pipes they use, how they prepare or mix the crude opium. A. The essential part of the pipe is the head or bowl, made generally of terra cotta, but capable of being produced from a variety of materials. This bowl on its outer surface is provided with a small aperture, measuring perhaps one-sixteenth of an inch in diameter, round which the extract is placed. On the side of the bowl opposite to this aperture it is fixed to the tube through which the smoke is conducted to the mouth. This tube, of bamboo or any hollowed out wood, is from 12 to 16 inches long from the bowl to the mouth piece, but in the Chinese pipes it is mostly prolonged for from 4 to 6 inches beyond the bowl in the direction opposite the mouth piece. The Chinese use a mixture of opium with sam-shu (a variety of gin) made up in the consistency of treacle. The ordinary pharmacopœial extract may be used.

(20) C. W. S. and H. P.—Wax method of engraving: The picture or drawing of which it is desired to make a plate to print from is first photographed or traced upon a very thin film of wax covering a perfectly smooth copper plate. The lines on the wax are then cut out with an ordinary graver's tool. Names and figures are pressed in with type slightly heated. The untouched surfaces of the wax between the lines are then built up or raised with wax—these elevations forming in the completed block depressions corresponding to the routed portions in the common wood block. The height of the built up portions depends upon the distance between the lines—where the lines are near together, no building up being necessary. From the engraved wax plate an electroplate is made in the usual way. The composition of the wax used is a secret; it must cut freely without pulling, must be tough but not hard enough to crack or chip, and it must not be so soft as to prevent the forming of clean, sharp lines.

(21) S. A. S.—We believe that sheets of pure rubber are impervious to the vapors of mercury.

(22) B. F. D. desires a method of treating fence posts and wash poles to prevent their decaying under and near the surface, or retarding decay. A. Dipping the wood in a mixture of 25 gallons of water in which 5 pounds chloride of zinc has been dissolved is said to be an excellent remedy. Dipping the ends to be buried in coal tar is likewise recommended. The efficiency of the last named agent is increased if the ends are first slightly charred.

(23) R. B.—Gas stoves are not as economical as coal stoves, and are not healthy unless ventilated. The composition of chlorodyne is variable. There are at least a dozen formulas for it. Five ingredients are usually considered essential—chloroform, morphia, hydrocyanic acid (prussic acid), oil of peppermint, and molasses. An excellent formula is given on page 420 of the present United States Dispensatory.

(24) J. G. S. asks for a receipt for cleaning filigree silver work that has become tarnished by exposure. A. You can dip it for a moment in a solution of cyanide of potassium. If not very badly tarnished, probably a solution of hyposulphite of soda will clean it. If there is no base metal about the ornament, you might clean it by boiling it in sulphuric acid. 2. Has there ever been invented an automatic water pitcher that will fill the tumbler and then regain its position? A. We have never seen a water pitcher of that description. 3. Why is it that glass cloth is not used as clothing, if it can be spun or woven? A. We think that glass cloth, although somewhat flexible, would be too friable for general use as a material for clothing.

(25) F. S. L. asks: 1. How much manganese does it take to fill a porous cup of the Leclanche battery, and what does it cost by the pound or quart as they sell it? A. It depends on the size of the porous cup. The cup should be filled entirely around the carbon rod. Granulated black oxide of manganese costs ten cents per pound. 2. I am making a clock to go by electricity; will you please explain how they are worked and what way are they connected, and can they be worked with a Leclanche battery? If not, what kind of a battery can be used? A. For information on electric clocks, consult SUPPLEMENT, Nos. 191, 198, and 44. 3. I want to make a motor to make six lights to go by steam. Will you let me know how to make it? A. We do not understand from your query whether you mean the steam motor, electric motor, or water motor, or whether you have inadvertently used the word motor when you mean dynamo.

(26) G. W. K. asks: What cement will unite metallic foil to card or wood? A. Dissolve glue in boiling water to the consistence of cabinet maker's glue, then stir in sufficient wood ashes to produce a varnish-like mixture while hot; the surfaces to be united must be covered with this compound and pressed together. A solution of shellac and gum mastic dissolved in alcohol, to every pint of which 1 teaspoonful of glycerine is added, is said, on excellent authority, to be good for this purpose.

(27) F. A. M. asks how to make a preparation that will take the black off nickel on stoves and make it look like new. A. A little rouge with linseed oil on rag will clean the nickel, or if necessary use the metal paste recommended for polishing, in answer to query 20 in SCIENTIFIC AMERICAN of May 2, 1885.

(28) B. H. G. asks for the composition of sulphur ointment, and what kind of soft soap is used with it. A. Sulphur ointment is made by mixing together 1 ounce sublimed sulphur and 2 ounces lard. A soft soap is one composed of potash as the alkali with some fat or oil. For the purpose desired you can readily procure a soft soap from any competent druggist. Its preparation is described in the U. S. Dispensatory.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted,

December 8, 1885,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

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Nervine, Scotch Oats Essence Company 12,838
Tea, J. Keer 12,831
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