
a Weekly journal 0f practical information, art, science, mechanics, chemistry, and manufactures. Vol. $\underset{\text { [NEW. SERIES.] }}{\text { LIII.-NO. }}$ 24.]

NEW YORK, DECEMBER 12, 1885.
[\$3.20 per Annum.


A GREAT SEWER BUILT BY AN IMPROVED METHOD OF TUNNELING, IN BROOKLYN, N. Y.-[See page 373.]

## \%rientific gmmiran.

ESTABLISHED 1845.
MUNN \& CO., Editors and Proprietors. ublished weekly a
No. 361 BROADWAY, NEW YORK.
A. E. BEACH.

## TERIIS FOR THE SCIENTIFIC AMERICAN

One copy, one year. postage included...
One copy, six months, postage included
Clubs.-One extra copy of The Scientifac Ambrican will be supplied ratis for every club of tive subscribers at $\$ 3.20$ each; additional copies ame proportionate rate. Postage prepaid
emit by postal order. Address

## The Scientific American Supplement

is a distinct paper from the Scientific American. THE SUPPLEMENT is issued weekly. Every number contains 16 octavopages. uniform in size
with ScIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT,
$\$ 5.00$ a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all newsdealers throughout the country.
Combined Rates.-The Scientific American and Suppliement will be sent for one year, postage free, on receipt of seven dollars. Both
papers to one address or difierent addresses as devired papers to one address or different addresses as desired.
The safest way to remit is by draft, postal order, or registered letter.
Address MUNN \& CO., 361 Broadway, corner of Franklin Street, New York.
Scientific American Export Edition.
The Scientific American Export Eaition is a arge and splendid periodical, issued once a month. Each number contains about one hundred
large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the Scientific AmeriCAN. with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, $\$ 5.00$ a year, sent prepaid to any part of the
wor.d. Single copies, 50 cents. Manufacturers and others who desire to secure foreign the 50 cenc. nouncements published in this edition at a very moderate cost. The Scientific American Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN

NEW YORK, SATURDAY, DECEMBER 12, 1885 Contents.


TABLE OF CONTENTS OF
SCIENTIFIC AMERICAN SUPPLEMENT NO. 519,
For the Week Ending December 12, 1885.

Chemistry.-A New Process of Liquefying Oxygen.-By M. L. ${ }^{\text {PAGE }}$ CAILLETET. - With t wo enuravings of the apparatus used.... ...... 8293 I. ENGINEERING. ETC.-The Treatment of Sediment-carrying By GEO. J. SPECHT.-Characteristics of torrential streams.-Means of improving mountain str
tection of steep slopes, etc
The Forth Bridge.-Righting a caisson. -1 figure.. Triple Compound Engines.-A Abstract of a paper read by Mr. A. E. Seaton at a meeting of the Institution of Naval Architects.. III. TECHNOLOGY.-A Photographic Hat.- With three figures..
The Manufacture of T'oilet Soaps.- By C. R. ALDER WRIGE The Manufacture of Toilet Soaps.-By C. R. ALDER WRIGET.Plants and appliances used in the manulacture of soap.-Processes
of the second, third, and fourth groups.-Cold processes.-Transparent socaps.- -Remelted soaps.
Nobert's Ruling Machine for Use in Ruling Test Plates and Dif. fraction Gratings.- Described by Mr. J. MAY ALLS, JR. The Recovery of Residuals from Furnace Gases.-With description of the plant used by Messrs. Hobert Heath \& Son................
A pparatus for Extracting Reet Juice by Diffusion.-With full de A pparatus for Extracting Reet Juice by Diffu
scription of the Dujardin plant and 22 figures.
V. PHYSICS. ELECTRICITY, ETC.-An Improved Microtome or Instrument for Cutting Sections for Microscopical Purposes.-
With an engraving............................................ With an engraving...
Improved Tide G
ures..............................................................$~$ a Solid Electrolyte.-A paper read by SHELFORD BIDWELL before Section B, British Association
Palmieri's Constant Dry P

Influence of Electricity upon a Liquid Film.-Experiments of Profs. Reinold and Rucker.
. ARCHITECTURE, ETC.-Improved Method of
boratories.-By C. M.STUART.-With one figure. boratories,-By C. M. STOART.-With one figure. St. Mary's (R. C) Church Leek, Staffordshire.-Wi................. ings.
The
I. HORTICULTURE ETC-Clematis Dividiana-Hards herbaceous plant.-With engraving. French Method of Exterminating the Phylloxera. - Four engrav-
ings..........................................................................................
8
II. MISCELLLANEOUS.-The Climatic Influences of Forests.-Their influence upon the proauction andfreques influencer upon the
poor--With portrait,................................................. 82
BENEDICT RoEZL, Horticulturist--His life and work-With por-

HOW TO MARE WINTER EVENINGS PROFITABLE.
This is the season of short days and long evenings, the best time of all the year for study and improve ment.
Perhaps you are a young man desirous of obtaining commercial employment. One of the best passports in that direction, next to good character, is good handwriting. Of course, you know how to write, but like the great majority, probably, you have never trained yourself to write well. No merchant wants his books disfigured by awkward and illegible scrawling. No lawyer will submit to badly written copies. We suggest you de vote yourself this winter to persevering endeavors to improve your penmanship. You will be surprised at the improvement which real effort in this line will achieve. May be you would like to learn stenography and type writing. The faithful employment of your winter evenings in this work may make you a first-class graduate before the long days come again, and enable you to earn a handsome support.
Do you wish to become expert as a mechanical draughtsman? There are excellent instruction books sold very cheaply. The industrious occupation of your evening hours as a learner will surely be fruitful of results. We know of excellent draughtsmen, now enjoying good salaries, who taught themselves to draw in evening hours, while companions idled away their time in smoking, cards, or gossip.
Are you of an inventive turn of mind? The best of all times to study up and think out plans for new con trivances is in the quietude of evening. The results of earnest thought in the production of inventions are simply astonishing. In general, it is the improvement in simple devices, things of everyday use and that everybody wants, which are the most profitable. The patent for the little invention of the spring window shade roller, now so generally employed in all dwell ings, has brought great wealth to the fortunate in ventor. He is now a millionaire. His device was truly a happy thought. We know of a lady in Chicago whose patents for the invention of a moving belt for drying eggs, albumen, etc., have revolutionized certain great branches of trade, and now bring her a great in come. The people want improvements in every con ceivable form. Not only is the field of invention vast but it is open to everybody. There are no distinctions in respect to sex or age. The way to invent is to "keep thinking;" the way to accomplish anything is to "keep working."

## THE NOVEMBER METEORIC SHOWERS.

The meteoric display of Nov. 27 th was visible to the inhabitants of more than a quarter of the globe. It was observed at Teheran, Persia, and was unusually brilliant in other parts of Asia, as well as in Naples and London. What was seen in our own locality during the evening was only the end of the main shower. At the Yale observatory, shortly after six o'clock, forty-four shooting stars were counted in twenty-four minutes. Many of them had considerable brilliancy, and left trails of light behind them. Later in the evening, the meteors were less numerous, but were estimated at 100 per minute. They appeared to radiate from Andromeda, and as one observercan seebut about one-sixth of those visible, something near six hundred meteors could probably have been counted in a minute had the staff of observers been sufficient.
The display is due to the breaking up of Biela's comet, a dissolution first noticed in 1846. Since then the work has progressed rapidly, until the comet is now in millions of fragments. In ages past the wandere traveled among the fixed stars, but its path eventually approached so near to the sun that the intense heat is supposed to have started the disintegration. Detached fragments trailing after the comet formed its tail. In 1840 it was observed to have become divided into two parts. This destruction has continued until the comet is but a mass of fragments, which follow the old orbit. Once in about six and two-third years the earth passes through this meteoric belt. The fragments of the comet are made luminous by their rapid movement through the atmosphere, and not unfrequently fall to the earth. The display lasts as a rule for two or three hours, but varies greatly in its brilliancy. The last one of any importance was in 1872, when between fifty and one hundred thousand stars could have been observed by a single party. The display of 1879 was less striking. The next contact with the ruins of the comet occurs in 1892. Though the main shower lasts for but a short time, an occasional meteor may be seen almost up to Christmas-time.

## Underground Electrical Conduits in New York City.

The New York State law of June 13,1885, provides that the authorities of the larger cities of New York State shall appoint commissioners to examine into the merits of different systems of underground electrical conduits, and to see that within a reasonable time all poles and overhead wires are removed from the streets of these cities. In New York city, Messrs. Charles E. Loew, Theodore Moss, and Jacob Hess were appointed commissioners. In compliance with the further terms of the law they imme
panies then in existence to present plans for the transfer of their lines to underground conduits, giving them sixty days in which to respond. As the companies ailed to present a satisfactory scheme, the commis sioners are investigating the subject themselves, and apparently mean to do it thoroughly. They have invited those interested to submit plans, and there are already over a hundred schemes represented at the rooms of the Commission, 23 West 23d St. These form veritable museum of electrical contrivances, and are now being catalogued. The commissioners expect to visit Chicago, Washington, Philadelphia, and other cities where underground systems are in operation. With the help of experts, they will then begin the difficult task of sifting out the best and most feasible scheme.
It is a work of some magnitude, and will probably result in no definite proposition until next spring. It s hoped that the plan selected"may be carried into operation during the summer. The companies themselves are stated to be anxious to have the underground plan arried out, as a matter of economy in the long run, and are doing what they can to aid the work of the Commission. When a plan is finally selected, the commissioners have full authority to compel its adoption by all who use the streets for carrying electric wires of ny kind.
We judge that the Secretary of the Commission, Mr. Moss, has an embarrassment of riches in the plans already submitted to him; but as the search is for the best, the competition is still open

## PHOTOGRAPHIC NOTES.

To Prevent the Cracking of Lantern Condensers.When the oxyhydrogen light is used in the optical lantern, accidents often happen by the cracking of the condenser from unequal heating, by reason of its close proximity to the light. One method which has been proposed consists in clamping a small sheet of glass directly against the face of the condenser, and in also providing, by perforations in the surrounding metal band, or the free circulation of the air between the lenses Should the heat become too intense, the glass plate will crack and thereby save the condenser.
At one of the recent meetings of the Amateur Photo graphic Society in this city, Dr. Laudy stated that he had used for some time, with perfect safety, a thin sheet of mica in contact with the face of the lens toward the light.
The streaks in the mica did not show on the screen, and but very slightly retarded the light. It was advised that a very clear sheet be selected, as a yellow secimen would interfere too much with the transmitted light.
It is undoubtedly a wise precaution to use some creen of a refractory material between the light and the condenser.
Testing the Thickness of Gelatine Films.-Concerning the manufacture of dry plates and the recent tend ency of the manufacturers to increase their sensitive ness without regard to other desirable qualities, such as opaqueness to resist halation, the Photographic News remarks:
A good way of testing if the thickness of a film is sufficient to give the required opacity is the following The film is wetted, and the plate is placed between the observer and a bright gas or lamp flame. If the film is thick enough, the shape of the flame will not be seen through any part of it; in other words, it (the film) will be translucent, but not transparent. Of course, the actual plate experimented on will be spoiled, but the destruction of one plate is a small matter if it will enable the photographer to determine whether he will be wise in purchasing a batch of plates or not and if he desires to try several, he may use any safe artificial light in which no diffusing medium is used, in which, that is to say, the flame of the light is visi ble. But with the safest light possible, the examination must be very rapidly performed if the plates are sensitive. They must be held near the light, and at the best the test is not so searching as with an un covered light. Of course, the plates used may have re ceived an exposure, and the test may be performed immediately before development, so that there is no waste. Plates which show a flame as described should be rejected, much more those which show the shape of the flame through the film while it is dry.
We have so far pointed out the evils which result rom the use of plates too thinly coated, and the readiest way of judging of a film whether or not it is thick enough; and now we have to make a somewhat serious charge against plate makers in general. We have no hesitation in saying that the average opacity of the films of plates in the market has greatly fallen off during the last few years. One cause of this is doubtless to be found in the fact that the average sensitiveness of plates has, during the same few years considerably increased, and that, therefore, the opacity has decreased, apart from any reduction in the amoun of silver used. Every one who has experimented with emulsion knows that, as a rule, increase of sen sitiveness means decrease of opacity and covering power.

## ASPECTS OF THE PLANETS FOR DECEMBER.

## saturn

is morning star until the 26th, when he becomes evening star. On the 26th, at 6 o'clock in the morning, he is in opposition with the sun, his place in the heavens being then, as the word implies, opposite the sun. He rises in the east at that time as the sun sinks in the west, and adorns the sky from sunset to sunrise. He presents a grand display throughout the month, and thirty years must complete their slow circuit before he will again be visible in his present aspect.
The hour has come that observers have so long desired. The beautiful planet is in opposition, only two months past perihelion, his magnificent rings are open to their widest extent, and he has reached his highest northern declination. He is charming to behold as he makes his way with retrograde steps through the smaller stars of Gemini. He is surpassingly lovely in the tolescope as he lies cradled in his rings, and surrounded by the points of gold that reveal the presence of his eight satellites.
'These are red-letter days for Saturnian astronomers, who will not fail to improve the precious opportunity for studying his complex system, especially the constitution of the dark spaces between his rings, and the shadowy markings on his disk. The features of this planet's surface are of extreme delicacy. The eye must
be practiced, the instrument of the best kind, and the be practiced, the instrument of the best kind, and the atmosphere clear to give any hope of reaching reliable
results. Mr. Denning, of Bristol, a close observer, gives an interesting report in Nature of observations that have been made upon the Saturnian belts during the last few oppositions.
A very definite narrow dark belt has bounded the southern side of the equator, remarkable for its compact appearance, though exhibiting no distinct spots. One or two observers have detected proofs of condensation. The belts near the pole are so faint that there is doubt if they have really been seen except by the eye of fancy. It is generally agreed that some of the features of the planet are variable, and this accounts for the difference of opinion among observers. Especially is this the case in regard to the division between the rings and the division in the outer ring. These must fluctuate at short intervals, or the evidence of different observers and different telescopes is strangely at variance. There is not much probability that definite results will be reached at the present opposition, even under such favorable conditions. None the less should the observation be thorough, close, and long-continued, for this is the only method by which terrestrial observers can hold communion with the other planets, or learn even the first lessons of what is going on in their distant domains. - It is easy to recognize Saturn as he rises in the northeast about 6 o'clock in the evening on the 1st of the month, for he is almost in line between Pollux and Betelguese.
The right ascension of Saturn on the 1st is 6 h .29 m . his declination is $22^{\circ} 23^{\prime}$ north; his diameter is $19 \cdot 2^{\prime \prime}$ and he is in the constellation Taurus.
Saturn rises on the 1st about 6 o'clock in the evening; on the 31st he sets a quarter before 7 o'clock in the morning.

## venus

is evening star. She reaches one of the great timemarks in her course during the month. On the 8th, at 9 o'clock in the evening, she is at her greatest eastern elongation, being $47^{\circ} 19^{\prime}$ east of the sun. Her progress eastward is then stayed. Remaining stationary for a few dảys, she commences to turn her steps westward, increasing her pace, apparently approaching the sun, and really approaching the earth.
There is no need to call attention to her lovely aspect as night after night she holds her court in the western sky as queen of the stars, now shining amid the golden glow of the sunset and now rejoicing amid the crimson hues that make the western sky like a dream of beauty. One never tires of admiring this bewitching star. She will be charming as she retraces her steps toward the sun, and afford a fine subject for study in the remaining two months of her course as evening star.
Seen through a telescope at elongation, she takes on the phase of the moon at her last quarter. She will quickly assume that of the waning crescent as she approaches us more nearly, increasing in size through turning less and less of her illumined disk to the earth until only a thread of light is visible as she passes between us and the sun at inferior conjunction.
The right ascension of Venus on the 1st is 19 h .58 m .; her declination is $23^{\circ} 25^{\prime}$ south; her diameter is $23.6^{\prime \prime}$ and she is in the constellation Sagittarius.
Venus sets on the 1st at half past 7 o'clock in the eve ning; on the 31st she sets at 8 o'clock.

## JUPITER

is morning star. On the 26th, at 5 o'clock in the morn ing, he is in quadrature with the sun, being $90^{\circ}$ west of him. His southern declination will prevent his being seen under the best aspect, but he is now in fine position for observation, notwithstanding this drawback. At the time of the latest observations before the conjunction of Jupiter, the famous red spot, which had nearly disappeared, showed unmistakable evidences of
activity. The ellipse grew darker, the central light cloud disappeared, and the spot had reassumed the appearance it presented in 1878. Interest for Jovian observers will therefore center in the present aspect of the red spot and the changes that have taken place during the time the planet was hidden in the sun's rays. The Prince of Planets is more tangible than his more distant brother Saturn, and his atmospheric features are more firmly established. Observers will therefore find interesting subjects for study in the red spot, the dark belts, the white spots bordering them, while the huge planet is favorably situated, as he is, during the entire month, rising before midnight at its lose.
On the 8th, at 6 o'clock in the evening, Jupiter is in close conjunction with Eta Virginis, a star of the third magnitude in Virgo, being $10^{\prime}$ south. Planet and star re invisible at the time of conjunction, ear each other on the morning of the 9th
The right ascension of Jupiter on the 1st is 12 h .12 m .; his declination is $0^{\circ} 6^{\prime}$ north; his diameter is $32 \cdot 8^{\prime \prime}$; and he is in the constellation Virgo.
Jupiter rises on the 1st a few minutes after 10 o'clock in the morning; on the 31st he rises a few minutes before half past 11 o'clock in the evening.

## MARS

is morning star. On the 3d, at 6 o'clock in the evening, he is in quadrature with the sun, and henceforth until he reaches opposition will be of some importance on the planetary record. Mars is the only one of all the planets of the system where we probably see the real surface and distinct markings that indicate land and water. We simply see atmospheric effects in the other planets. The last opposition of Mars brought the planet to view in a most unfavorable light, on account of his great distance at the time. Schiaparelli, however, managed to detect the double markings in the so-called "canals." The next opposition is nearly as unfavorable as the last, but there is alway a possibility that something valuable may be added to what is known, or at least that former observations may be verified. On the 3d of December, Mars is in conjunction with Regulus, being $1^{\circ} 19^{\prime}$ north. For several days the star and the planet may be seen in the same field of vision in a marine glass. Mars will be easily found during the month, on account of his vicinity to Regulus.
The right ascension of Mars on the 1st is 10 h .43 m . his declination is $9^{\circ} 21^{\prime}$ north; his diameter is $7 \cdot 6^{\prime \prime}$; and he is in the constellation Leo.
Mars rises on the 1 st about a quarter after 11 o'clock in the evening; on the 31st he rises a quarter after 10 o'clock.

URANUS
is morning star. He reaches quadrature on the 28th, at 10 o'clock in the evening, making the third planet in quadrature on the sun's western side during the month, the events occurring in the following order: Mars, Jupiter, Uranus.
The right ascension of Uranus on the 1st is 12 h .26 m .; his declination is $2^{\circ}{ }^{\prime} 7^{\prime}$ south; his diameter is $3 \cdot 6^{\prime \prime}$; and he is in the constellation Virgo.
Uranus rises on the 1st at half past 1 o'clock in the morning; on the 31st he rises soon after half past 11 o'clock in the evening.

## MERCURY

is evening star until the 18th, and then joins the morning stars. On the 18 th, at 11 o'clock in the evening, he is in inferior conjunction with the sun, passing beween the earth and the sun, and reappearing on his western side as morning star.
The right ascension of Mercury on the 1st is 18 h .4 m .; his declination is $25^{\circ} 37^{\prime}$ south; his diameter is $6.6^{\prime \prime}$; and he is in the constellation Sagittarius.
Mercury sets on the 1st at half past 5 o'clock in the in the morning.

NEPTUNE

## evening star.

The right ascension of Neptune on the 1st is 3 h .15 m .; his declination is $16^{\circ}$ north; his diameter is $2.6^{\circ}$; and he is in the constellation Taurus.
Neptune sets on the 1st about half past 5 o'clock in the morning; on the 30th he sets about half past 3 'clock.

## THE MOON.

The December moon fulls on the 21st at 3 h .58 m . P.M. On the 8 th, the two days' old moon is in conjunction with Mercury at 1 h .9 m. A.M., being $6^{\circ} 3^{\prime \prime}$ north. On the 10th he is in conjunction with Venus at 6 h .19 m . P.M., being $5^{\circ} 56^{\prime}$ north. On the 19 th she is near Neptune at 2 h .24 m. A. M., being $2^{\circ} 45^{\prime}$ south. On the 22 d she is at her nearest point to Saturn, 6 m . after midnight, being $3^{\circ} 58^{\prime}$ south. On the 27 th , she is in conjunction with Mars at $4 \mathrm{~h} .19 \mathrm{~m} .$, A.M. being $2^{\circ}$ $48^{\prime}$ south. On the 28 th , she is in conjunction with Uranus at 7 h .41 m. A.M., being $55^{\prime}$ north.
occultations.
The moon occults the planets Jupiter and Uranus, and the bright star Aldebaran, as well as numerous tars of less note on the celestial calendar during the
interesting. The phenomenon as seen from the center of the earth will take place on the 28 th, at 3 h .55 m . A. M., Washington mean time. It will be visible to all observers on the earth's surface whose position corresponds to the position of the moon as seen from the earth's center, or her geocentric position. They must, however, be on the dark side of the earth at the time, and between the limiting parallels of $39^{\circ}$ north and $29^{\circ}$ south. The occultation will be visible for a very short time at Washington, the latitude being $38^{\circ} 53^{\prime}$ north, just below the northern limiting parallel. There will be a close conjunction of the moon and Jupiter in this vicinity that will be worth getting up early to observe, the moon being within a few hours of her last quarter and the bright planet being fair to see, for moon and star will hang side by side before the breaking of the dawn.
The occultation of Uranus occurs on the same mornning at $7 \mathrm{~h} .41 \mathrm{~m} .$, A.M. Washington mean time, and is of course invisible in this vicinity, as it takes place after sunrise.
The occultation of Aldebaran, for the twelfth time during the year, will occur on the 20 th , at 4 h .28 m . A. M., Washington mean time. The phenomenon will be visible at Washington. The immersion of the star occurs at 5 h .15 m . A.M., Washington mean time. The occultation continues 49 m . The emersion occurs at 6 h .7 m . A.M., but will not be visible, as moon and star are then below the horizon.

## DECEMBER

shows an active condition of the sun's family. The heavens are alive with interesting events among our celestial neighbors, the planets. The moon occults Ju piter and Uranus on the same morning, and hides from view the red star Aldebaran on another occasion. A telescopic view of the occultation of Jupiter presents a scene of wondrous beauty. The Prince of Planets surrounded by his beaming satellites plunges headlong into the moon's domain, and is suddenly blotted from the sky: It is only for a short time. He soon reap pears as majestic and stately as ever, pursuing his course among the stars, and soon with his companions to disappear in the coming daylight. The opposition of Saturn is a noteworthy event on the monthly record. There are also to add to the list the quadratures of Mars, Jupiter, and Uranus, the greatest eastern elongation of Venus, and the inferior conjunction of the swift-footed Mercury. Mars holds a conference with Regulus, and Jupiter draws near to Eta Virginis.
December, therefore, presents a prospect of enjoyment and abundant opportunity for steady work for those who follow the planets in their courses, and seek to fathom the mysterious bond that unites planet to planet, and binds the members of the solar family into one harmonious whole. They bear constant and tan gible testimony to the resistless sway wielded by the all-powerful sun, whose least disturbance is felt in the system's remotest bounds, and who holds within his fiery orb the issues of life and death for his family of worlds. In his life we live, in his death we die.
The sun crowns the month with two great events. On the 21st, he reaches the winter solstice, when he turns his smiling face northward, and gives promise of the more gentle breezes and warmer sunbeams that will surely follow his approaching steps. On the 30th the sun is in perigee, or at his nearest point to the earth being $3,000,000$ miles nearer than when most distant thus tempering the severity of winter in our northern clime.

## Trial of the Dynamite Air Gun

Three dynamite projectiles were thrown from Lieut. Zalinski's pneumatic gun, at Fort Lafayette, New York harbor, on the afternoon of Nov. 28. The projectiles were thrown a distance of about two miles, and two of them, one containing 50 and the other 100 lb . of nitroglycerine, exploded in a most satisfactory manner, the other one sinking in the water without exploding Previous to firing the dynamite-loaded projectiles, ex periments were made with those loaded with sand, to obtain the proper range, and Lieut. Zalinski explained the working of the gun to a large number of visitors who had been invited to witness the trial. An illustrated description of the gun and its mode of operation appeared in the Scientific American of Oct. 31. When the projectile containing 100 lb . of dynamite struck the water, it sent up a column of spray 150 feet into the air, accompanying which was a cloud of yellow smoke and a report similar to that made by heavy ordnance. The air pressure employed was 1,000 pounds to the square inch, and this, so admitted as to realize a large part of its expansive force in the long gun, gave the needed velocity to the projectile, without a sudden concussion at starting, as would have been the case with gunpowder, all according to the anticipations of Lieut. Zalinski. The practical demonstration thus afforded that the most powerful of modern explosives can be thus handled, even though the range is as yet comparatively short compared with that of the best modern guns, marks another and most important step in the development of the means afforded for carrying on modern warfare.

## GRADING AND DITCHING MACHINE.

The cart is provided with a tilting bottom, and is carried upon one plain wheel and upon one wheel formed with buckets upon the inner side at the rim. On the side of the rear of the cart next to the bucket wheel is secured a knife, which serves to remove any dirt that may extend beyond the inner side of the bucket wheel. A plow for filling the buckets is attached to a beam provided with a lever mechanism, by means of which it may be raised and lowered as desired. As the cart is drawn forward, the earth is thrown by the plow into the lowest buckets; as the wheel revolves, the buckets dump the earth upon an inclined board, resting upon the top of the side of the cart, and down which it slides to the inside. When full, the cart can be taken to any convenient place and its load dumped.


## TOBIAS' GRADING AND DITCHING MACHINE.

This invention has been patented by Mr. Benjamin Tobias, of Washington, Ill.

## IMPROVED FIRE ESCAPE

The prevalence of destructive and fatal fires in the larger cities during the past few years has called forth a strong effort on the part of our inventors to devise efficient means for the rescue of those imprisoned in burning buildings. We have illustrated several of these devices from time to time, and in our present issue show one which has recently been patented by Mr. Thomas Macdonough, of Cheboygan, Mich.

It is the merit of the invention that it scarcely needs explanation, since our illustration tells the whole story at a glance. A strong metallic cable is stretched along the front of the building just below the cornice. Movable rings support vertical cables, which are connected in pairs by means of iron cross bars. These bars are provided with two friction wheels at each end between which the cables pass. A strong hook on the cross bars permits the suspension of a metallic basket, which,


MACDONOUGH'S IMPROVED FIRE ESCAPE.
when in use, is brought to the level of the window sill, so that a person can readily step into it. The device is manipulated by two persons on the street, who raise the frame and basket by separating the lower ends of the cables, and allow them to descend by approaching each other. The speed of the descent is thus regulated at pleasure, and the rescued persons may be landed on
the opposite side of the street, away from the burning
building. The baskets are made telescopic, so as to occupy but little space when not in use, and are kept in the different rooms of the building.
Practical tests of this escape have been made in Detroit and other places in the West, and its action pronounced very satisfactory. Being entirely metallic, it is fireproof, and may be kept in service as long as the strength of the building will permit.

## Percentage.

The reckoning of percentages, like the minus sign in algebra, is a constant stumbling block to the novice. Even experienced newspaper writers often become muddled when they attempt to speak of it. The as cending scale is easy enough. Five added to twenty is gain of 25 per cent; given any sum of figures, the doubling of it is an addition of 100 per cent. But the mo ment the change is a decreas ing calculation, the inexperienced mathematician betrays himself, and even the expert is apt to stumble or go astray. An advance from twenty to twenty-five is an increase of 25 per cent; but the reverse of this, that is, a decline from twenty-five to twenty, is a de crease of only 20 per cent.
There are many persons, otherwise intelligent, who cannot see why the reduction of one hundred to fifty is not a decrease of 100 per cent, if an advance from fifty to one hundred is an increase of 100 per cent. The other day an article of merchandise which had been purchased at 10 cents a pound was resold at thirty cents a pound, a profit of 200 per cent; whereupon a writer, in chroni cling the sale, said that, at the beginning of the recent depression, several invoices of the same class of goods which had cost over thirty cents per pound had been finally sold at ten cents per pound, a loss of over 200 per cent. Of course, there cannot be a decrease or loss of more than 100 per cent, 'because this wipes out the whole of the investment. An advance of from ten to thirty is a gain of 200 per cent; a decline from thirty to ter is a loss of only $66 \frac{2}{3}$ per cent.-Jour. of Commerce.

## IMPROVED METAL TONGS.

These tongs are designed to enable the blacksmith to do the most difficult jobs of welding without the use of helpers. Fig. 1 is a perspective view of the tongs, with two sections of pipe clamped in them ready to make the miter weld shown in Fig. 5; Fig. 3 shows a miter weld of two pieces of one-half inch square bar; Fig. 2 shows a section of gas pipe butt welded; and Fig. 4 represents a taper tap that was broken in the center, and which the inventor of these tongs, Mr. William W. Winegar, of Chambersburg, Ill., brazed to gether, making the tap as good as it was before being broken.
To the forward end of each of the arms is secured, by means of a set screw, a clamp, in the upper jaw of which is a screw; these clamps are provided with long necks into which the ends of the arms fit. This construction allows the clamps to be pushed up or down on the arms, to lengthen or shorten them as required, and by means of the screws the clamps may be held at any desired angle. The arms are held at any distance apart by a curved bar attached to one arm and passing through a slot in the other. When the tongs are in use, the pieces to be joined are placed in the clamps and held by turning down the screws, the clamps having been first adjusted on the arms to suit the shape of the pieces. After the pieces have been properly set in the clamps, the arms are brought together, and held firmly by turning the screw down on the curved bar. The pieces are then in position for soldering, welding, or brazing. It will be seen that the operator has complete control over his work, and gains much time in bringing the two parts together. In joining the pieces, instead of striking their ends, the clamps may be struck on projecting side pieces, thereby preventing damage to the ends of the parts. The device is exceedingly simple, is durable and efficient in use, and can be made at a small cost.

Mr. C. H. Chase, of Bridgewater, N. S., writes to us that, contrary to the generally accepted belief, the first gold found by James Marshall in California was not on the Sacramento River, but on one of its tributaries, he Feather, about 45 miles above the city of Sacraento, and within the limits of the present city of Marysville.

## GATE FOR WATERWHEELS.

The invention herewith illustrated-patented by Mr. D. L. Trullinger, of Union Mills, Oregon-consists of a waterwheel having a series of hinged discharge gates, so constructed and arranged that springs regulate their opening or closing, according to the pressure and the amount of water supplied. Fig. 1 is a vertical sectional elevation of a waterwheel, showing the gates partly open; Fig. 2 is a plan view on line $x x$, and Fig. 3 a vertical section on line $y y$, showing the gates closed. The waterwheel, of any approved construction, is inclosed in a casing provided with the usual chutes. Directly under each bucket is hung a gate


## TRULLINGER'S GATE FOR WATERWHEELS

formed with trunnions placed in bearings in the rim and hub of the wheel. Thegates are arranged radially and form bottoms for the buckets, and each is curved downwardly and overlapped by the one next following. On the inner and outer edges of the gates are ugs entering segmental grooves formed in the hub and rim; these lugs rest on springs. The weight and presssure of the water on top of the gates swing one end downward, thereby opening them to discharge the water. The springs are compressed by the lugs, according to the pressure of the water supplied, and the gates are thus kept open as long as the pressure is exerted, and close or open still more if the pressure be diminished or increased; this permits the pressure of the water to be kept the same inside of the casing, whether the gates are fully or only partially open.

## Cleaning Water Pipes.

An experiment of cleaning main water pipes of inrustations by means of chemicals was successfully acomplished last year in Leipzig. The main pipe beween reservoir and the pump, 2.8 miles long and $15 \frac{1}{3}$ inches in diameter, was covered with incrustations about one inch thick. The cleaning lasted two months, and during this period the main pipe was filled eight times with solution of hydrochloric acid, three times with solution of soda, and once with solution of chloride


WINEGAR'S IMPROVED METAL TONGS.
of lime. By this means the incrustations were entirely removed, and the gauges at the pumps showed pressure 30 pounds less than before.

## California Sea Lions.

The thousands of sea lions which occupy the bays and coast near San Francisco are under the vigilant eye of the Fish Commission. The animals are very voracious, and are stated to devour hundreds of thousands of pounds of edible fish daily. The fishermen declare that they make hard times in their business. Their curious manner of living upon the rocks around Golden Gate makes the beasts one of the sights of the city, and one seidom neglected by tourists. It may be decided to protect the lions within a national reservation instead of trying to exterminate them. They will be made the subject of an exhaustive report to the Commission.

## SMOKE CONSUMING FURNACE.

In our issue of August 22 last, we described an ad mirable smoke consuming furnace devised by Mr. John L. Peslin, of Appleton, Wis. Though it was susceptible of some improvements in the minor details. its construction embodied the correct principles of the chemistry of combustion. Since that time, Mr. Peslin has been at work making these improvements, and in the modified form illustrated in our present issue he has incorporated them in a construction applied to a battery of boilers. It will be noticed that the feeding is effected from the front instead of from the top, as formerly.
We show the end boiler of a battery, with the front plate broken away in order to disclose the construction. The grate bars immediately under the boiler are made with a straight pitch, and incline toward the center. At their upper ends they are in line with step grates of fireclay, which receive the fresh fuel. These in their turn terminate against the sheet metal forming the sides of the smoke chamber. A cast iron guard, of curved cross section, extends over the top of this chamber to prevent the fuel from falling through into the ash pan. The fresh coal is introduced into the chamber over the step grate, where the heat is sufficient to partially coke the coal. The smoke and volatile products given off, instead of finding their way to the stack, are drawn into the smoke chamber by a downward blast of steam. They then pass under the grate and through the layer.of burning coals, where they are thoroughly consumed, the gases being ignited and the suspended particles of carbon brought to the temperature of combustion. The fuel, now deprived of its smoke producing constituents, is ready to be brought upon the grate. This is effected by turning a lever that tilts the step grate into the position shown at the right hand of our engraving, by which the coke is thrown into the zone of combustion. A weight on the end of the lever counterbalances the grate and fuel, making this operation easier for the fireman.
Such an arrangement of the furnace insures the combustion of every part of the fuel, utilizing its entire heat energy, and at the same time preventing thesmoke nuisance. It gives the advantages of coke and the heat economy of coal.

## oldest Habitations in America.

Major Powell, Chief of the Geological Survey, who has been about a month in field has discoventh in he field, has discovered in New Mexico, near Califor nia Mountain, what he pro nounces to be the oldest human habitation upon the American continent. The mountains in this vicinity are covered with uge beds of lava in which uge beds of lava, in which the prehistoric man and his comrades excavated square rooms, which were lined with a species of plaster made from the lava, and in these rooms were found various evidences of quite an advanced civilization, among them a species of cloth made of woven hair and a large ${ }^{n}$ number of pieces of pottery. In the sides of the rooms cupboards and shelves were excavated. In one room, sticking out of the bare face of the wall, was a ace of the wall, was a Small branch of a tree. it was found that there was a hollow space behind the wall. Colonel J. H. Steph enson, Major Powell's as sistant, broke this with a pick and found a little concealed niche, in which was a small carved figure resembling a man done up in a closely woven fabric
which with the touch of the hand turned to dust. It was blackened and crisp, like the mummy cloths of Egypt. In all, some sixty groups of these lava villages were found, there being twenty houses in each group. The evidences of civilization were similar, but removed
by their crudity and want of skill a good deal from the articles found in the cliff houses.-Santa Fe New Mex.

A New Island in the Pacific.
in working, and is thereby a decided improvement over the more yielding wrought iron carriage.
The sole plate which carries the boiler, and to which the side frames are bolted, is also one strong casting The United States Consul in. Samoa has advised the The engine has two cylinders placed horizontally on Merchants' Exchange of San Francisco that a new the sole plate, and motion is communicated to the crank shaft by connecting rods in the usual way. The center post on which the crane turns is of wrought iron. Link motion for reversing is provided. The cranes are made to hoist or lower and turn round by steam, the two motions being performed simultaneously if desired. A powerful friction brake is provided, by means of which the load may be suspended or lowered. The crane is fitted with single motion, and lifts its maximum loads by double chain.
The same speed of lift can be attained in this way as by double gear and single chain, and the former arrangement possesses the advantage of having fewer working parts and clutches than the latter, and less liability to derangement. A separate and larger winding barrel, 14 inches diameter and 14 inches long, can be provided if required. This barrel can be attached to the crane barrel in a few minutes, and by means of it light loads can be raised by single chain at a very quick speed.
The crane has thus the advantage of the following variations in the speed of lifting its load, which in practice will be found of the utmost convenience, viz. By double chain, the maximum load can island has been thrown up in the Pacific Ocean. It is $\mid$ be lifted at about 40 feet per minute; by single about forty miles off the Tonga group, bearing toward chain, half the maximum load at about 80 feet the Fiji Islands. Its appearance has a practical im- per minute; and by the barrel of larger diameter portance, since it is in the track of California vessels. lighter loads can be lifted at about 160 feet per minute The island is two miles long and 250 feet high. It is in The boiler, a most important part of a steam crane latitude 20 deg .28 min . south, and longitude 175 deg 21 min . west.

THE CONTRACTOR'S CRANE
A new portable crane, embodying all the essentia features which should be present in an apparatus of this class, and which are here combined with lowness in price, has recently been brought out by Messrs. Ale has large heating surface, and steam can be kept up without extra effort in firing.
A water tank is attached to the boiler, which is fed by means of an injector. The jib, which has a radius of 16 feet, at an angle of $45^{\circ}$, is of wrought iron. A small canopy is provided to protect the driver, is within easy distance of the starting handles, and at the same time commands an uninterrupted view of the hoisting chain.

## New British Army Service

 Rifle.The decision of the committee which was appointed some time since to con sider what form the new military rifle should take is that the diameter of the bore is to be 0.40 inch in place of the 0.46 inch of the Martini-Henry, and the weight of the bullet is to be reduced 96 grains, being 384 grains in place of the old weight of 480 grains. The powder charge, however remains as before, namely 85 grains. There will be 9 grooves in the rifling in place of seven as before and the pitch will be 15 inches in place of 22 inches. The muzzle velocity will, by these means, be in creased 255 feet a second that is to say, from the ori ginal 1,315 feet per second to 1,570 feet per second The practical advantage that will follow will be that the trajectory will be so far lowered, and at 500 yards the bullet would not go much, if any, above the head of an average soldier if fired from the ground In the old rifle the rise would be between 8 feet and 9 feet in the same distance.
The recoil is said to be much less with the new weapon, and, to judge by trials made, accuracy of shooting generally has been far more nearly ap proached than before
ander Shanks \& Son,London, Eng., and Dens Ironworks, Arbroath. From an inspection of our engraving, for which we are indebted to Iron, it will be seen that the carriage on which the crane rests is formed of one strong casting-an arrangement which secures rigidity

The Proper Weight of Man.
Professor Huxley asserts that the proper weight of man is 154 lb ., made up as follows: Muscles and their appurtenances, 68 lb. ; skeleton, 24 lb. ; skin, $101 / 2 \mathrm{lb}$.; fat, 28 lb. ; brain, $3 \mathrm{lb} . ;$ thoracic viscera, $31 / 2 \mathrm{lb} . ;$ abdominal viscera, 11 lb .; blood which would drain from the body, 7 lb . The heart of such a man should beat 75 times a minute, and he should breathe 15 times a minute. In 24 hours he would vitiate 1,750 cubic feet of pure air to the extent of 1 per cent. A man, therefore, of the weight mentioned should have 800 cubic feet of well ventilated space. He would throw off by the skin 18 oz . of water, 300 grains of solid matter, and 400 grains of carbonic acid every 24 hours; and his total loss during that period would be 6 lb . of water and a little more than 2 lb . of other matter.

## AN IMPROVED HORSESHOE.

The improved form of horseshoe shown in our illustration is the invention of Mr. James S. Charles, lock box 694, Omaha, Nebraska. In the first figure the under side of the shoe is represented, and in the second the top view. The body of the shoe is provided with a continuous, vertical flange, which has its edge sharpened and hardened by means of a new process devised by the inventor. The flange extends somewhat beyond the ends of the main body of the shoe, and is beveled into a sharp point. This feature is intended to give the shoe a greater hold on the roadway than can be obtained by the ordinary construction. The nail holes formed in the web are countersunk, as shown. They have their longer dimensions radiating toward the center, so that the thin part of the nail shall enter the hoof in the direction of its fiber, and do as little injury as possible. By driving the nail in the line of least resistance, the labor of shoeing is reduced, and there is less danger of splitting the hoof. While this form of nail hole is not essential to the invention, it is regarded


## CHARLES' IMPROVED HORSESHOE

as much the preferable construction. Should it be desired, howēver, the shoe may be made with the ordinary openiugs.

## IMPROVED MAIL BAG AND LOCK.

The accompanying illustrations show a mail bag and lock designed to do away entirely with the long strap, the staples, and the padlock heretofore used, substituting a lock which becomes a part of each mail bag, and is never detached therefrom. Figs. 1 and 2 show the bag open and closed, Fig. 3 is an enlarged face view of the lock, Fig. 4 showing the same with the front plate removed and parts shown in section, while Fig. 5 is a longitudinal sectional view. The bag has springs on theinside of the flap, and permanently attached thereto, to keep the mouth of the bag open when the flap is raised, thus holding it in the best position to facilitate the emptying and filling of the bag with mail matter. The lock is simple in construction, and perfectly solid when clused, so that if run over by a wagon it will not be injured. It is difficult to pick or force open in any way the locking bars carrying lugs, and being pressed by springs against recessed partitions of the lock casing. On the top surface of the front plate undercut ribs are formed for receiving and holding a ticket on which may be printed the station to which the pouch is to be returned, or the postal division, etc. The lock casing is attached to one flap of the bag, and the top plate to the other. The bag is locked by a slight pressure on closing, and the lock, springs, hinges, and swivels surrounding the mouth of the bag cannot be cut or removed by any ordinary means. This improvement is applicable, at but moderate cost, to all the old mail bags, while it can be applied to all new ones at an expense not to exceed that incurred for the pres ont unsatisfactory fastenings.
These inventions have been patented by Mr. Dennis P. Brophy, of Nokomis, Ill.

## STOCK AND COLLAR.

This invention particularly relates to stocks and colars such as are used by clergymen, in which a bandlike collar, designed to encircle the neck and opening at the back, is used and combined with a stock usually made to present a black fall in front and to expose a portion of the collar above it. One end of the collar is formed with a pocket that receives the other end when the collar is placed around the neck. This construction forms a ready means for putting the collar on and tak ing it off, and also gives an easy or yielding fit, and adapts it to different sized necks; it also provides fo expansion the collar with out exposing a break where the two ends meet. An inner encircling spring serves to support the collar and give it elasticity circumferential ly. This spring forms part of the stock, the material of which covers it ; one end o the spring enters a socket in the other end. The stock is also made with an outer black strip, above the fall arranged to encircle or partly encircle the collar, which is exposed above it. The collar and stock are held firmly together, but may be easily separated when necessary. It will be seen that the stock and collar present a neat appearance, and the latter is free from the unsightly break so common in articles of this de scription.
This invention has been patented by Mr. B. J. Kolb, of Glandorf, Ohio.

The Coventry Locomotive Boiler.
At a recent meeting of the Engineers' Club at Philadelphia, Mr. John T. Boyd presented an illustrated description of the "Coventry" locomotive boiler which is probably the latest novelty in locomotive con struction.
It was built at the Brooks Locomotive Works, Dunkirk, N. Y., and placed on one of their standard 17 in. by 24 in . engines, with 61 in . d̈rivers. The economy of the boiler as a steam generator has not been made public, but while in service on the New York division of Penna. R.R. it has proved to be almost absolutely free from smoke and cinder discharging qualities. The boiler is of the straight top return tubular type, is made of Otis steel throughout, and is remarkable in having but two barrel sections, excluding the smoke box. The stack is " behind instead of before," and is located over the front end of what might be called the upper crown sheet, which forms the bottom of the back combustion chamber, which is directly over the fire box, the stack itself rising from top of boiler between the cab and dome. The crown sheets are self-sustained by long stay bolts opposing the pressure in inside of boiler.


BROPHY'S IMPROVED MAIL BAG AND LOCK.
dome to the " $T$ " head in smoke box. In order to get the exhaust steam from the cylinders into the stack, side pipes, provided with expansion joints after leaving the smoke box, are placed outside of but close to the boiler jacket, and enter the back combustion chamber close to the base of the stack.
The throttle lever is turned "upside down" to get a pulling motion to open the throttle, and the rod is forked to pass around stack at its base in order to reach the bridge pipe at dome. The steam supply for injectors, air brake pump, heater cocks, cylinder oilers, blower, etc., is brought from bridge pipe in two pipes, one on each side of boiler. The mud ring in water leg is shaped to take the curved sides of the back head, and allow the outside side sheets of the fire box to lie straight against the edge of the ring, thereby reducing "scarfing" the edges of the back head to a minimum, if not dispensing with the "scarfing" altogether. The boiler is 61 in . in diameter, $23 \mathrm{ft} .4_{\frac{7}{16}} \mathrm{in}$. long, and is of $1 / 2 \mathrm{in}$. steel. The barrel contains 1522 -in and 433 -in. tubes, each $11 \mathrm{ft} .51 / 8 \mathrm{in}$. long. The fire box is 5 ft .10 n. long by 34 in . wide, and crown sheet about 4 ft . above grates. Total heating surface is about $1,265 \mathrm{sq}$. ft. Weight of boiler alone is $23,000 \mathrm{lb}$.

## DOOR CHECK.

The device herewith illustrated holds the door open when desired, and yet does not interfere with the openng and closing. Secured to the door frame, near the floor, is a plate from which a flat jaw projects hori zontally, the top of the jaw being provided with a lug projecting toward the door. In the iaw is an opening, through which is passed a flat bar, one end of which is pivoted in jaws projecting from a plate secured to the door. In the bottom of the opening is a hole for receiving a beveled nipple on the under side of the bar,


MAURER'S DOOR CHECK.
as shown in the sectional view, Fig. \%. A flat spring provided with an adjusting screw presses the'bar down. When the door is being opened or closed, the bar slides through the opening; and when the nipple enters the opening, it is pressed into the hole by the spring and the door held. By exerting sufficient power the nipple can be pulled out of the hole, when the bar is free to slide in the opening. The pressure of the spring on the bar produces enough friction to prevent the door swinging too easily. The door can be held open more or less by placing the nipple at different distances from the end of the bar. This invention has been patented by Mr. Adam Maurer, of 210 Elm Street, San Antonio, Texas.

## Caution to Amateur Electricians

Certain printed instructions for the preparation of the chromic acid solution for batteries direct that the sulphuric acid be poured into hot solution of potassium dichromate; unless this be carefully done, small portions of the oil of vitriol may be projected into the face of the operator. Bunsen's method is preferable mix the dichromate, in granular form with the sulphuric acid, then add cold water, with continued stirring; the union of the acid and water generates suffi cient heat to speedily effect the solution of the salt.

Carp Planted in Rivanna River.
On June 25, 1885, Colonel M. McDonald took from the carp ponds at Washing ton seventy-five thousand carp from three to ten days old, and deposited them without loss at Charlottesville, Va., in the Rivanna River. The oldest of the fish were from $11 / 4$ to $11 / 2 \mathrm{in}$. in length. Access to the back combus̃tion chamber is had by Only a few of the fish died in transit. The river means of a manhole in the rear head of boiler, through selected is a muddy stream containing no other which the exhaust nozzles and lift pipes are put in fish, except suckers. The dams below Charlottesville position. The lower or 2 in . tubes are arranged as in prevent the ascent of bass and other predaceous fish the ordinary locomotive, while the upper or 3 in . tubes from the James River.-Bulletin U. S. Fish Commis. are grouped around the drypipe as it passes from the sion.

THE KNICKERBOCKER AVENUE EXTENSION SEWER, BROORLYN, N. Y.

## beg first page liugtation]

The city of Brooklyn is now building a sewer, having an area equal to that of a circle 12 feet in diameter, from the junction of Knickerbocker and Johnson Avenues, through Johnson Avenue and South 5th Street, to the East River. The necessity for the work is apparent from the fact that the present outlet sewer for this section of the city, which drains an area of about 2,800 acres, some of which is very low and flooded by every rain, is discharged upon the low lands at the head of Newtown Creek, making a nuisance greatly detrimental to public health and damaging to valuable property in the vicinity. Frequent complaints from people living near this outlet and by the Department of Health rendered the construction of a new outlet absolutely necessary.
Although there is nothing new either in the sewer itself or the duty it is designed to perform, the method of building one section of about three-quarters of $e 6$ mile in length is certainly unique and interesting. Owing to the depth of the grade lines of the sewer below the street surface, in the greater portion of section one (next the river), and the danger to heavy buildings on both sides of South 5th Street, it was thought better to prosecute the work by means of tunneling rather than by open trench. Our frontispiece is composed of views showing the manner of prosecuting the work, both in the tunnel and in the open cuts.
The section of the sewer for almost its entire length is circular, 12 feet in diameter inside; and where it has been essential to alter this form, the sectional area has been made the same. The sewer is built of brick laid in cement, and the minimum thickness is 12 inches. At some points a foundation was made of transverse and longitudinal timbers, and the brick invert was reduced in thickness to 8 inches, between which and the timber was a bed of concrete. Where necessary, re taining walls, 3 feet thick at the bottom, 2 feet thick at the top, and extending a short distance above the center line of the sewer, were built. For the greater part of the tunnel section, the work passes through sand, and the sewer is a simple ring of brick. At each crossing street is a manhole, 3 feet in diameter, where it joins the arch, 2 feet in diameter at the surface, and in height varying with the depth of the sewer below the street. The outer end of the outfall is 18 feet in width and $61 / 2$ feet in height, measured from the center of the invert, the curve of which has a radius of 41 feet, therides arertie and on them rest iron I-beams, 12 inches deep, and varying in length from 20 feet at the outer end to 13 feet where the outfall sewer joins the circular one.
The general method of prosecuting the tunnel portion of the sewer has been to sink shafts at about every 700 or 800 feet, and then drive the headings each way. Fig. 1 represents the shaft on South 5th Street near 5th, which is 64 feet in depth to the bottom of the invert. The sides are held by sheet piling, and extending through the center are guides for the cage, the machinery for operating which is in the building shown at the right. A track is laid down each tunnel to the heading, as shown in Fig. 5. The cars filled with the excavated material are run to the bottom of the shaft, raised to the surface, and run to the dumping ground. Just east of 5th Street it was necessary to build a short section (Fig. 3) by open cut, and arter this had been completed, the earth for filling in was obtained through the shaft shown. Fig. 2 shows the dumping car here used. The faces of the forward wheels are narrower than those of the rear ones, thereby permitting them to pass between the ends of the rails, which are inclined upward at a sharp angle, and rest in the curved parts of inner rails. The rear wheels moant the inclined rails, thus tilting the car and dumping the load.

Fig. 5 is a view looking into the heading, and Fig. 6 is a longitudinal sectional elevation of the same. The pilot tunnel here used is the invention of Mr. J. F. Anderson, and was first used upon the Hudson River tunnel; the duty it performs in its present location is precisely similar to that it performed under the river. The pilot is $51 / 2$ feet in diameter, and is made up of interchangeable flanged iron plates, bolted together. It is kept as near as possible in the center of the tunnel, and is extended some distance ahead of the finished masonry, the advance being made by removing the rear plates, carrying them forward, and bolting them to those already in place. The forward end of the pilot being in undisturbed ground, and the rear end being firmly held by radiating struts resting against the masonry, there is formed a rigid center or hub from which the work can be braced.

In the heading, the earth at the crown is removed and an iron plate inserted; this plate is bolted to the one already in, and is held by a strut against the pilot. These plates, unless the earth is very treacherous, are only carried about half way down each side. After the plates have been put in far enough, the section next the masonry is cleared, and a portion of the brickwork built.
This method of tunneling not only gives an exact idea of the nature of the material in advance of the
main work, but also serves to firmly hold the sides of the excavation, preventing caving in; and where the route extends through a street lined upon each side with extends through a street lined upon each side with below the surface, it has many advantages over the ordinary open cut. In addition, it occupies the street only at the shafts, so that travel is not much interfered with. Fig. 4 shows an open cut portion of the work. Before beginning operations, the old sewer was removed and a new one built under each sidewalk, as a tem porary measure during construction. A platform carrying the hoisting machinery extends across the trench, and is mounted upon wheels running upon tracks laid at the edge of the opening. The sides are held in the usual way by sheet piling braced by timbers extending across the opening, and which also carry the gas and water mains.
It is estimated that the total cost of the sewer-which will be finished in a short time-will be $\$ 575,000$.

## IMPROVED CORK ATTACHMENT.

The art of bottling liquids has attained quite large proportions as a distinct business. The machinery and appliances for driving and fastening the corks have been well studied, and brought to a considera


HAYWARD'S IMPROVED CORK ATTACHMENT.
ble degree of perfection. But the reverse process, that of unbottling, has received less attention. It is usually left to the individual to struggle with the wires and a corkscrew as best he can. If the cork be of good quality, and not too tightly wedged, he succeeds fairly well; but it often happens that this is not the case, and numerous fragments of cork, perhaps the largest portion on the inside of the bottle, is pretty sure to be the result. We illustrate the cork attachments devised by Mr. John W. Hayward, of St. Johns, Newfoundland, which makes it as easy to get a cork out of a bottle as it is to drive it in. An ordinary cork, $O$, of the required size, has a piece of strong non-corrosive twine, 1 , let into its sides. A button or shield. 5, also non-corrosive, is placed on the inner end of the cork to prevent the twine cutting through it. A hand metal tag, 2, is secured on the twine where it is knotted, or in case a capsule is placed on the end of a piece, 4 , which hangs below the capsule. A rubber button, 3, placed on the outer end of the cork, has a hole or slit through which the twine passes. In 6 is shown the wire attached to the bottle neek, $6^{1}$ representing the hook, and $6^{2}$ the manner of locking it in place. 7 gives the appearance of a bottle when corked and the twine secured on the wire hooks. In 8, a capsule has been placed over the cork, and the tag is seen protruding beneath its edge. 9 shows the manner of securing the twine over the wire by stretching the elastic button, 3 , and $9^{1}$ the top view of the bottle when the operation is completed.
When the cork is being driven into the bottle, the rubber button is turned over on the twine and tag, as shown in 10, to protect them from injury. The button is then reversed, one loop of the twine passed under the wire hook on one side, and by stretching the,rubber button the other loop secured on the opposite hook. The process of unbottling is shown in our last figure. The tag is grasped, and by an upward twist the capsule is torn open. The twine is disengaged from the wires, and, by passing the first and second fingers through the loop, the cork can be readily drawn. This system does away with the corkscrew entirely, each cork carrying its own means of release. It is applica ble for any liquids, medicines, liquors, inks, etc., and ber of times. Mr. A. B Cohu, 197 Water Street, New York city, has the agency for this attachment.

## BALANCED WATER MOTOR.

At the Inventions Exhibition, London, Sealey Allin, Queen Victoria Street; shows a patent balanced float water motor, with which he claims to obtain a working efficiency of over 90 per cent. Our illustration is from the Engineer. It consists of a series of feathering floats, hinged to a chain which works over a pair of drums, the floats on the descending side being inclosed in a casing, so as to form a series of moving chambers, which are successively filled with water as they enter the casing.
A cross section of the casing is shown in the annexed sketch. A A are planed grooves, in which slide projecting pieces forced on each link of the chain, the clearance being limited to one-sixty-fourth of an inch. The
 clearance of the floats themselve can, therefore, be made very small, and the inventor states that in this way he has been able to reduce the loss from leak age to a comparatively insignificant amount. The feathering of the floats is automatic, and is regulated by the level of the tail water; for so long as the pressure of water behind is greater than the resistance in front, the chain is pushed forward. As soon, however as the resistance exceeds the pressure, the floats fall away from the chain, and rise nearly vertically out of the water. 'The power is taken off from the top drum, which is provided with specially formed teeth, which take each link of the chain as it passes over. The speed of the chain is about 180 feet per minute. Assuming that the difficulties of construction have been overcome, there seems no reason to doubt that the efficiency of such a motor as this will be much greater than that of even the best waterwheels, as a greater percentage of the fall can be utilized.


ALLIN'S WATER MOTOR.
It must not, however, be forgotten that hitherto, in the majority of cases where waterwheels have been applied, economy of water has been a secondary consideration, and there is, after all, something very fascinating in the simplicity of a waterwheel. What it may be in the future is, of course, a different matter. Probably, if any serious attempt is made to take advantage of the power to be derived from natural falls of water, or, as Mr. Allin proposes, of the rise and fall of the tide, more attention will be paid to efficiency; and if, as is stated, about 93 per cent of the actual energy can be given off in useful work, there may be a considerable field for Mr. Allin's invention.

The Colorado oll Field.

According to the Petroleum Age, Mr. David Kirk, President of the McCalmont Oil Company, lately visited the oil field which is located on the plains of Florence, ten miles southeast of Canon City, on the Denver \& Rio Grande Railroad. The four wells now producing are owned by three different companies, and have an aggregate production of ten barrels. They are situ ated on a stretch of ground about three miles in length and with its width undefined. One small wel was drilled north of the better ones, but no dry holes have been found, and the extent of the territory is a matter of conjecture. The wells produce the maxi mum amount of oil when they are pumped by heads twice a day. When the walking beam is kept constantly wagging, the wells do not produce any more oil than when they are pumped by heads.
The best well is owned by the Arkansas Valley Oil Company. It was placed on exhibition for Mr. Kirk's benefit, and pumped five barrels per day. A well which has been shut down for a month or more will not pro duce any more oil when started than it would if it had been worked steadily. For some unexplained reason, the wells do not fill up. The oil comes from a shale rock about 1,200 feet below the surface. It is of a beautiful yellowish-green color, and about 30 gravity Local representatives of the Standard Oil Company report that it will afford 40 per cent of illuminating and 12 per cent of lubricating oil. The question of transportation is a perplexing one to the oil operators beyond the "Father of Waters." The oil produced must be taken to Pueblo, 40 miles away, before fair freight rates can be obtained through competing lines. Cleveland parties are now building a refinery at Canon City, which will bring the oil produced here in competition with that brought across the plains. Mr. Blake, who represents the Standard at Denver, is authority for the statement that the States and Territories of Colorado, New Mexico, Montana, Wyoming, and Utah have a daily consumption of refined which is equivalent to 200 barrels of crude oil.

## A Remarkable Drainage Enterprise.

Few people are probably aware of the great engineering undertaking, in which Russia has been engaged for years, of draining the Pinsk marshes. These are so extensive as to secure special designation on the ordinary map of Europe, being, we believe, the only case of the kind; and, in point of area, are very much larger than Ireland. Situated on the Russo-Polish confines, they have become famous in Russian history as a refuge for all manners of romantic characte have remained an irreclaimable wilderness in
the midst of a prosperous corn-growing region up to within the last few years.
In 1870 the Russian Government first took in hand seriously the abolition of this wild expanse, which, owing to being perpetually more orless submerged and covered with a jungle growth of forest, prevented not only communiation between the Russian districts on either side, but also between Russia and Austro-Germany. Consequently, a large staff of engineering officers and several thousand troops were draughted into the region, and these have been engaged upon the undertaking since. Up to the present time about $4,000,000$ acres have been reclaimed, thanks to the construction of several thousand miles of ditches and of canals o broad as to be navigable for barges of several hundred tons burden. Just now the engineers are drawing up the programme for next year, which comprises the drainage of 350,000 acres by means of the construction of 120 miles of ditches and canals.
Of the $4,000,000$ acres already reclaimed, 600,000 acres consisted of sheer bog, which has been converted into good meadow land; 900,000 acres of "forest tangle," which have been prepared for timber purposes by cutting down all the underwood and thinning the trees; 500,000 acres of good forest land-forest oases in the midst of the marshes-hitherto inaccessible, but which have been connected more or less by navigable canals, and thereby with the distant markets; and finally $2,000,000$ acres have been thrown open to cultivation, although only 120,000 acres have been actually occupied up to now. Besides making the canals and ditches, the engineers have built 179 bridges, bored 152 wells from 40 feet to 80 feet deep, and 425 from 20 feet to 40 feet, and have made a survey of 20,000 square miles of country hitherto unmapped. When their task is finished, Russia will have effaced from the map of Europe one of the oldest and toughest bits of savage nature on the Continent, and a few years will suffice to render the Pinsk marshes undistinguishable from the rest of the cultivated region of the sources of the Dnieper. From ain $\oplus$ ngineering, geological, and scientific point of view, generally, the work is one of special interest, and capable globe trotters, anxious for a novel theme, might do worse than spend a few months amidst the fading worse than spend a few months amidst the fading

## A NEW DOMESTIC MOTOR

Our readers are already acquainted with the many efforts that have been made to devise a motor adapted to the requirements of the smaller industries. We have from time to time described such motors-run by team, gas, hot air, or water-and we now propose to speak of one which is interesting from the problem that the inventor proposed to himself to solve, as well as from the means he took to solve it. The inventor,


Fig. 2.-DETAILS OF THE MECHANISM.
Mr. A. Pifre, set out to construct a motor that should be capable of being used everywhere, even in the city or the village, be easy to set in motion, and keep in repair without special knowledge, and combine the simplicity of gas motors with the economy, etc., of the team engine.
In order to solve this problem, which is one that has often attracted the attention of engineers, and is of great importance, Mr. Pifre had recourse to steam. His idea was that since the steam engine, raised to its highest power, has centralized motive power to the profit of the greatest enterprises of our epoch, it might become its province to likewise act as a domestic motor. As the chief defect of small steani engines is that they require more care and watchfulness than are demanded by large ones, M. Pifre has changed the usual mode of producing steam and converting it into work, and has devised an apparatus which is capable of run ning automatically for several hours without any supervision on the part of its owner. Hence the char


Fig. 1.-PIFRE'S DOMESTIC MOTOR
acteristic name of "Automotor" that has been be stowed uponit.
The generator and motor are united upon the same base, and the condenser is located wherever most con venient.
The generator, A (Fig. 2), has some resemblance to a hot air stove, but one that has been changed internally in such a way as to produce an abundance of steam. The fire is lighted at the base of a central cylinder, $D$, which is afterward filled up to the top with fuel. The combustion proceeds upon the grate, $\mathbf{E}$, at the base of the cylinder, and is absolutely constant so long as any coke remains. Fuel is put in at distant intervals to make up for what has been burned. This suffices to render the production of steam constant and
regular, without any of those disturbances that take place in the usual boilers of small size. The intensity of the fire is regulated through the door of the ashbox and the damper in the chimney.
The motor, $B$, is of the vertical type. Its cylinder, its piston, and its valves operate without ever being lubricated with.any fatty matter. As for the con denser, C , that consists of a pipe, $G$, that surrounds the escape pipe, $F$, to a certain distance, and permit of the circulation of cold water around it
The steam produced in the generator passes into the cylinder, and, after moving the piston therein, escape through the pipe, $F$, is condensed in the pipe, $G$, and falls in the form of water into the small reservoir, $K$. From this latter the distilled water is taken up by the feed pump, L, and introduced again, well aerated and ree from grease, into the generator, $A$, whose level remains constant. This constancy in the level of the water and the automatic feeding of fuel in the furnace are characteristic traits of this new motor, the surveillance of which is thus reduced to it simplest limits.
The automotor shown in Fig. 1 is the smallest size that Mr. Pifre constructs. It is of one-quarter horse power, weighs 770 pounds, and occupies a space of but $31 / 4 \times 2$ feet. Its height is $21 / 4$ feet. Notwithstanding its small dimensions, it is provided with all those safety apparatus that are found in large engines. The small reservoir for condensed steam is surmounted by an electric telltale, which makes itself heard whenever anything wrong occurs.
Aside from the applications already made by Mr. Pifre in various Parisian industries, one of these little motors has recently been very ingeniously applied to the running of a steam launch twenty feet in length, which it takes but one man to maneuver.-La Nature.

The Miller Process for Refining Gold and Silver.
Mr. G. W. Griffin, U. S. Consul, Sydney, N. S.W., says This process was discovered in 1868 by Mr. F. Boyer Miller, then one of the assayers to the Sydney mint and now superintendent of the bullion office in the Mel bourne branch. It was introduced on a practical scale in 1869, when over 200,000 ounces were treated; since then it has been applied to the whole of the gold brought to the Sydney mint for coinage, with the ex ception of such small quantities as had been previously refined. The total weight operated on at the Sydney mint has amounted to more than $6,600,000$ ounces (or 20 tons), and the value of the silver extracted and sold to $\$ 875,000$, of which $\$ 200,000$ have been paid over as revenue, and the remainder to the owners of the gold. The average assay of the refined gold, which in 1869 was 0.9931 , is now 0.9965 . These results have been obtained with comparatively little expense, while the introduction of the process has been in many ways of the greatest advan tage to the successful working of the mint.
The chlorine process has also been in use at the Melbourne branch since its opening in 1872 and over $7,000,000$ ounces of gold have been re fined with the same satisfactory results.

Mr. Miller stated in his application for a patent that his invention has for its object the toughening of brittle gold bullion and the re fining of alloyed gold, whether naturally or artificially alloyed, together with the separation of any silver it may contain. The operations requisite may be performed on the sole of a reverberatory or other furnace or in retortsmade of some refractory material, or, as the inventor prefers, in good clay crucibles.
The crucibles are prepared by dipping them in a strong solution of borax in hot water, and subsequently drying them. In these the gold to be operated on is melted in the ordinary manner, with the addition of one-half of 1 . per cent of fused borax, a well fitting cover having first been luted over the mouth of each crucible employed. In this cover are one or more holes to allow of the introduction of a tube or tubes constructed of some suitable refractory material, such as fire-clay, descending to the bottom of the crucible, and through which chlorine gas or hydrochloric acid gas is forced while the gold is still in a melted state. After the chlorine gas or hydrochloric acid gas has been thus passed through the melted gold for a sufficient time, which necessarily varies according to the quantity and quality of the gold operated on, the silver and baser metals are con verted into chlorides, and rise to the surface of the refined gold. The more volatile chlorides partially escape, and the remainder is easily removed by pouring the entire contents of the crucible into the moulds and taking out the cake of chloride as soon as cold, or by allowing the gold to cool sufficiently to set or become solid, but not to become so cold as to pre vent the more fusible chlorides from being poured off to be subsequently reduced to the metallic state by any of the well known methods.

A boiler has been constructed in France in which the metallic surface exposed to fire does not touch the water.

## candelabra cactus and california woodpecker

by c. f. holder.
One of the most picturesque objects that meet the eye of the traveler over the great plains of the south ern portion of California and New Mexico is the can delabra cactus. Systematically it belongs to the Cereus family, in which the notable Night-blooming Cereus also is naturally included. In tropical or semitropical countries these plants thrive, and grow to enormous size. For example, the Cereus that bears those great flowers, and blooms at Night, exhaling powerful perfume, as we see them in hothouses in our cold climate, are even in the semi-tropical region of Key West, on the Florida Reef, seen to grow enor mously in length.
We cultivated several species of the more interesting forms during a residence on the reef. Our brick house, two stories in height, was entirely covered on a broad gable end, the branches more than gaining the top. There is a regular monthly growth, and this is indicated by a joint between each two lengths. Should the stalk be allowed to grow without support, it will continue growing without division, and exhibit stalks five or six feet in length, when they droop, and fall upon the ground.
Where there is a convenient resting place on which it can spread out and attach itself, the stalk throws out feelers and rootlets, which fasten securely to the wall or brickwork; then, this being a normal growth, there is a separation at intervals of about a foot. That is, the stalk grows in one month about twelve inches, and if it has support the middle woody stalk continues to grow about an inch further, but has no green, succulent portion, in fact, looks like a stem; then the other monthly growth takes place, and ends with a stem, and so on indefinitely. Our house was entirely covered by the stems of such a plant, and the flowers were gorgeous in the extreme. The perfume, however, was so potent that it became a nuisance. Such is the Night-blooming Cereus in the warm climates, and similarly the Candelabra Cereus grows in stalks, but architecturally erect, fluted like columns. The flowers are large, and resemble those of the night-blooming variety. Some columns remain single, and are amazingly artificial appearing; others throw off shoots, as seen in the picture. Therê are some smaller varieties that have even more of a candelabra look, there being clusters of side shoots, the latter putting out from the trunk regularly, and standing up parallel to each other. The-enormous size these attain-is-well shown in the picture.
Whenever the great stalks of these cacti die, the succulent portion is dried, and nothing is left but the woody fiber. They are hollow in places, and easily penetrated. A species of woodpecker, Melanerpes formicivorus, is found to have adopted the use of these dry stalks for storing the winter's stock of provisions. There are several round apertures seen on the stems in the pictures, which were pecked by this bird. This species of woodpecker is about the size of our common robin or migratory thrush, and has a bill stout and sharp. The holes are pecked for the purpose of storing away acorns or other nuts; they are just large enough to admit the fruit, while the cup or larger end remains outside. The nuts are forced in, so that it requires considable wrenching to dislodge them. In many instances the nuts are so numerous, the stalk has the appearance of being studded with bullets. This appearance is more pronounced in cases where the dead trunk of an oak is used. There are some specimens of the latter now owned by the American Museum of Natural History, which were originally sent to the Centennial Exhibition at Philadelphia. They were placed in the department contributed by the Pacific Railroad Company, and at that time were regarded as some of the wonders of that newly explored region through which the railroad was then penetrating. Some portions of the surface of these logs are nearly entirely occupied by the holes with acorns in them. The acorns are driven in very tightly in these examples; much more so than in the cactus plants, as the oak is nearly round, and the holes were pecked in solid though dead wood. One of the most remarkable circumstances connected with this habit of the woodpecker is the length of flight required and accomplished. At Mount Pizarro, where such storehouses are found, the nearest oak trees are in the Cordilleras, thirty miles distant; thus the birds are obliged to make a journey of sixty miles to accomplish the storing of one acorn. At first it seemed strange that a bird should spend so much labor to place those bits of food, and so far away. De Saussure, a Swiss naturalist, published in the Bibliotheque Universelle of Geneva entertaining accounts of the Mexican Colaptes, a variety of the familiar "high hold," or golden winged
woodpecker. They were seen to store acorns in the dead stalks of the maguey (Agave Americana). Sumichrast, who accompanied him to Central America, records the same facts. These travelers saw great numbers of the woodpeckers in a region on the slope of a range of volcanic mountains. There was little else of vegetation than the Agave, whose barren, dead stems were studded with acorns placed there by the woodpeckers.
The maguey throws up a stalk about fifteen feet in height yearly, which, after flowering, grows stalky height yearly, which, after flowering, grows stalky
and brittle, and remains an unsightly thing. The interior is pithy, but after death of the stalk the pith contracts, and leaves the greater portion of the interior hollow, as we have seen in the case of the cactus branches. How the birds found that these stalks were hollow is a problem not yet solved; but, nevertheless, they take the trouble to peck away at the hard bark, and once penetrated they commence to fill the interior; when one space is full, the bird pecks a little higher up, and so continues.
Dr. Heerman, of California, describes the California Melanerpes, as one of the most abundant of the woodpeckers; and remarks that it catches insects on the wing like a flycatcher. It is well determined that it also eats the acorns that it takes so much pains to transso m
It seems that these birds also store the pine trees, as well as the oaks. It is not quite apparent why these birds exhibit such variation in habits; they at times select the more solid trees, where the storing cannot go on without ing cannot go on without
each nut is separately set in a hole of its own. There seems an instinct prompting them to do this work, though there may not be any of the nuts any of the nuts
places. There are many varieties, and as many different shapes. Some lie on the ground; others, attached to trunks of trees as parasites, hang from branches like greatserpents; but none is so majestic as the species called systematically Cereus giganteus, most appropri ately. The species growing pretty abundantly on the island of Key West is called candle cactus. It reaches some ten or twelve feet, and is about three inches in diameter. The angles are not so prominent, which gives the cylinders a roundish appearance. They form a pretty, rather picturesque feature in the otherwise barren undergrowth of shrubbery and small trees. Accompanied by a few flowering cocoa palms, the view is not unpleasing. The fiber of these plants is utilized in some coarse manufactures. The maguey, or Agave, is used in the manufacture of fine roping. Manila hemp is made from a species. The species whose dried stalks re used by the woodpeckers for their winter storage was cultivated at Key West, Florida, during several years, before 1858. Extensive fields of the Agave stood unappropriated at that period. Considerable funds were dissipated on this venture. Extensive works were established, and much confldence was entertained that the scheme would prove a paying one, but the "hemp" rope which this was intended to rival could be made cheaper than this. The great Agave plants, with their long stalks, stand now, increasing every year, until a portion of the island is overrun with them.

## Corrosive Sublimate as a Surgic

## Dressing.

While we are all familiar with the fact that the bichloride of mercury is a most valuable disinfectant, yet we doubt whether its full power is realized, and whether it holds that high place in the estimation of surgeons to which its undoubted efficacy entitles it.
Considering it as one of the most valuable aids to the surgeon, we deem that all should be familiar with its merits, and we therefore desire to call notice in an especial manner to its use. In one of our hospitals in this city, solutions, varying from 1 to 1,000 to 1 to 5,000 , are kept constantly on hand, and when cases of bruised and lacerated limbs are brought in, they are at once enveloped in these solutions, and the results are truly remarkable. One case is so striking as to merit special note:
A small child was brought in with his leg so mangled (bones comminuted, etc.) that the whole surgical staff (three prominent surgeons) decided that amputation was imperative. To this the parents so strongly objected that the surgeons were forced to yield. Explaining to the parents the almost certainty that the child would die, and placing the responsibility where it rightly belonged, the limb was incased in bichloride sawdust. Presto! result, an absolutely perfect limb.
Many such cases could be cited, but suffice it to say that by the use of corrosive sublimate we can save many limbs that would otherwise be sacrificed.
In this connection, it will be well to note that Dr. R. J. Levis has great faith in the potassio-mercuric iodide. He has tablets prepared of such strength that
the birds. Curiously enough, there are many instances of the birds placing pebbles instead of nuts in holes
they have purposely pecked for them. Serious trouble has been experienced by these pebbles suddenly com ing in contact with the saw of the mill through which the tree is running. The stone having been placed in a living tree, as is often the case, its exterior had been lost to sight during growth.
Some doubt has been entertained about the purpose of the bird in storing the nuts in this manner. De Saussure tells us he has witnessed the birds eating the acorns after they had been placed in holes in trees, and expresses his conviction that the insignificant grub which is only seen in a small proportion of nuts is not the food they are in search of.
C. W. Plass, Esq., of Napa City, California, had an interesting example of the habits of the California Melanerpes displayed in his own house. The birds had deposited numbers of acorns in the gable end. A considerable number of shells were found dropped underneath the eaves, while some were found in place under the gable, and these were perfect, having no grubs in them.
The picture shows a very common scene in New Mexico. The columns, straight and angular, are often sixty feet in height. It is called torch cactus in some
one dissolved in a pint of water gives him a ${ }^{\frac{1}{2}{ }^{\frac{1}{0} \sigma 0}}$ soution, which with hydronaphthol constitutes his antiseptic armamentarium.-Med. and Surg. Reporter.

## Progress at Sibley College, Cornell University.

A very desirable feature has been added this year to the usual roster of the engineering course. A number of well known specialists have engaged to lecture to the students, among whom Dr. R. W. Raymond, of the Institute of Mining Engineers, Dr. Leavitt, of the Mechanical Engineers, Mr. C. T. Porter, Mr. J. M. Allen, Dr. C. E. Emery, and Mr. J. C. Hoadley have been announced. These gentlemen select their own subjects, and are able to present to the students the results of active professional life.
A beautifully made longitudinal section of a Deane steam pump has been added to the College Museum. Other firms are preparing similar models.

## Preserving Plants.

For the last three years, says Mr. P. Hennings, certain fruits, flowers, and other portions of plants have been preserved in perfect condition at the Berlin University (Botanical Museum), by means of a solution ontaining four parts of water and one part of alcohol saturated with salicylic acid.

## Sorrespondence.

## Making Water Heat Itself.

To the Editor of the Scientific American:
In your issue of November 7, Mr. O. B. Server files
"this his caveat of priority," in that he has conceived the idea that a current of water may be induced to obligingly change its velocity to heat, and thus modify the temperature of adjacent countries.
Mr. Server proposes to avoid the expense of Mr. J. c. Goodridge's proposed dam across the Straits of Belle Isle, and by the erection of a few "waterwheels and friction contrivances" to so heat. the water that it will eclipse the Gulf Stream itself as a dispenser of warmth. But has not Mr. Server carried the matter a little too far in his anxiety to secure the proposed benefit to America, and yet avoid any possible cooling of the haunts of the British lion?
What if his "friction contrivances" should heat the water too much, to the boiling point perhaps, and, besides cooking all the fish in the vicinity, should give Canada and New England a tropical climate? It is well indeed that he is to " stop the wheels in summer."
Bantering aside, it is clear that Mr. Server has been reading thermodynamics; but either he has just begun it, or else he has skipped the mathematics. He informs us that he would "change its velocity to heat," but he does not say what will become of the hot water. Perhaps he thinks that it would kindly take itself out of the way without any velocity. Does he think that the numerous icebergs which Mr. Goodridge mentions are going to be scared by his "friction contrivances," so that they will steer clear of the Straits?
But these and a few other little matters we will leave for Mr. Server to figure on, and suppose his "waterwheels, friction contrivances," etc., to be all set up in working order, churning the vast stream, ten miles wide and fifty to one hundred feet deep, to a mass of foam, and that, as the water passes them, its whole velocity is transformed to heat; now, what is the energy of the current, or rather of each pound of it, moving at a velocity of two knots per hour, or less than four feet per second? By the well known formula than four feet per second? By the well known formula
for energy $=\frac{-}{2 g} v^{2}$ water equal to about $1 / 4$ of one foot-pound. Further, the amount of energy which, transformed to heat, will warm a pound of water one Fahrenheit degree is 772 foot-pounds. Hence, our quarter of a foot pound of energy will warm the water just $\frac{1}{3088}$ of a degree.
We can imagine Mr. Server feeling of the water on the "hot side" of his "friction contrivances," to see if it will burn his fingers! But while he is looking about for a thermometer that will register his $\frac{18}{8088}$ of a degree, we would advise people to lay in as usual their winter's supply of coal.

Chas. W. Baker.

## University of Vermont.

## The New York Pneumonia Epidemic.-A Probable Cause.

T'o the Editor of the Scientific American:
The article on "Pneumonia and Ozone," in your issue of Oct. 3, was read by me with considerable interest, and is suggestive of important inquiry.
The careful observations of Dr. Draper, of the Meteorological Observatory, Central Park, extending over a period of eight years, touching the contemporaneous prevalence of pneumonia and the presence of ozone in the atmosphere in excess, are worthy of note; and it would have been additionally instructive to have been able to ascertain whether the two occurred more especially in cold weather.
The majority of observers state that ozone is found more abundantly in winter than in summer. Its comparative scarcity during the summer has been accounted for by supposing that more of it is consumed in oxidizing the organic impurities of the air, which are, of course, more abundant during hot weather. Others have believed that less ozone is produced in summer in consequence of the occurrence of only one maximum of atmospheric electricity in the twenty-four hours dur ing that period of the year.
Several observers have noticed an excess of ozone during the night. Mr. Lowe, of the Boston Observatory, also found that the excess of ozone at night over the day varies during the different seasons of the year (Brit. Assoc. Rep., 1862), and this appears, very generally, to correspond with the cold season and early spring (vide "Ozone and Antozone, their History and Nature," by Cornelius Fox, M.D.; I. and A. Churchill, London, 1873 .)
This prevalence of pneumonia in New York would, it might be supposed, correspond largely with the continuance of cold weather, at whose door we are accustomed to lay much of evil connected with diseases of the respiratory organs.
Dr. Felix von Niemeyer, of Tubingen, in his "Text Book of Practical Medicine," remarks: "We particularly observe the epidemic occurrence of pneumonia in severe and protracted winters during the prevalence of a northeast wind; sometimes, however, it arises under
conditions precisely the reverse." With regard to the influence of cold, be continues: "It is difficult to decide influence of cold, be continues: "It is difficult to decide
in individual instances whether the attack has been in individual instances whether the attack has been
preceded by an exposure to cold more severe than that to which the patient has repeatedly exposed himself with impunity. Opinions, therefore, are divided as to the effect of cold in producing pneumonia."
Supposing the fatality from the disease to have occurred chiefly in the winter months, while noting the observation of the prevalence of ozone in excess, under such circumstances, I am inclined to think, with you, even if the connection between the two be not purely accidental, that they can scarcely stand in the relation of cause and effect; and especially as there does appear to me to exist a more than probable cause for the greater prevalence of pneumonia in the city of New York which has been noted recently
In the English Lancet of Sept. 20, 1884, I communicated an article "On Some Probable Points in the Etiology of Pneumonia," etc., as the result of experience in private medical practice, succeeded by observation afforded during a period of service in the Public Health Department in the northwest of England, in which are detailed numerous instances of the fatal occurrence of pneumonia where there had been detected a palpable contamination of the atmosphere of the dwelling with filth emanations.
The instances there detailed are the result of but one year's observation (the last of my tenure of office, the notes being at hand), yet amply sufficient, as it appears to me, to prove unmistakably that there is more than a probable causative intluence at work in the production of the disease in the manifest defilement of the air within the dwelling.
The relation of pneumonia with typhoid fever has long been observed by medical writers, and the cause of the former, which I have pointed out, would coincide with the presence of bacteria in the system, when suffering from it, without necessarily committing ourselves to a causative specific bacillus.
It might appear to savor of conceit when I state that, when I saw the communication in your columns of the 3d Oct., alluding to the great prevalence of pneumonia in New York during the present year, the circumstance at once occurred to me that, when in that city in the late spring of last year, in the company of a gentleman from Detroit, Mich., and noticing the deep sewerage works which were in process of construction, and contemplating the increased dangers caused by their junctions communication with the buildings adjacent, more particularly with their deep basements, which it would appes they were intended to sewer, I remarked to my friend that I feared these deeper sewerage works would not prove an unqualified benefit, and we might expect to hear of the prevalence of such diseases as pneumonia; and on my return home I mentioned the same thing to my family, touching the danger to the health of the inhabitants of the Empire City.
The problem of efficient sewerage is as yet unsolved, more especially with reference to the thorough cleansing and ventilation of the sewers; and where deep sections from the mains are brought within the very walls of our dwellings, efficient ventilation being then so
difficult, the pernicious gases therefrom have a tendency to diffuse themselves through the building, attracted by the lighter, warmer air within, in spite concrete, water trapping, and other precautions.
If the basements of the large structures in the city now being erected, must be drained into the sewers, it would seem imperative to devise some means of diverting the gases from diffusion within, such as by raising the temperature of the air of the ventilating shafts to a higher degree than that of the air inside the building, and carefully maintaining its excess; while the thorough and systematic flushing and disinfection of the main sewers, and of the branches to individual properties, where greasy house waste or other deposit adheres so tenaciously, becomes all the more imperatively necessary. Where practicable, all house waste pipes should discharge into exposed outside channels, and the sewer sectional inlets should be several feet distant from the foundation walls.
Where sewers are, of necessity, in near contiguity, the advisability of providing a stratum of impervious moist clay or stiff soil around the foundation exteriorly, for some feet in width, so as to preserve the ground air of the foundation free from defilement, will be apparent.
The drainage of water closets presents difficulties requiring special precautions, the object being to isolate their position as far as possible from the house atmosphere. This has been more or less attempted by plac ing the soil fall pipe external to the building, and freely
ventilating its base and apex, taking care that no filth containers are permitted in the structural arrangements, and securing ample flushing provisions. The higher up in the building the water closets are placed, the better it would appear for securing the purity of the indoor air of the rooms on the lower stories, provided it be free from other sources of sewer defilement. But with cellar drains, communicating with the sewers, the difficulty of securing this first essential of
physical health is greatly increased, and the danger to
the inhabitants correspondingly augmented; the problem is, confessedly, a difficult one to solve, if indeed it be capable of satisfactory solution, and we find the assurances of so-called experts balk us in the repeated inroads of deadly disease.
While yielding to the demands of so-called civilization, we are in danger of renouncing the first principles of health.
By multiplying conveniences for the disposal of house waste, by means of communication with the sewers, all alive with their pestilential contagium, we are inviting deadly disease to enter our dwellings; and by perpetuating systems which rob the soil of its due quota of waste material, for transformation and reconstruction, we are alike impoverishing our exchequer and encompassing too readily our own destruction.

John Ward, M.D.
Sutton, Birmingham, England, Oct. 22, 1885.
The Telephone Question.
To the Editor of the Scientific American:
I trust you will permit a brief summary in your columns of facts on the other side of the telephone question. They are as follows:

1. Reis telephones, when used as described by him, will not transmit speech.
2. He who invents a new art is entitled to the fame and financial success based upon a patent for such an art.
3. If the assertions that Reis did occasionally understand spoken words be true, that did not constitute the art of speaking, because an art is something that can be controlled, and Reis then only spoke because the action of his transmitter occasionally was beyond his control.
4. Five years before Reis made his instruments, their principle was fully published in a prominent scientific paper in the city where he then lived, under the name "telephony," and hewas then an astive member of the physical society of that place. Those principles were first accurately expounded by Charles Bourseul, of whom said publication spoke.
5. The method of producing undulations by immersing an electrode in liquid, which is the subject of Mr. Gray's caveat, was described in Mr. Bell's original application, which was sworn to several weeks before Mr. Gray's caveat was written. Hence, it is absurd to assert that Mr. Bell obtained that idea from Mr. Gray's caveat.
6. That we can now speak with the Reis instruments is no more proof in favor of Reis than the fact that "we can also now speak with a Morse key and sounder is a proof that. Morse invented the art of speaking by electricity. Both, together with other electrizal in struments, can to-day be manipulated on Bell's prin' ciples so as to transmit and receive speech.

## E. Berliner.

Washington, D. C., November 27, 1885.
The statement made by our correspondent in his fifth paragraph, we believe, is now for the first time brought out, and is of especial interest in view of the testimony of Professor Gray.-EDs.

## The Preservalion of Ropes.

The preservation of scaffold ropes is a matter of great practical importance when scaffolding remains erected for any considerable time, especially in localities where the atmosphere is destructive of hemp fiber. It has been suggested that in these cases the ropes should be dipped, when dry, into a bath containing 20 grammes of sulphate of copper per liter of water, and kept in soak in this solution for four days, afterward being dried. The ropes will thus have absorbed a certain quantity of sulphate of copper, which will preserve them from the attacks of animal parasites and from rot. The copper salt may be fixed in the fiber by a coating of tar or by soapy water. For tarring the rope it is best to pass it through a bath of boiled tar, hot, drawing it through a thimble to press back the excess of tar, and suspending it afterward on a staging to dry and harden. In the second method, the rope is soaked in a solution of 100 grammes of soap per liter of water. The copper soap thus formed in the fiber of the rope preserves it from rot even better than the tar, which acts mechanically to imprison the sulphate of copper, which is the real preservative. It is not stated whether the copper treatment is equally serviceable with dressed as with plain hemp ropes.

## Borax as an internal oisinfectant.

In the Union Medicale, Dr. Cyon confirms the statement, made by Dumas in 1878, that borax is possessed of most valuable antiseptic powers. Independently of its value for the preservation of food, it is a great preventive of infectious diseases, and may be employed internally to ward off epidemics. It may be taken for months or years with impunity, and constitutes a valuable prophylactic. Dr. Cyon states that it is a renarkable fact that in all epidemics of cholera the workimen in boracic acid factories have always escaped the disease. The usual dose is five or six grammes ( 75 to 90 grains) daily, taken for an indefigrammes
nite time.

## enaineering inventions.

A car coupling has been patented by Mr. William H. Knight, of Portland, Oregon. Com-
bined with a drawhead is a crossbar therein and a rod brojecting apward therefrom a spring acting an projecting upward
rod, while there
crossbar upward.
A grip for cable railroads has been patented by Mr. David Stout, of Logan City, Arizona Tere. Its construction is such that when the cable is grasped the friction will be between the shoes and blocks con-
nected with bars bolted to the frame cf the car, and the nected with bars bolted to the frame
cable will be protected from wear.
A chart for railroad rolling stock has been patented by Mr. Joseph S. Graham, of Buffalo, N Y. It has apertures arranged in vertical and horizon-
tal rows, numbers being produced at the left of the tal rows, numbers being produced at the left of the
horizontal rows, and two numbers, one above the other, above each vertical row, the chart to show th
A rock drilling machine has been pat Combined with a tube for holding the drilling bit is bevel gearing for revolving the tube, and a fixed screw held in a frame and passed through a nut on the end of the tab
cally.
$\underset{\text { A hydraulic motor has been patented }}{ }$ by Mr. Christoph G. Wurster, of Hudson, N. Y. This invention consists of two cylinders with pistons, two
cylindrical valve chambers with slide valves of special construction, with inlet and outlet ports, an exhaust
chamber, and connections for transmitting the motion chamber, and connections for transmitting the motion
to a common shaft, making a motor intended to giv high speed with a simple construction.
A distance instrument for surveyors' use has been patented by Mr. Jefferson L. Buford, of Albany, Texas. It has a novel arrangement of horizontal gradnated ring, with a telescope made ajustable
about a vertical axis, with other special features, to permit the distance from a given spot to a remote point to be quickly determined, and dispense with the tra
erse table, table of logarthms, and chain carrying. erse table, table of logarithms, and chain carrying. William C. Miller, of Parsons, Kan. It has such an arrangement of the waste cellars that the oil cannot
drip to the bottom of the cotton and be lost, but will
fil flow on and lubricate the spindle, while the box haa
such vertical division that when a brass becomes heate and swells, the sections can be quickly separated for the removal of the heated parts.
A combined air exhauster and water elevator has been patented by Mr. Thomas Arthur, of
Bangor, Pa. It is made with a conical tube inserted in a water pipe, and connected by an air pipe with the up.
per part of the short arm of an elevator, the lower end per part of the short arm of an elevator, the lower end
of the arm having a water seal, and the upper end of the long arm. being extended down past the end of the air pipe, its lower part having an air inlet, the device
being gdapted tor wtharawig water and air from mines.

## agricultural inventions

A combined cultivator and land marker has been patented by Mr. B. Frank Birkett, of Burling ton, N. J. This invention covers a novel construction
and combtmation of parts in a machine to make it read ily adjustable for either of the two uses, or it can be ad justed so that will throw the soil toward or from the plants as desired.

## MISCELLANEOUS INVENTIONS

A washboard has been patented by Mr. Isaac Hussey, of Columbus, O. It has ribs or bead rying brushes or tufts held in place by wires secured in A bed pan has been patented by Sarah V. Beal, of Ann Arbor, Mich. It has a double bottom, with a discharge pipe on a level with the true
bottom, having branch pipes projecting laterally, to discharge the contents of the pan at either side of the
bed through a connecting flexible tube.
A lighting device has been patented by Mr. Nathan B. Stubblefield, of Murray, Ky. It con-
sists of a tapering tube with removable handle, a wick, and a sheath fitting the tube, making a convenient de vice for lighting lams
moving the chimneys.
A horsa collar has been patented by Mr. Martin $F$. Sauer, of Somonauk, Ill. The collar is
stuffed in the usual manner, but has a peculiar neck stuffed in the usual manner, bnt has a peculiar neck
formation to render it flexible and so it formaion to render it fexible and a in will not bear on
the throat or breast of the animal, while it is intended to outwear the ordinary form of collar.
A lock for sliding doors has been patented by Messre. Miles Hayden and William C. Dison, of Gay Hill, Texas. It is specially intended for use on
freight cars, where great durability and safety are re freight cars, where great durability and safety are re
quired, and contains novel featurescalculated to rendry it free from liability to damage by collisions, while

## can be quicery and reailteperas

A vegetable cutter has been patented by Mr. Alfred Cannon, of High Spire, Pa. It has a cut-
ter operating across the open forward end of a feed box ter operating across the open forward end of a feed box,
in front of a feed board, making a machine suitable for in ront of a f feed board, making a machine suitabie for familes, or which
for stock on farms.
A bicycle holder has been patented by Mr. Albert P. Seiler, of Mansfield, Ohio. Combined with a base are rollers and upwardly projecting frame
to hold a bicycle in such manner that the rider can ope rate it as if on the road, and exercise himself in such way as to increase his speed or to strengthen his mus-
cles.
A carpet sweeper has been patented by Mr. George W. Kelley, of Goshen, Ind. Combined
with a box and brush roller journaled therein is a friction roller and various novel devices for adjusting the
bruab to project a greater or less distance from the bet
lom of the box, and so thecarpet
A window seat box has been patented y Mr. William H. Wetherill, of Philadelphia, Pa. It is so contrived that the box and lid form a double seat, dich mat be occupied by two persons in din eren od the box also forming a covered receptacle for keeping
A bracket arm has been patented by Mr . Carl Hollweg, of Barmen, Germany. It is formed
of a series of links pivoted to each other, acted upon by fo a series of links pivoted to each other, acted upon by
springs between them, and locked in line by suitable springs between them, and locked in line by suitable
latches, the arms being made in such manner that they legan extended or
A clothes line holder has been patented y Mr. Josiah S . Wailes, of Florence, Kan. Thisinvention covers an endless clothes line, two sets of pulleys
or supporting the same, with a post or support having a laterally projecting arm carrying a pulley and placed intermediately on but one line, with other novel fea-
tures for conveniently operating a clothes line.
An irrigating attachment for bottles has been patented by Mr. Anaximander B. Tutton, of Sioux Falls, Dakota Ter. It is forapplying medicinal solutions
or other liguids directly to mucous canals of the body or other liquids directly to mucous canals of the body,
and is so made as to be attached to any bottle or vial containing the fluid to be in jected, also acting to keep he bottle otherwise closed as with a cork.
A syringe for hypodermic injections Llizabeth, N. J. It is transparent, with lines of gradu ation and figures, with an outer casing through which the graduating lines and figures may be seen, the device being intended to guard against errors in meas.
nent in administering medicines in this manner.
An incubator has been patented by Mr. Charles S. Newsom, of Gallipolis, Ohio. Its con-
struction is simple, and such that a lighted lamp heats struction is simple, and such that a lighted lamp heats
water to make an even temperature of the required water to make an even temperature of the required
warmth, while the eggs can be easily removed, turned, warmth, while the eggs can be easily removea, turnea, and takes up but little space.
A combined gate roller and hinge has been patented by Mr. Edwin C. Washburn, of Nevada,
Mo. The hinge and plates forming the body of the device are of wrought iron, and the construction is such that a gate thus hung can be rolled back in the usual manner or swung on the hinge,
for a gate designed for furm use.
A bamboo fishing rod has been patented by Mr. Eugene M. Edwards, of Hancock, N. Y. It is made of compound strips or splints, glued together on their unenameled sides or faces, thus giving greatly
increased strength, the rod being built up of such comncreased strength, the rod being built up of such compound splints, and this method
ing the rod near the gmall end.
A fish hook has been patented by Mr . Cornerizas Lie, of Tronahem, Worway. In the body of
 so that the points of the hooks will be projected from the artificial fish when the bar is moved by tension on he line to which it is attached.
A machine for making barbed fence stripe has been patented by Mr. Jacob W. Roop, of
Harrisburg, Pa. It has rolls for cutting out the barbs nd ornamental alarm fins, and for bending up and own alternately the barbs and corrugating the strips, with rolls for forming the bl
steel or other suitable metal.
A bow facing oar and oar lock has been patented by Mr. Jacob L. Kwarel, of New York city.
Cogged sections are employed, with the oar fulcrumed ogged sections are employed, with the oar fulcrumed is such that the oar will hang low in the oar lock, to give the user better control of the oar and more purA chicken brooder has been patented by Mr. Maurice H. Strong, of Cincinnati, O. It is for raising chickens hatched by an incubator or by hens,
nd contains a variety of novel combinations of parts and contains a variety of novel combinations of parts,
whereby the brooder can be thoroughly ventilated and djusted to any desired height according to the height
A poultry water can has been patented by the same inventor. It is so constructed that the fowls cannot soil the water by stepping into it or scratching
dirt tinto ot, and it may be used as a fountain to supply water to the trough as rapidily as required, a neck on the can and flange in the cup having apertures through the can and fange in the cup having apertures through
which the water can pass from the can into a circular or annular trough formed in the cup.
A door strip has been patented by Mr. William Clark, of Lincoln, Neb. It is held vertically movable on the bottom of the dor, and has at its top two spring arms, ono of which is held by a staple to the
free edge of the door, so the strip will automatically free edge of the door, so the strip will automatically
close the space between the bottom edge of the door and close the space between the bottom edge of the door and
the top of the sill, and will be raised when the door is opened.
A store service apparatus forms the sabject of two patents issued to Mr. Louis G. Bottedo, of Atlantic, Iowa. This invention relates to apparatus In which overhead tracks, switches, and cars are use ters and the wrapping places, and provides certain
ovel features whereby many cars can be used, and the novel eatures whereby many caly
system can be run automatically.
An automatic stock water tank has been patented by Mr. Richard $\mathbf{H}$. Barber, of Galena Kan. The body of the tank is divided vertically for Che greater part of its height by partitions, forming rethe construction being such that different stock may be watered at different pointe, and so the quantity of water
may be gauged as desired.
A wrench has been patented by Mr. Samuel J. Lea, of Chattanooga, Tenn. It construction is
such as to readily adapt the jaws of the wrench to stand such as to readily adapt the jaws of the wrench to stand
at any desired angle relatively to the handle, for use in at any desired angle relatively to the handie, for use in
turuing set screws between the arms of pulleys and in
places diffcult of access, while it can be quickly set fo
different sizes of nuts or pipe, and readlly changed from pipe wrench to a nut wrench.
A thread guide and tension regulator forioom shutules Las been patented by Mr. George Bald wh, of Wilimantic, Conn. Combined with the shattle a slot at the other, with a screw and forked plate held on the strip, the thread from the spindle passing between
the prongs, and the plate being adjustable to increase 0 the prongs, and the plat
diminish the tension.
A harness pad press has been patented by Mr. Joseph W. Johnson, of Lathrop, Mo. It has base patee, side plates with aleral sioted lugs, bote
for adjustably securing such plates, form bars pivoted Yor adventabe siderng plates and clinch bars pivoted a
between the one end between the form bars, with other novel fea teares, whereby the stretch can be taken out of
leather, and the pad can be stuffed while in the press. A grain bag filler, weigher, and register has been patented by Mr. Lewis P. Summers, of Pecuhar, Mo. The grain to be bagged and weighed is, by a hopper 3 by means of a suction blast made by $a$ fan, th hopper having two discharge tubes pendent verticall rom its bottom, and al ways filled with grain during th operation of the machine, but discharging alternately.
A scoop balance attachment for weigh ing scales has been patented by Mr. Asa Leas, of West Manchester, Ohio. This invention covers a doubl balance the scale by an upper and lower notch, and i intended to operate automatically, so that articles may be weighed in the scoop or on the platform withou
ancing the scale by adding or removing weights.
A clothes drier has been patented by Mr. Leonard A. Johnson, of Candor, N. Y. Combined with a frame having slats secured on its front are arm pivoted therein and adapted to swing through slots be tween the slats, with locking bars for holding the arm when they are swung out through the eslots, making
device which is strong and durable, and which can be olded very compactly.
An umbrella and parasol frame has been patented by Mr. Willian P. Conner, of Blooms
burg, Pa. The ribs and braces are arranged in pairs burg, Pa. The ribs and braces are arranged in pairs,
the braces of each pair and ribs of each pair being connected at the hinged or pivoted ends, and the ends of the braces of each pair being pivoted to adjacent ribs of
two different pairs of ribs, making a stiff frame, but which also has considerable spring.
A fishing reel has been patented by Mr. Julius Vom Hofe, of Brooklyn, N. Y. This inven Ion covers a novel construction of the head of the frame of the reel, which is made of a hard rubber or other like fiange or disk recessed to receive the gearing, and
metal outer plate to form bearings or sockets for the spindles, there being also a peculiar attachment of the is made capable of different adjustment
A spring seat for vehicles is the subject lehem, Pa. It is so constructed that a part of the sprivgs may be detached from the Iower board, according to the weight or number of persons to ride, and the seat
will always have a level up and down movement, and ride equally easy with up and down movement, and without endwise or lateral pitch.
A hide fleshing machine has been patAccording to this invention, an endless belt carrying knives suitable for fleshing is made to revolve on beangs, so the knives. will be carried above an inclined
table taking the place of a flesher's beam, the latter table taking the place of a flesher's beam, the latter
being brought near enough to the knives for them to work upon the hides by means of a treadle.
A heat regulating mechanism for in cubators has been patented by Mr. Jason L. Cousins, of Kane, Pa. The bos for receiving the egg trays is sur
rounded by an air space, and on its side is a boiler with gas or oil burner, with which a flue and valve are
connected the valve forming an armature connected connected, the valve forming an armature connected
with an electro-magnet, battery, and thermostat, the ap. aratus covering severa d operation.
A washing machine has been patented by Mr. George L. Ferris, of Mexico, Mo. It has a circular drum pivoted to revolve in a box or tub with at
cover, the drum being revolved by a crank handle, and having on its inner surface a series of ribs or troughs, the ribs being hollow and wedge-shaped, and in opera-
tion intended to carry up the clothes and water at the tion intended to carry up the clothes and water at the
sides of the drum and let them drop in the middle
ag hydrocarbon burner has been patent-
ed by Mr. Joseph Marion, of Brooklyn, N. Y. Com-
bined with a shallow receiver having air passages is a
bined with a shallow receiver having air passages is a water box fitted to its bottom, and having correspond-
ing passages, the arrangement being such that combustion will take place at the surface of the oil, the ail supply will be previously highly heated, and small
steam jets be made to unite with the fame to increase its efficiency.
A paint mixer has been patented by Mr. Frederick Brandenberger, deceased (Frederika
Brandenberger, execurix), of Danville, IIl. It is more especially designed for stirring mixed paint in a storage vessel prior to drawing, such vessel being provided with a crank operated shaft and blades which lift the liquid paint from the bottom and cause it to rise in
whirling currents toward the center and top, thorough whirling currents toward the center and top, thorough-
ly mixing the contents of the vessel.
A mole ditching, tile forming, and wire laying machine has been patented by Mr. Samuel Montgomery, of West Toledo. Ohio. This invention covers
a novel construction and combination of parts in a machine for forming a continuous cement tile or lining to a mole ditch, and also for laying telegraph or telephone wires either directly within the mole ditch or within the cement tile formed therein, and so the tile may bo
used as a drainage tube.
A gate has b
A gate has been patented by Mr
Joshua D. Fox, of Frankfort, Ind. It is a little longer
orward inclination, and the lower part of the rear end bar is connected with the hinge post in the ordinary ay, while to the upper end of the rear end bar is at-
ached, a pivot which works in a horizontal pulley, with ther novel features, making a gate which can be readi$y$ opened and closed by persons in vehicles or on horseback.

## Special

## A TREASURER'S SAFETY

An Active Screw Manufacturer has the Twists taken out of his System.
Once upen a time-and it was not so many years ago, ere unknown. The screms of those days were fnished off fat at the end, and a hole had to be bored for each best inventions the world has known were by lazy fellows; and the gimlet screw was one of them. A me-
chanic who was sorn tire," "nad woo hated the labor
h boring hole in the wod the thought that if the screw were furnished with witt
le tail end in the shape of a pointed gimlet, much trouthe tail end in the sha
ble might be saved.
At frst the mavafoacture of such screws was attended ndue time invented.
The timimetelinvented. screw is one of the necessities of
he present age. Our great screw factories turn these he present age. Our great screw factories turn these usefulilttle things out by the million and million. One
of the greatest of the screw concerns is the American Senew Company, wiland
The treasurer of this great corporation, and one of its
nost active managers, is W . H. Henders on, most active managers, is W. H. Henderson, Esq., one of
the most widely known business men of Providence. Mr. Henderson, who is now well advanced in years. has
ad a long experience of invalidism, against which he bravely battled. His principal trouble was catarrh,
which was so obstinate a for a long time to defy all
treatment, and so deeply seated as to cause a great deree of deafness.
Our Rhode Island correspondent recently spent an
our with Mr. Henderson, who talked freely of his past and present experience. "My catarrh was of very long
standing," said Mr. H. "At an early age I had a severe ilm was this catarrh. The catarrh took a very strong hold ne me, and in spite of all that the doctors could do for me it increased from year to year to such an extent that
my expectorations were so copious as to be very annoyng. You may judge how they were when I tell you that would often use up as many as half a dozen handkerwas so great that I almost feared to go to sleep lest I hould be choked while asleep. I would have to rise once or twice during the night and free my nostrils and mouth from the accumulations. I am now over the worst
f my trouble, however, and my catarrh is so nearly gone hat it gives me no inconvenience. One handkerc "Then, Mr. Henderson, some of the treation."
"Yes; let me tell you about it. I tried a great many hings, which were of no avail. One m medicine matter
nother failed me. I tried electricity, and thought I received some advantage from it; but the relief proved ceived some advantage from it; but the reler proved
only partial and temporary. I was ready to try almost
anything that gave any hope of relief. Mr. Sullivan anything that gave any hope of relief. Mr. Sullivan
Fenner, of this city, advised me to try Compound OxyFenner, of this city, advised me to try Compound Oxy-
gen, an article of which I knew nothing except what he told me. It had been of great advantage to him and his son. This gave me practical and lasting relief. It was
about two and a half years ago that I sent to Philadelhia for a 'Home Treatment' of the Compound Oxygen, nd at once began using it. You may judge of my surfelt it was doing me good, in checking the discharges and giving new life to the affected parts. I used the
oxygen regularly and persistently for several months. Oxygen regularly and persistently for several months.
At frst $I$ could inhale only a few seconds at a time, and the use of the inhalant, inhalation became easier, and
elief was greater. The gain in my strength and general ealth was very satisfactory. I Lad been so much of an invalid that I was unable to atrend to my business with
enularity; but as my improvement in health went on, gradually but surely. I found myself able to do far more than I had done for years. To indicate to you the ex-
tent of my improvement, I may say that I now rise early. tent of my improvement, I may say that I now rise early.
and am at my office by nine or ten o'clock. I have nine and am at my office by nine or ten o'clock. I have nine
clerks and keep them busy. I go out during the day and bout to a great deal of out-door business, down town. eading or "Thenl."
"Qen?" Quite as free as a man of my age can ever expect to be
fter such a protracted siege with so obstinate a disease. or all practical purposes I sm a well man. I still take ompound Oxygen occasionally, especially if I take cold,
or there is nothing like it to break up a cold. I have visited Messrs. Starkey \& Palen, in Philadelphia, and have talked with them over my case. They are gentle-
men for whom I have a high esteem, and I am glad they men for whom I have a high esteem, and I am glad they
nave done so much good and relieved so much distress ave done so much good and relieved so much distress
as they have with the Compound Oxygen." "Some of your friends have had pleasant experience
with Compound Oxygen, have they not, Mr. Hender-
on?" I
"Yes; I have recommended it to many. My wife has
" aken it with good effect. She was suferng witr genenothing else did.
ny clerks, Mr. Tyler. This gent, the father of one of ears of age. For many years he had suffered from sthma. For twenty-five years he had not been able to seep except when sitting in a chair. He could not lie
ppon his back. He wrote to Messrs. Starkey \& Palen or a 'Home Treatment' in May, and by July he
ble to lie on his back and sleep like other people. ble to lie on his back and sleep like other people.
"I think it is asking a great deal of'Compound Oxygen to expect it to afford relief in such old and obstinate
cases as these. But you see what it has done. It can be ases as these. But you see what it has done.
depended upon. I frmly believe in its efficacy."
The number of those The number of those who are frm believers in the on the increase. It is a wonderful remedy for the relief of the suffering and the strengthening of the weak An interesting treatise on the subject is published by Mesirs. STAREEY \& Palen, 1529 Arch Street, Philadelphia. This
apply forit.

DBusiness and æexsonal.
The charge for Insertion under this head is One Dollar
a line for each insertion; about eight words to a line 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.

Curtis Return Steam Trap returns all condensations into the boiler without waste. Curtis Regulator Works

Agents Wanted.-New household novelty; sells a sight;
N. Y.
55 good unpatented inventions (various) to be sold for P. O. box 510, Philadelphia, Pa.

For Sale--A manufacturing business protected by pa-
tents. Address for particulars Geo. Haseltine, 247 Broadway, N. Y.
Billings' new Hand Vise, with parallel jaws. Drop Forg Castings for model steam engines in brass, iron,
white metal. Address E.P. Ryder, Brooklyn, N. Y. Fhite metal. Adaress E.P. Ryder, Brooklyn, N. Y. Tongs illustrated on
Geo. E. Lloyd \& Co., Electrotype and Stereotype Machinery, Fol
Chicago, Ill.
Nickel Plating.-Sole manufacturers cast nickel an odes, 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 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,
Munn \& Co., 361 Broadway, N. Y.
The Knowles Steam Pump Works, 44 Washington sued a new catalogue, in which are many new and im proved forms of Pumping Machinery of the single and
duplex, steam and power type. This catalogue will be duplex, steam and power type. This
Air Compressors, Rock Drills. J. Clayton, 43 Dey st.,N.Y Haswell's Engineer's Pocket-Book. By Charles H. Haswell, Civil, Marine, and Mechanical Engineer. Giving Tables, Rules, and Formulas pertaining to Mechan-
ics, Mathematics, and Physics, Architecture, Masonry, ics, Mathematics, and Physics, Architecture, Masonry,
Steam Vessels, Mills, Limes, Mortars, Cements, etc. 000
pages, leather, pocket-book form, $\$ 4.00$. For sale by Munn \& Co., 361 Broadway, New York.
Shafting, Couplings, Hangers, Pulleys. Edison Shafting
Mfg.Co..86 Goerck St., N.Y. Send for catalogue frg. Co. 86 Goerck St., N.Y. Send.for catalogue and prices Iron Planer, Lathe, Drill, and other machine tools of Wanted.-Patented articles or machinery to manufacFor Power \& Economy, Alcott's Turbine, Mt. Holly, N.J. Machinery for Light Manufacturing, on hand and 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 Canada. Cost for Canadian patent. \$40. Various other
foreign patents may also be obtained. For instructions address Munn $\&$ Co., Scientiric American patent
Supplement Catalogue.-Persons in pursuit of infor mation of any special engineering, mechanical, or scien
tific subject, can have catalogue of contents of the Sol ENTIFITC AMERICAN SUPPLEMENT sent to them fride. ENTIFIC AMERICAN SUPPLEMENT sent to them frie.
The SUPLEMENT contains lengthy articles embracing
the whole range of engineering, mechanics, and physical 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 Pumpind for catalogue.

Send for descriptive circular on lubrication. Charles H. Besly \& Co., North American Agents for Reise
Celebrated Solid Oill 175 \& 177 Lake St., Chicago, Il.

Mineral Lands Prospected, Artesian Wells Bored, by
Pa. Diamond Drill Co. Box 43, Pottsville, Pa. See p. 46. Cutting-off Saw and Gaining Machine, and Wood
Working Machinery. C. B. Rogers \& Co., Norwich, Conn. Curtis Pressure Regulator and Steam Trap. See p. 350 . Send for catalogue of Scientific Books for sale by
Munn \& Co., 361 Broadway, N. Y. Free on application. Best Automatic Planer Knife Grinders. Pat. Face Plate
Chuck Jaws. Am. Twist Drill Co.., Meredith, N. H. We are sole manuftur We are sole manufacturers of the Fros We make pure
Removable Pipe and Boiler Coverings. We
asbestos goods of all kinds. The Chalmers-Spence Co., asbestos goods of all kinds.
419 East 8th Street, New York.
Crescent Solidified Oil and Lubricators. Something new. Crescent Mfg. Co., Cleveland, 0
Steam Hammers, Improved HydraulicJacks, 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. Ad
Emerson, Smith \& Co., Limited, Beaver Falls, Pa.
Safety Elevators, steam and belt power ; quick and Safety Elevators, steam and belt power ;
mooth. D. Frisbie \& Co., Philadelphia, Pa.
"How to Keep Boilers Clean." Send your address
r free 88 page book. Jas. C. Hotchkiss, 86 John St., N. Y. Barrel, Keg, Hogshead, StaveMach'y. See adv. p.76. The "Improved Greene Engine" can be obtained only
from the sole bwidera, Providence Steam Engine Co.,R.I. Nervous, Debilitated Men.
a a free trial of thirty
You are allowed a free trial of thirty days of the use of
Dr. Dye's Celebrated Voltaic Belt with Electric Suspensory Appliances, for the speedy relief and permanent cure of Nervous Debility, loss of Vitality and Man
hood, and all kindred troubles. Also for many othe
diseases Complete restoration to health, vigor, an diseases. Complete restoration to health, vigor, an
manhood gurranteed. No risk is incurred. Illustrat miseases. Complete restoration to hearn, Ngor, an
manhood guranteed. No risk is incurred. Illustrat
pamphlet, with full information, terms, etc., mat
free by addressing


Manufacture of Soaps, Candles, Lubricants, and GlyceManufacture of Soaps, Candles, Lubricants, and Glyce-
ine. Illustrated. Price, $\$ 4.00$. E. \& F. N. Spon, New
Patent Elevators with Automatic Hatch Covers. Cirular free. Tubbs \& Humphrey, Cohoes, N. Y. Iron and Steel Wire, Wire Rope, Wire Rope Tram-
ways. Trenton Iron Company, Trenton, ways. Trenton Iron Company, Trenton, N.J. Machinists' Pattern Letters. Pattern Letters to order. Brass and Wells \& Co., 110 Fulton St., New York. Brass and Iron Working Machinery, Die Sinkers, Split Pulleys at low prices, and of same strength and Works. Drinker St.. Philadelphis Pa \& Son's Shafting

## 

HINTS TO CORRESPONDENTS.
Names and Address must accompany all letters,
or no attention will be paid thereto. This is for our

though we endeavor to reply to all, either by letter
or in this department, each must take his turn.
pecial Writen In
personal ration
personal rather than general interest, cannot be
expected withoutr remuneration.
cientife therren Suphenents referred
to may be had at than office. price Price 10 cents each.
Inerals sent for examination should be distinctly
nerais sent for e
narked or labeled.
(1) P. Z. E.-You will find full instruc-
(2) H.-Car wheels fixed on their axles in going around curves.
(3) U. O. C. asks: In which number of the Scientific American are the directions for mak-
ing an induction coil for electrically lighting gas? A. ing an induction coil for electrically lighting gas? A.
For information on induction coils consult Supplement, No. 160.
(4) R. H. asks how to stick celluloid to
A. Use the following cement

Gum shellac............................ 1 ounce Camphor.
Camphor
Alcohol.
solve and filter; o
Alcohal.
Macerate the scraps finely divided in the alcohol, and
(5) J. S. B. asks: What is the correct proportion of gas and air to form? the explosive mix-
ture in a gas engine? A. It varies in different engines. In a compression engine, it is one of gas to ten welve of air; in non-compression engines, one of ga
(6) A. N. R.asks how to construct neap serviceable telephone to transmit sound a dis y. A. Two cigar bozes about six inches square con nected by a stout cord or, better still, by means of
(7) F. A. T. desires a recipe for polish ing shirt bosoms, collars, and cuffs, that will put gloss finish on them. A. Pour a pint of boiling wate ight Use a small quantity in the starch.
(8) W. H. B. asks how to polish clarify, and color ox horns. A. The process is elabor
ately explained in Spons' Workshop Receipts, First ject
(9) F. O. writes: I wish to filter quantity of bay rum; could you tell me of a cheap wa to manage it? A. Filter it through
paper in a glass or porcelain funnel.
(10) W. F. H.-Kerosene can be vapor zed by gentle heat. Gasoline is one of the lightest dis
(11) H. E. C. asks if a diamond can b ssolved in vinegar. A. No.
(12) F. L. B. asks: Can you give me diave fain how to make a cheap anemometer that wil give fair results as to accuracy in respect to wind pres mechanic can make. A. Make a disk of wood havin one square foot area; attach to the center of the disk a rod; place the rod in suitable horizontal guides, and
put a spring back of the disk. By means of a spring put a spring back of the disk. By means of a spring
balance graduate the rod into pounds and fractions of pounds. Support the disk on a pivot, and provide a vane which will hold the disk to the winn. Thated in pounds and ounces, and from this indication you ca readily compute the velocity of the wind. Should you
desire to do so, you can apply to the rod an index, and desire to do so, you can apply to the rod an index, and
provide a curved scale along which the index may move thus rendering the divisions of the scale greater, and permitting of seeing the indications at a greater dis-
tance. You can also readily make an anemometer by tance. You can also readily make an anemometer by connecting suitable registering mechanism with a smal
carefully made windmill. The graduations of your indicati
ment.
(13) M. D. L. M. asks what sulphurous undphur in dry air or oxygen gas.
(14) C. W. F. asks: In what can rubber be dissolved so that a thick or thin varnish can be
made to cover rubber cloth? A. Rubber may be dislved in naphtha, also in bisulphide of carbon.
(15) E. T.-Any wholesale drug house barium with sulphate of ammonium.
(16) M. asks a good cure for mange in a dog, rather a light case. A. An ointment consisting of 1 ounce sublimed sulphur and 2 ounces lard, mixed to gether, is generally used for light cases.
(17) J. H. D. asks (1) the quickest way to make vinegar from cider. A. The manufacture of vinegar consists simply in exposure to the air, thereby from $75^{\circ}$ to $85^{\circ}$ Fah., in open vats or by trickling ove wood. 2. Can vinegar be made quicker from cider
water? A. Yes; but the article made from pomace is not marketable, on account of its Alavor.
(18) A correspondent writes: Wherecan the seed of pure Havana tobacco be procured? A.
Send to some of the large seedhouses in New York, and they will send to Cuba, and obtain the seed fo you. 2. Desires information on the curing of the leaf.
A. F. W. Coon, Edgerton, Wis, A. F. W. Coon, Edgerton, Wis., bas recently published
a book on this subject, and there is also a book on "Tobacco Culture" published in this city, which we can
re for you.
(19) V. D. \& Co. ask: At what point in he discharge of a rifie does the recoil occur-when the ball first starts, or as it l
A. When the ball starts.
(20) W. H. A. writes: I have two good magic lanterns, and have very little use for mor than one; is there any possible way of using th lenses or combination of the lenses for a photograph
camera? The condensers are $31 / 2$ inches diameter, the camera? The condensers are $31 / 2$ inches diameter, the
focusing lenses $11 / 2$ inches. A. Your lantern objective if of good quality may be used to advantage in $p$
tography. The condensers would not be available.
(21) F. J. G. asks: 1. Can you inform me how to make small "electric influence machine," partly described in Scientific American, March 7,
1885, page 150? A. You will find the Holtz electrical machines described in SuPplement, Nos. 278, 279, and
(22) J. R. F. asks: 1. Can you tell me
where the reels made on the lazy tongs principle can be wought? A. We believe that the reels referred to can be bought at most of the stores dealing in worsteds. some of the same kind? A. If the reels referred to are made by the inventor or under his sanction, and there is nothing upon any of the reels or the packages that
contain them to indicate that they have been patented, you cannot be prosecuted for making the reels.
(23) H. W. B.-When the Bell magneto elephone is employed for both transmitting and re ceiving, it is simply inserted in the line. You may
use two such instruments at each end of your line, use two such instruments at each end of your line
employing one as a transmitter and the other as or experimental purposes.
(24) D. J. A. asks: Will you please inform me how I can prepare plaster of Paris so that it will not crack or chip, without adding greatly to it
cost? A. You can harden plaster casts by soaking them in glue size, afterward allowing the casts to dry per fectly.
(25) J. G. writes: A bets B that there is no one-wheeled vehicle in existence operated similar to tricycle or bicycle. B claims that there is, and says hat the unicycle on page 150, vol. l., Scientific Ameri can, proves it. A. The vehicle mentioned in our
paper is a unicycle. The best bicycle riders can and do paper is a unicycle. The best bicycle riders
(26) W. H. asks how to make colors adere on albumenized photographs. A. Make a solution of albumen as follows: Separate from the germs the
whites of eight eggs, these should amount to 8 fluid ounces of albumen. Add to this quantity 24 drops of glacial acetic acid diluted with one ounce of water. Stir well with a glass rod for a minute or so withou
making a froth. Allow the solution to stand for an hour or more, then strain through a couple of thick nesses of cambric muslin. Finaily add half a drachm of liquid ammonia; bottle, and cork tightly. The so In mixing or dissolving the colors, use one part of fhe albumen solution in four parts of pure water. the colors will adhere perfectly
with a brush. Add to the 4 ounces of water a tew drops of prepared ox gall when the colors are diluted
(27) C. H. McC. asks: What will remove the spots from a zinc lined bath tub in which water has been permitted to stand for several days? Ordinary scouring, etc., have no effect upon it. A. Soap remove any spots. If the spots fail to yield to these substances, a little dilute hydroch
but this dissolves away the zinc.
(28) O., Ky.-The tin bath used in tin plating becomes foul by absorption of iron or other just above the melting point of tin by allowing the bath to cool down slowly until signs of setting are noticed, when the pure tin will run off. The refining of the spongy mass or thick tin is too difficult for ordinary practice, and this is generally sold to chemical Banca tin is supposed to be the purest and best fortining purposes. The production is very small, and the probability is that it is mostly absorbed in the English
in plate interest. The trade is not reliable, and you tin plate interest. The trade is not reliable, a
(29) H. F. S. asks how red flannel underclothing can be treated so as not to cause constan
rritation to the skin. A. The irritation is caused by the flannel and not by the dye. The belief isvery common that red flannel has some special value becuuse of its color, but the belief is without foundation, and any other color where the flannel is of the same quality is equally efficacious. The red flannel selected is often
and perhaps generally thick and heavy in texture, and consequently causes an irritation of the skin, for which
the dyeatufit is by no means reaponsible. A softer
annel, or one made soft by wearing and washing, is (30) W. T. S. asks: What will congeal yasoline so as to make it somewhat like jelly? There out of clothing. He has something that he puts in
gasoline which makes it like jelly. A Gasoline, which gasoline which makes it like jelly. A. Gasoline, which
is one of the flrst distillates from crude petroleum, and is one of the first distillates from crude petroleum, and very much the same as benzine, will remove grease
without any admixture. Possibly the ingredient is without any admixture. Possibly the ingredient is
some inert substance, like fuller's earth, chalk, mag. ome inert substance, like fuller's earth, chalk, mag.
esia, or it may be Castile soap. Sometimes scouring nesia, or it may be Castile soap. Sometimes scouring
balls are sold having the foliowing composition: Dry balls are sold having the foliowing composition: Dry faller's earth, moistened with the juice of lemons; add small quantity of pearl ashes and a little soft soap;
nead the whole well together into a thick elasic paste; form it into smali balls, and dry them in the sun. When used, moisten the spot on the clothes with water; then rub it with the ball, and let the spot dry
in the sun. When washed with pure water, the spot in the sun. W
will disappear.
(31) O. F. asks: 1. What is the best kind of putty to fill the seams of the planking on the bottom of a small sailing yacht, and how should it be
mixed, etc.? A. Fuse together equal parts of pitch mixed, etc.? A. Fuse together equal parts of pitch and gutta percha, and to this add about 2 parts of lin-
seed oil, containing 5 parts of litharge. Continue the heat outil the ingredients are uniformly commingled. eat until the ingredants are uniformly commingled. This cement should be applied warm. 2. The ma-
ogany trimmings on the above yacht are finished with n article known as Crockett's spar varnish, and cannot be removed by the use of sandpaper, emery, or scraping, except by a great amount of labor. Please inform me if there is any other means by which it can be re-
moved with less difficulty. A. Try the preparation removed with less difficulty. A. Try the preparation re-
commended in answer to query 17, in Scientifio commended in answer to query 17, in Scientifio
(32) J. C. asks (1) the best welding comound for welding cast steel when the coail is bad. A. good welding compound may be made by pulverizing 0 parts,borax and 1 part salammoniac together; then dry, and pulverize and use for welding in the mass dry, and pulverize owder a better way (if the same
 ise only, by taking from the forge fre, a little at a me, the coked or half burnt coal and quenching it by rinkling with a little water; lay this aside for special se. 2. The reason for four rollers on roller skates? . The wear on four rollers is much less than on two ollers. The facility for making the mechanical moveent required for turning curves is also favored by use of four rollers. Two rollers have been used-
txperts now skate on one roller.
(33) A. M. writes: In trying to take out few rust marks in a silk handkerchief with javelle water, I stained the part whereon I poured it. Will
you please let me know how to remove it? A. The velle water is a bleaching agent, and removes color. ul whether the shade can be reproduced. When color a a fabric has been accidentally or otherwise destroyed y acid, ammonia is applied to neutralize the same, fter which an application of chloroform will, in some ses, restore the original color.
(34) J. N. asks (1) how tincture of iron and steel is made. A. Tincture of iron is officinal, and therefore can be found in any pharmacopocia. It con-
sists of solution of chloride of iron 35 parts and alcohol 65 parts. The use of the word steel becomes superfuous, as tincture of steel and tincture of iron are synonymous. 2. How carbolic salve ts made. A. Take
carbolic acid, $1 / 2$ fluid drachm, and lard 1 ounce. Triturate together in a porcelain mortar. 3. To give name of any papers treating of the hair, in keeping it fom falling out and preserving the same. A. See "The MENine of the Hair,"
MEs. 102 and 388.
$\int_{\text {( }}{ }^{35}$ ) W. A. W. desires a recipe for tores. A. The best mucilage is made by dissolving gum arabic in water, and adding a little oil of cloves to prevent its decomposition. A common receipt is: Mix 3 ounces gum arabic, 3 ounces distilled vinegar, 1 onnce white sugar; 1 part of acetic acid in 5 parts of
water can be used instead of the distilled vinegar. The water can be used instedd of the distilled vinegar. The
poorer grades are made by treating starch with sulpoorer grades are made by treating starch with sul-
phuric acid. The government uses the following: Gum dextrine 2 parts, acetic acid 1 part, water 5 parts. Disdextrine 2 parts, acetic acid 1 part, water 5 p
solve in a water bath and add alcohol 1 part.
(36) A. E. S. asks (1) if there is anything hat would keep the scum out of an aquarium withou snails, and they will keep the aquarium in order. How to clean the shells and corals of the greenish How to clean the shells and corals of the greenish
matter ? A. The shells can be cleaned by washing matter? A. The shells can be cleaned by washing
with a little dilute hydrochloric acid. Great care wist be taken to remove all traces of the acid before the shells are re
stroy the fish.
(37) G. W. W. asks for a description of an imitation of etched or embossed glass. A. The folowing is used to render glass opaque. Mastic...
Gum sand
Ether..
Powder the gums and add to the ether, and shake till dissolved; then filter or pour off from the sediment
after standing a while, and add of benzole from 2 to $23 / 4$ ounces, beginning with the smaller quantity and testing till a surface of the right degree of fineness is produced, upon evaporation. This varnish should be carefully preserved in a tightly stopped bottle, so as o prevent evaporation.
(38) J. D. W. desires a formula how to make the so-called "tablet glue." A. 1. White glue, refined clycerine, acetic acid, and coloring material. 2. Common glue with about 5 per cent glycerine. 3. A quarter of an ounce crude gutta percha dissolved in
carbon disulphide to the consistence of mucilage. The carbon disulphide to the consistence of mucilage. The
materials used in making this glue or cement for pads materials used in making this glue or cement for pads are generally of a low grade commercially, so tha
experiment is necessary to make a good article.
(39) A. F. C. asks (1) fora preparation to clean silver-liquid or paste. A. Mix 8 ounces prepared
chalk, 2 ounces turpentine, 1 ounce alcohol, 4 drachms spirits of camphor, and 2 drachms liquor of ammonia. Apply this mixture to the article with $a$ sponge, and allow to dry before epolishing. . . How to make a dress-
ing for ladies' boots? A. See answer to query 2 , Scring for ladies' boots? A. see answer to query 27 , Sc1Entific American, vol. li., No. 17.
(40) M. S. P. writes: 1. I have two fingers dislocated in the knuckle joints. The joints
are considerably enlarged, and somewhat stiff and tenare considerably enlarged, and somewhat stif and ten-
der to pressure. What shall $I$ use on them to reduce them to their natural size and usefulness? A. Consult a physiciar is the best thing to do. Tincture of iodine or solution of arnica, or indeed both, may be ap-
plied with advantage. 2 . How shall I make a cheap plied with advantage. 2. How shall I make a cheap
and serviceable paint for tar paper roof? A. See "Reand serviceable paint for tar paper roof? A. See "Re
ceipt for Roofing Paint," in Scientrict Amercan SUPPLement, No. 113.
(41) J. T. L. asks how to obtain a cement thich can be seed on crockery, ete., and not be
affected by hot water. A. Calcine oyster shells, pound
and sift then smooth stone with a muller till reduced to the finest powder, then take white of egg, and form the whole into a paste, join the piecese of glass or china, and press
together 6 or 7 minutes. This cement will never yield together 6 or 7 minutes. This cement will never yield
if properly applied. Glue with whicha a little potassium bichromate is mixed becomes insoluble when exposed to the light.
(42) J. G. asks: 1. What is acid phosphate of lime? A. The calcium phosphate which con-
tains hydrogen. 2. Which is the best kind of molasses to use in the manufacture of shoe blacking? A. Ordi-
nary common molases. nary common molases. 3. A receipt for a frst class
blacking would be very acceptable. A. See four formulas in Scientific American, vol. li., No. 5, in
(43) L. W. asks the meaning of the photographic terms f 8 , $\mathrm{f} 11 \cdot 3$, etc. A. The term f represents the equivalent focus of a lens, which we will say
is seven inches. This is multipipied by 16 or 64, which transforms the seven inches into so many sixteenths largest diaphragm measures perhaps $\& \frac{1}{2}$ of an inch; the question then arises, What part of the total equivalent
focus does that represent? We find it by dividing the ${ }^{4} 8$ by 54 , the diameter of the diaphragm:

## 

Therefore the largest stop is equal to one eight and three-tenths of the equivalent focus, and we express it in termi f 8. These terms are uniform for any lens, such terms than to call them $1,2,3,4,5$, etc., as is com
mon. $f 8 \cdot 3$ in any lens means relatively the same sized stop; we thereby can understand readily whether it is nation illumi nation we should have on the eground clase,
(44) J. $\mathrm{J}-\mathrm{W}$ ask what
(4ishing Turkey red cloths undergo after lecess. of finishing Turkey red cloths undergo after leaving the
dye vats, that iis, from the time the cloth leaves the dye vats, that is, from the time the cloth leaves the
vats to the time when it is placed in the market for sale. A. The material is first singed over a flame o heated surface, then boiled in a soap solution, and
this washed away with cold water. Next it is hot this washed a way with cold water. Next it it hot hot
pressed under a hydraulic press at a high pressure with pressed under a hydraulic press at a high pressure with
hot steam. In some cases it is stretched in a stretching machine. Details of the process may be found in ing and Calico Printing or Calvert's book on the (45) R. W. writes: A drum or pipe is filled with water, and the cap screwed on tight. This is put inside another and larger drum, which is also
fastened steam tight. Steam is then admitted to the farger drum. Now, what will be the effect on the larger drum. Now, what will be the effect on the
smaller rumm? Will it burst or will it collapse? A.
The effect will be to generate pressure in the inner The effect will be to generate pressure in the inner
drum, equal to the pressure of the steam admitted araund it. There can be no collapsing of the interior drum, and the pressure within it and outside of it being
equal, the water within the inner cylinder will be in equal, the water within the inner cylinder will be in
zunch the same condition as that in an ordinary
poiler ing. ${ }_{(46)}$ W C F asks: 1 . What sized cell of the battery illustrated on first page of SUPPLEMEENT, No. 149, woold be most eoonomicag lof use in in ringing
electric bells? A. One quart cells will answer the purNo. 149 , woula be most eronomical or use in ringing
electric bells? A. One quart cells will answer the pur-
pose 2 How many cells at each end would be te pose. 2. How many cells at each end would be re-
ouired to ring an ordinary bell a distance of 600 feet over a No. 16 galvanized wire with good ground connection? A. Two at each end of the line will be re
quired for so small a line wire; better use $\overline{\text { No }}$, 1 to quired for so small a line wire; better use No. 12 for
your line, when one cell will probably answer. 3. In giving surface required for plate for ground connection giving surface required for plate for ground connection
of lines, do you compute surface on both sides of the
plate plate,
able.
(47) B. \& D. write: Please inform us through the columns of your paper what the difference is between (if any) one square yard and one yard square,
considering it as applied to flat or surface measure. A. The term square yard signifies a surface equal to a rectangular surface measuring one yard along each
of itss sides. A square yard of surface may be of any shape. The term yard square applies to anything of rectangula
its sides.
(48) W. B. P. asks: 1. Can a good working photographic camera be made from a lens taken from Are they necessary? If so. can they be added? Where can Inget specifify? cirections? A. If yoursciopticon has
A. a first class objective, it may be used in photiconraphy.
You can apply diaphragms by securing a fata ring in You can apply diaphragms by securing a fiat ring in
the middle of the tube, and sawing into the side of the tube at the eegee of the ring, os that you may insert
diaphragms by the side of the ring. Diaphragms are diaphragms by the side of the ring. Diaphragms are
often necessary to good deffition and depth of field often necessary to good defnition and depth of field
2. Can glue or gelatine to which bichromate of potash
has been added be kept in a common glass bottle for ase, or must it be kept in the dark, or be prepared fresh has been added must be kept in the dark or be freshly prepared. 3. After it has dried and become in-
soluble in water, does it become hard and brittle? A. soluble in water, does it become hard and brittle? A.
Yes. 4. Is frequent oiling good for a new harness? A. Yes, if oiled with neatsfoot oil. 5. Ought it to be commend a preservative dressing that will leave the commend a preservative dressing that will leave the
leather bright and smooth, so that dust will not adhere lather bright and smooth, so that dust will not adhere
and water will not penetrate? A. Consult SUPPLEMENT. . 368.
(49) B. A. L. asks: 1. A practical receipt For a lacquer for varnishing an old theodolite? A. Good lacquar can be made by dissolving seed lac in
55 per cent alcohol, afterward filtering the varnish thus produced, and coloring it with turmeric or dragon's blood. If you are unable to procure seed lac, use the
best quality of white shellac instead. The article to best quality of white shellac instead. The article to
be lacquered should be slightly warmed before applying the lacquer, to prevent it from becoming chilled. The lacquering should be done in a very warm room, and as soon as possible after the application of the
lacquer the article lacquered should be warmed, either by placing it in an oven or by applying to it the heat y placing it in an oven or by applying to it the heat
of a Bunsen gas burner or alcohol lamp. 2 . Which is he working side of the inclosed piece of drawing paper? A. The rough side. 3. Is the concave side of rolled paper always the working side? In some papers there
are no water letters. A. It should be, because the workare no water letters. A. It should
ing side is in that way kept clean.
(50) Querist asks: I have seen several rticles published in regard to oil on the troubled waters, but no satisfactory solution of the phenomenon. The omething to do with it. It is a well known fact that oil is almost a non-conductor of electricity; that being he case, are there different kinds or qualities of elecwatity in combination with the atmosphere and the andery fould an an insulator destroy any atraction for fatraction? other,
Does the wind passing over the water create friction enough to excite or produce electricity similar to friction of non-conductor) confine the different kinds electricity to their own elements, or the air kind to the air, and the water kind to the water? A. We think
the electricity generated by the passage of the wind over the surface of the water is immediatelv conducted away by the water. It is probable that electricity has
nothing whatever to do with the quieting effect of the oil upon the water.
(51) C. W. T. asks: 1. Are steel screws tronger than brass? A. Yes. 2. Is there any way impler than plating them, to prevent rust? A. Bluing brass plating is probably better. 3. Would not bricks set in Portland cement make good ballast for fiat bottomed sailboat? A. They would answer very well,
although heavier material would be better. 4. Would not serews serve as well as sails in putting - -flat bot-
(52) E. W. R. asks (1) how celluloid stereotypes are made. A. Celluloid stereotypes are
made by placing the dried mould and the celluloid of made by placing the dried mould and the celluloid or Which the stereotype is to be made in a frame pro nder constant pressure. The whole is then immersed
hot oil, until the celluloid is sumficiently hot oil, until the celluloid is sufficiently softened put on, to prepare plaster of Paris moulds for casting? have no trouble to make the moulds, but cannot fil them with metal so as to make a perfect cast. A. Plaster of Paris moulds for metal stereotypess must be
Very thoroughly dried before any attempt is made ne them. The common method of drying them is to bake them in an oven until no further moisture can be emoved in that way. They are then immersed in the bubbles cease to rise from the mould. It is then in ted from the melted metal, bringing with ita portion of the metal, and supported in a horizontal position until the netal is cooled.
(53) F. W. T. asks: 1. Would Swedish iron do as well as soft cast iron for armature? A. It How can I stop the articles turning black when plating nickel? Consult SUPPLEMENT, No. 310. 3. Would I have a right to sell the machine I am making? A.
We cannot reply to this query We cannot reply to this query without knowing what
kind of machine you are making. 4. What kind of a gas is made by putting zinc in nitric acid? A. Hydro-
(54) O. A. writes: I possess a camera front Dallmeyer lens, 10x12, rapid rectilinear, lensess
inches diameter. Could I use it in a camera $5 \times 8$ for inches diameter. Could I use it in a camera $5 \times 8$ for
dry plates by subsitutuing the same for the original, ry plates by substituting the same for the original,
and what would the result be? A. If you use a $10 \times 12$ and what would the result be? A. in you use a 01212
rapid rectilinear Dallmeyer lens on a $5 \times 8$ camera, the picture will be too large in proportion to the plate.
This may be remedied byplacing the camera further distance from the object to be photographed than would be necessary ordinarily, and thereby have té picture of a proportionate size.
(55) C. J. F. writes: I have bent seven pieces of tire steel 1 inch by $1 / 4$ inch into a uniform wreshoe shape, and bound them together. They hat 'gauge will I require to work it as an electronagne. Aso, how many Bunsen cells will it require, and the probable strength of attraction? A. Steel is not suitabie for the cores of electro-magnets. You
should use the softest iron, with a winding of No. 16 wire, and with iron cores of the size given you would require about four Bunsen cells. Such a magnet ought to sustain from 200 to 300 pounds.
(56) J. M. A. writes: I would like to know celegraph (SUPPLEMEMENT, No. 284, page M522) that oththing should intervene between the observers. Can the instrument be made to reflect a beam of light upward so
as to be visible 25 miles, the country level but heavily as to be visibe 25 miles, the country level but heavily
timbered? How can I obtain data for formulating the
lenses? A. Telegraph signals have been produced by liminating clouds with light flashes, but this plan it
mpracticable. The only practicable way of telegraph ing ,by light flashes is to throw the light directly from one station to the other. There can be no inter-
vening object. Consult Suppiement, Nos. 253, 258, 287.
(57) T. McN. asks: Will you please tel why rotary engines have never come into practical use What the objections to them, etc.?
me any work treating of them? me any work treating of them? A. Because they are
practically far inferior to the reciprocating engine, and because they are theoretically no better, aliso because of the difficulty of constructing a rotary engine with far as we know, have proved to be very uneconomical. scribed in Reauleaux, Kinematics of Machinery.
(58) J. D. writes: 1. I should like to know w large can a dynamo machine be made like the on of the wire So the emant, No. 1619 Is there any dange the electro-magnet? If made on a much larger scale,doe the thickness of wire want to be increased accordingly? A. A few years ago these machines were made of quite
large sizes, and many of them are now in use for the electric deposition of metals, but they have been su perseded by more efficient and economical machines,
In large machines the armature is groved circumfer entially at different points along its length, to receive binding wire which is wound around the iron and the wire forming the conductor of the armature to restrain action. 2. What is agood thing to mix with rouge to keep in a paste, such as is sold in the stores in tin
boxes for polishing purposes? A. A mixture of beeswax and olive oil. 3 . What is oxide of tin soluble in A. Protoside of tin is soluble in acids. Binoxide of in when fused with alkalies or their carbonates form rule laid down in which the different numbers of wire can be known in parts of an inchs A. Nearly all elec trical works contain tables in which the various sizes of wre are given in fractions of an inch. 5. What is
 Edison electric lamp? A. The wire conductors which extend through the glass are platinum. The loo
which gives the light is a flomen
(59) F. E. P. asks: 1. How many times Nill the hammer of a common clock strike from noo till 6 oclock in the evening? $\Lambda$. Twenty-seven times.
The estriking mechanism of a clock is released exactly The strizing mechanism of a clock in reieased exactiy
at the close of the hour, so that the striking for any hour or the day really transpires after that hour has passed between noon and six o'clock would be 12, 1, 2, 3, 4,5 the sum of which is 27
(60) T. P. E. asks the origin of the length the yard measure. Also why st. Rupert's drop wa
called? A. The yard appears to have had its origin In England in the reign of Henry the First, " who or dered that the ancient ell should_be made of the exact length of his own arm, and that the other measures of
length should be based upon it.", In 1824 it was enacted by the English Parliament that if the standard yard hould be lost or defaced, it should berestored by mak ag a new standard yard bearing the same proportion $t$. bears to $39 \cdot 1393$ inches, the latter being the length of pendulum vibrating seconds in London. This measure ment, however, was found incorrect when the attempt was made to reproduce the standard yard, after th
destruction of the Parliament House by fire in 183 The standard was restored by making four standard yards from the best authenticated copies of the old tandard. These duplicates are the bases of the pres
ent United States and English standards of length.Prince Rupert's drops were so called from Prince Ruoo Charles II, in 1661.
(61) M. A. W. sends a plant for identi fcation. A. It is the Monotropa uniffora, known by the plant, etc.
(62) J. W. M. writes: 1 . When grinding wits an emery wheel. is it the iron or the emery that ron are thrown off in the in ination. Botis emery an emery wheels. If the particles become embedded in the eye, so that they cannot be removed with a pointed stick, the end of which has been slightly bruised and wet between the teeth, you should apply to a compe tent surgeon. It is always best while using an emery
wheel to employ some protection for the eyes. 2. wheel to employ some protection for the eyes. 2 What is the best way to get io out? Also give me a re
cipt for making a good soap to take off grease fron the hands, such as oil, from a dirty machine shop. A. alcohol and aqua ammonia equal parts.
(63) J. F. W. writes: I am about to get a microscope; what powers will be required? A You will require a microscope of medium quality, with aout three obfectives and two eyepieces. The entire
insect should be examined first with a low power, say ansect should be examined irst with a low power, say by a higher power, say a 3.4; finally, the details will re
aire a $1-4$ or $1-5.5$. Which is the more interestin study-insects or botany? A. It depends entirely upon he taste of the student; both subjects are deeply interesting, and might be conveniently carried on together. 3. I had $a$ collection of moths, butterfiies, and insects; sme kind of an insect got into my boxes and destroyed hem. Is it not the cabinet beetle? A. Probably. The kind. 4. Is there any preparation with which I can capture nocturnal insects? A. By employing a ca and a net you will be able to secure the insects. Ordinary sticky flypaper might be of some service in this connection. 5. In capturing insects last summer, I ad previously burnt ang them in a bottle in whice better way? Prussic acid.I have been told. A. Plare
own the neck insert a pledget of cotton. Place a few drops of ether or chlorof orm on the
close the mouth of the bottle with a cork.
(64) L. M. F.-The lower layer of bricks the entire building.
(65) M. R., Jr., writes: What is the latest discovery in metalizizin a non-metallic substance, electronlate wood and plaster of Paris figures and do ot want to take moulds of them in wax. I know that by first coating the substance with was or paraffine plumbago will adhere to it, but I wish to learn of a speedier way of preparing them for the bath. A. We
know of no speedier way of preparing articles for the know of no speedier way of preparing articles for the
electro deposit of copper than the one you describe. electro deposit of copper than the one you describe.
There are different ways, however, among which are There are different ways, however, among which are
the deposition of a film of silver, also the covering of the objects with the bronze powder.

## INDEX OF INVENTIONS

## For which Letters Patent of th

November 24, 1885,
and each bearing that date. [See note at end of list about copies of these patents.]
Acid, manufacture331,059

nnunciator, automatic electric, Price \& Bar ..... 330,003
Ant trap, W. H. Thompson.......
Auger blade, earth, A. Schulte ..... $.331,257$
$\left.\begin{array}{l}31,09 \\ 3 i 1,006 \\ 30,\end{array}\right)$Auger, earth, W. W. Curti
Awning. F. X. Brenner...


 ..... | 330,900 |
| :--- |
| 331035 |
| 330,877 |

Baling press, W. Gardner ..... 331,049
Bedstead, W. B. Clowers..............................
Beer, apparatus for flling kegs with, C. Mussel...
Belt equalizer and tightener, combined, D. Han- ..... 330,872
331,251
ney............ ..... 330,977
321,199
3311,173
Bicycle treadle, G. W. Weidman.
Billiard table leveler, G. Livingst ..... 331,173
330,911
330,967
Blind, window. W.G. Hale .....  311,130
Boiler furnace, Fowler \& Nepil.. ..... 330,885
331,093
 ..... $\begin{array}{r}331,882 \\ 331,057 \\ \hline\end{array}$
Boot, G. Valiant.....................................Kimball.381,148
Boot or shoe, R. R. Mathe,oot or shoe soles, tool for channeling, J.oots or shoes, device forBox. See Letter box
Bracelet. H. E. Chad wick.
Bracket. See Shingle331,187

| ...... 330,9 |
| :---: |
| ..... 330,93 |

Bridle, A. F. Bowen. ..... 330,933
331,030
331,176
Burglar alarm, B. T. Trimm ..... 330,942Taylor.
331,167
331,124
utton, E. Flagg.
utton setting machine, $\mathbf{F}$. $\mathbf{H}$. Rich
alculating device, A. W. Tucker...................
Can testing machine, J. E. \& W. S. Reynolds...Canning apparatus, J. Kinney.
Canes or umbrellas,
berger.
Car coupling, W. H. Knightar coupling, W. G. H. Thight..Car coupling, P. L. Wetmore....Car door change gate. J. Stephen
Car, poultry, Jenkins \& Streeter.
.ar, poultry, Jenkins \& Stree
Car, sleeping, H. Guillaume.
Car starter, W. P. Vickery.

| 330,938 | 11 | 122 | Ruk, R. P. Hemming......................16,392 to 16,394 |
| :---: | :---: | :---: | :---: |
|  |  |  |  |
| Clock synchronizer, Ramel \& De | er. | bined, M. J. Halliburton..... 331,131 | s |
| ${ }_{\text {Clothes bar, }}$ W. D. R. Robinson ..................... ${ }^{30,9,222}$ | eera band hook. | 37 | Statuette aroup, J. W. Enninger.................. 11.389 |
|  | k, Jee Back band hook. | 3 | , heating, Schermer |
| side | Hose. machine for inserting couplings into, J. F. |  |  |
|  |  |  | RADE MARKS. |
| Cook |  | Sewing machine buttonhole cutting attachment, | Bitters, E. Masquelier...................... ...... 12,800 |
|  | or. |  | Champagne, Carstairs, McCall \& Co.................... 12,794 |
| oking device for vessels | Inl |  | for |
|  |  |  |  |
| Coupling. See Car coupling. |  |  |  |
| Cultivator, H. M. Abbercrombie.................. 330,864 |  | Sewing machine feeding mechanism, |  |
|  |  |  |  |
| Cutitivator, J. H. Frazee........ |  |  |  |
| ditivator and land |  |  |  |
| ett. | Iron and steel, apparatus for the manufact <br> T. Williamson |  | Custar, wheel, Acme Hub Compans. |
| Zipf. ............................. 330,955 | Ju |  | Lockets, bracelets, and lace pins, w |
| ns, electrical |  |  |  |
| Eis |  |  |  |
|  |  |  |  |
|  | Latch | Vrooman.............................. 331,171 | Remedy for chills anda a linimen |
|  |  |  |  |
| Disisfectant and cleansing liquid for animals, | Lath | Shuttle box binders, roll for making, Wyman \& 3 , |  |
|  |  |  |  |
|  |  |  |  |
|  | Liquors, flling vessels with fermented. C. Mus- | Sink, J. B. Greene........................................... 3 30,892 | Tonic preparation for the treatment of certain |
|  |  |  |  |
| or lock, sliding, w. | Io |  |  |
|  | Lock, w. J. |  |  |
| Draught device, vehicle, T. H. | w. | Sounding apparatus, J. |  |
|  |  |  |  |
| ding. |  |  |  |
| machin |  |  |  |
|  |  |  |  |
| Electric machines and motors, armature for |  |  |  |
|  | low. $\qquad$ 331,105 | Stapling machine, Wilber \& Smith. $\qquad$ 330,950 |  |
| man. | Match |  |  |
| vator |  |  | Canadian Patents may now be obtained by the |
| vator |  |  |  |
| Engine. See Rotary engine. Vapor engine. |  |  |  |
|  |  |  |  |
| Engine reversing gear, H. B. I |  |  |  |
| ${ }_{\text {Envelope, J. J. T. }}^{\text {Eunh }}$ | Meter. See Piston meter. |  |  |
| Fabric. See Metallic fabric. | $\left.\right\|_{M i} ^{M i}$ | Sup | -foverfisemen |
| Fan. suspended. J J. M. Seymour................... 331.029 | Moulding machine, w. S. Garrison................ 31,050 |  |  |
| min pate, A. O. Thornton... | Moulding machines, pattern box for sand, M. R. | Swinging gate, W. H. Starrv........................... 830,937 Syringe, fountain, F. M. Davis................... 331,039 |  |
| Feed hopper and water trough, combined, A. |  | Table, J. Pleukharp............................. 33,212 |  |
|  |  |  | kngravings may head advertisements at the same rate |
| $\stackrel{\text { Fence }}{ }$ | Music rack and walking cane combined, O. B. ${ }^{\text {Pierce }}$, | Table leaf su Telegraph in | per tisements must mear received at at publication office as aearly |
| Fence | Uusic sheets for mechanical musicalinstruments, 30,22 |  |  |
| Fertilizer drill, A. W. Kappenberg................ 33,200 |  |  | r |
| ${ }^{\text {Fibrous plants, roller cr }}$ | . 098 | Telephone, |  |
| $\stackrel{\text { File, }}{ }$ | Ne | Telephone and telegraph protector, c. c. ${ }_{\text {Drase }}$ (r) ${ }^{\text {a }}$ |  |
| Fille, etter, | Oil press mat and compressor, w. F. shatier | Telephone exchange ssstem, J. P. Davis............ $31,1,186$ |  |
| ee, paper, E. E. |  |  |  |
| Filter, J. F. Le, Beau................... ......... 330,907 |  |  |  |
|  |  | Ticketcutter, register, and alarm, Poland \& Cray ford .............................................................................. |  |
| Fire escape, J. Fleming.............................. 3311191 | Overshoe, H. I. Crampton....................... 3311030 | Tire shrinker, W. Lehmer......................... 331.080 |  |
| e escape, H.F. |  | Tire |  |
| Fires in grain or malt mills, mechanism for extin- | Packing, piston, B. C. Waite. | Tongue support, wayon, C. Hein................... 33,2,23 |  |
| mh packing apparatus, |  |  | off, Seamans \& Ben |
| hing |  |  |  |
| Iding gate and window |  |  |  |
|  |  |  |  |
| Fording guide, A. P. Barber, Jr................... 33, 1.022 | ${ }^{\text {Pastry }}$ Pawl |  | St, New York. Send 10 cents for a 100 -page pamphiet. |
| Fork. See Table fork. | Pen, L. |  |  |
| eezing liquids, apparatus for, | Pen holder, J. Felbel............... ................ 330,881 | ine |  |
| Fur blowing machines, bearing for, R. A. Belden., . | Petroleum heating apparatus, R. Schulz........... 331.161 |  |  |
| rnace, P. | union | der, th |  |
|  |  | Va |  |
| Furnaces, apparatus for firing, C. Holland, Jr..... 331,19 | Piston mete | Vave, balancea silide, D. A. Wooabury............ 3s.1,108 |  |
| ge. | Planter, T |  |  |
|  |  |  |  |
|  | Plow colter and j | Valves of fluid | mame Mass. Catalagues fir |
| s and cold air, device for mixing natural, J. H. <br> Sheffier |  |  |  |
| sas, apparatus |  |  |  |
| H. Eat | tato diger, L. G G. |  |  |
| Gas by eleetricity, turning on and shuting of, E . | Potato digerer, Press. See Baling press. | Vehicle spring, J. G. Roth......................... 313,1215 |  |
| s. white.................................... 331,221 | Pressure regulutor, fual, | ring saat, C. Van Horn ................ ${ }^{331.100}$ |  |
| engines, operating, L. . H. Nash............... ${ }^{3} 31.1$ | Protector. See Telephone and | Velocipede, , A.H. Bock, ........ Velocipede sadide A. H. Overion |  |
| Gas fitings, plumb bob for, J. J. Lawler........... 331.144 Gas generators, relief valve for, W. T. Bate...... 351,044 | Puller. $\begin{aligned} & \text { tor. } \\ & \text { Pe }\end{aligned}$ |  |  |
| Gas regulator, A. F. O. Olds........................ ${ }^{3} 3^{31}$ | Pump bucket, litt. F. H. Smith. |  |  |
| Gas retort lid, W. T. Walker.................... ${ }^{\text {a }}$ Gases, treating heating and illuminatin, w.F. | Pumping oil wells | Ventiliting apparatus, atomiver for, V . Oehimann 330,19 |  |
| Browne. |  |  |  |
| Gate. See car door change atee. Fold Swinging gate. Turbine whel gate. |  | 331137 |  |
| Gate, G. M. Bates ............................ 33111 | Rack. | Wagon spring seat. C. Van Horn.................. Walls, mould for building concrete, T. W. Car- |  |
|  | Railway cars, electric signal for, J. R. De Mier.... 331,012 Railway frog, J. Townsend |  |  |
|  | Railmay grip, cable, J. Hellings.......................... 3311.10 | Wash pave, J. G. Bryan. |  |
|  | Railway, hand mechanism for operating grippers for cable, W. H. Paine. .............................. . 331,238 | Washer. See Clothes washer. Nut locking washer. | N CL |
| Grain drier, G. H. Immendorf........................ 3311128 | Railway rail chair, J. Tomsend ........................ 23 z 23,1212 | Washers, making tapering, w. v. B. Ethriage.... 33,045 |  |
| Grain drill, W. H. Dysinger..................... 331.229 | Railway switch, J. A. Dugran.................... 30,888 | Watch, E. Kuhn............................. 383,905 |  |
|  | Railmays, ca |  |  |
| Grate, W. H. Browne..........................................331.141 | Rapid transit wrench, J. Du Shane................... |  |  |
|  | ${ }^{\text {Reel. }}$ Reel bolt |  |  |
| nding mill , J. \& \& E T. Faulkner................ 330.888 | Reel bolt, $\mathbf{0}$ O. P. Hurford..... | Werr and sluice, M. M. Czvetkovics................ ${ }^{331.038}$ |  |
|  | Regulator. See Gas regulator. Pressure regu- lator. |  |  |
| Gripping clamp for lines or reins, G. H. Sackett... 331,088 | Ring. See Finger ring. Rock drill S. Husey | Wheel for agriculural implements, Lon\& \& Bab- cock arem | The only Porfot bedy Dis |
| Guars, feed case for magazine, | Rock drill, , Husser..... Roller. See Shade roller. | wi |  |
| Hair crimper, D. Snyder.......................... 3131216 | ${ }_{\text {Rolling car rails, rill for, }}$ |  |  |
| mmock, V. P. P. Travers..................... 330.941 |  | ,50 |  |
| Horton................................ | Rolling girder rails, roll for, A. J. Moxham........ 3880.927 |  | FOWNE MANLA OT CHEMSTRY |
| tanger. See Door hanger. | Rope driving mechinery, w. H. Paine....... -1.: 331,239 |  |  |
| oww H. Winger............................. 330,952 |  |  | Cs, physigal and inor- |
| Hat and towel holder, w. Mathews................... 30,9 | Salt, preparing celery, E. C. Hazara.................. 8881.184 | Wrench, N. H. Grifith............................. 3131053 |  |
| Hat forming machines, turn table for, R. A. Bel- <br> den. <br> 331,181 |  | Wr rench, E. Phillips.................................. 331,158 Wringer. |  |
| Hay stay, H. A. House......................... 330,999 | Saw tooth swaging machine, J. . . Traverse........ 39,262 |  |  |
| ay carrier, J. $\mathbf{0}$. Kanouse....................... 33.0933 | Sawing machine rift, o. .s. Holt................... 3 31.135 |  |  |
| y press, G : Johnson . ................................ 3309192 | Scale, weighing and price, e. Sauermilch........... 331,030 | DESIGNS. |  |
| Hemmer, A. P. Barber, Jr......................... ${ }^{\text {Hide }}$ (31,021 |  | Chair back, F. F. Parker.......................... 16,3010 |  |
|  |  |  |  |

A new and orotomal Amentran Boot on the samutacture








S1．Walnut Sireet，Philadelphin．Pa．
THE MACHINIST＇s and STEAM－ENGINEER＇S
Practical Calculator．

 B；D．ㅍ․ prox
18mo，Morocco．Price．
D．VAN Nostrand，Publigher $\$ 2.00$ 23 Murray and $2 \%$ Warren Street，New York ARCHITECTURAE PERSPECTIVE



## INJECTORS

STATMONARYSTEAM ENGINESBSPECIALIY


 steam catamaran may bar



\％
A New Drill Chuck． THE HARTFORD．
 THE CUSHMAN CHUCK CO． Hartford，Conn．
y dealer in machinists＇Tools．
VOLNEY W．MASON \＆CO．， PRICTION POLLEZS CLUTCHES and ELEVATORS． providence，u．I
CHOLERA．－－ABSTRRACT OF A PAPER


Leffel Water Wheels，胃 With Important Improvements．
11，000 IN SUCCESSFUL OPERATION． FINE NINT PAMPELET FOR 1885 JAMES LEFFEL \＆CO．， 110 Liberty St．，N．Y．City．
THE TREATMENT OF IRON TO PRE－





Clark＇s Compressed Paper Skate Rollers


 NEWSPARER FILE




MUNN \＆CO．，


ELTING AND PACKING COMP＇Y
 mmery Wheels All other kinds Imifntions and Inferior
andard
BELTING，PACKING，and
HOSE．
Nヨサー YORIK BFITING \＆PACISING CO


上ー Warehouse： 15 Park R ow，Opp
Branches： 308 Chestnut St．，Phila．， 167 Lake


THE NEW＂GRESHAM＂PATENT AntomaticBe：StariingIniector

A most remarkable boiler feeder，which has just taken the first premium
at the Inventors＇Exhibition in England．May be used as a lifter or a non－
lifter ；restarts immediately without any manipulation whatsoeve，after ifter；restarts immediately without any manipulation whatsoeve，afte
interruption of the feed from any cause．The most effective injector eve sole representayives in tee onited stavg and canada，
NATHAN MANUFACTURING CO．
$92 \& 94$ LIBERTY ST．，NEW YORK，
 Andeme


## HANGERS．

Pat． $\boldsymbol{3}$ teel $\boldsymbol{3}$ hafting． PATENT FRICTION CLUTCH， Internal Glamp Gouplingsi A．\＆F．BROWN， 43 PARK PLACE，NEW YORK．



WANTED Tourmaline in quantities，in

 Helve Hammer

 ICE MACHINES Of all sizes，from
10 Ib．per Hour to 50 Tons per Day
Binary Absortion System． SIMPLENOMICAL，
 $16 \begin{gathered}\text { cortlandt St．，} \\ \text { NEW YORK，U．S．A．}\end{gathered} . . . ~$


## USEFUL HOLIDAY BOOKS．

TVOFREETEXP FRIEXEIPME． Helating to Mechanical，Chemical，Electrical，and Metalnurgicailinduatries，for


，420 illustrations．Prie，\＄2．son，and postage prears．id．Containing 702
DESCRIPTIVE CIROULARS SENT FREE ON APPLICATION
E．\＆F．N．SPON， 35 MURRAY STREET，NEW YORK．
展 MMINTINTG AND EEOISTIINTG

 Woodworking Machinery． Williamsport Macline Co．（Ltd．），


WITHERBR，RUGG\＆\＆ICHA RDSON．Manufacurers


DRAWING $\quad \substack{\text { Ilustrated } \\ \text { sent onalogue } \\ \text { sent on appotication to }}$


MENTAL CONTAGION IN INEBRIE－




TELEPHONES $\underset{\text { Ftraight or Crivate Lines．}}{\text { Croked }}$
 ICE－BOATS－THEIR CONSTRUCTION




## MANUFACTURERS

 MERICAN MECHANICAL DICTIONARY





## CURE ${ }^{\text {Oin }}$ Dit DEAF

Peck＇s Patent Improved Cushioned Ear Drums PERFECTLY RESTORE THE HEARING， and perform the work of the Natural Drum．Always
in position，but invisiole to others and comfortable
to wear．All Conversation and even whispers heal distinctly．We refer to those using them．Send for illustrated book with testimonials，free．Address， $\mathbf{F}$

DIPPNORUS the essential element of
restoring the Nervatory ot the Now EnEE Engish systise，ex for
ing exhausting discharges．Lost Power，and arrest－
 the noted years
 PORTLAND CEMENT．－THE SCI


## 


MEN



Pfovertisements.
 Engravings may head a a avortiveements at the same rate
per line, by measurement. a the letter pmess. Adver


SELECTRIC heavier beluting


## H.W:JOHNS ASMESTOS:

Steam Packings, Boiler Coverings, Fire Proof Paints, Cements, Etc.
Samples and Descriptive PriceLists Free. 9 H. W. JOHNS M'F'G CO., 87 MAIDEN LANE, N. Y. H. W. JOHNS M'F'G CO,, 87 MAIDEN LANE, N. Y.
i75 Randolph St., Chicago; 170 N. 4th St., Phladelph

dJACKET KETTLES,


## MALLEABLE

MODERN BRONZE ALLOYS.-A PA





## WESTON DYNAMO-ELECTRIC MACHINE

ELEETROPLATING AND ELECTROTYPING, refer to all the princlpal Stove Manufacturers, Nickel
and Silver Platers in the country. Over $1,500 \mathrm{n} \sigma$ win use Are also manufacturers of Pure Nickel Avioden, Nickel Salts, Polishing Composittons of all kinds,
and every varity of supplies for Nickel, Silver, and and every varlety of supplies for Nickel, Silver, and
Gold Plating; also, Bronze and Brass Solutions. Complete outits for plating. Estimates and catalogues fur nished upon application.

## IAANSON VANWINKLE \& C. SOLE AGENTS

New Yorkolice, $9 \cdot 2$ and 94 Liberty St: THE MANUFACTURE OF CRUCIBLE

 HERMOMETERS Photoraphich outhtif for


HARRTIInal and Only Builder of the With Harris' Pat. Improvements, from 10 to 1,000 H. $P^{\prime}$,
Send for copy send for copy Engineer's and Steam User's
Manual. By
J. W. Hill, M.E. Prlce 81.25 .

PATENTS. MESSRS. MUNN \& CO., in connection with the pubir
cation of the SCIENTIFIC AMERICAN, continue to excation of the ScIENTIFIC AMERICAN, continue to ex-
amine improvements, a to act as Solicitors of Patents for Inventors.
In this line of business they have had forty yearr' ex-
perience, und now have unequaled facilities for the prepperience, and now have unequaled facilities for the prep-
aration of Patent Drawings, Speciflcations, and the aration of Patent Drawings, Specifcations, and the
prosecution of Applications for Patents in the United
States, Canada, and Foreign Countries. Messrs Munn \& Co. also attend to the preparation of Caveats, Copyright for Books, Labels, Reissues, Assignments, and Reports on Intringements of Patents. All business intrusted to
them is done with special care and promptness, on very reasonable terms.
A pamphlet sent free of charge, on application, con taining full information about Patents and how to pro
cure them; directions concerning Labels, Copyrights Designs, Patents, Appeals, Reissues, Infringements, As
signments, Rejected Cases, Hints on the Sale of tents, etc
We also send, free of charge, a Synopsis of Foreign Pa tent Laws, showing the cost and method of securin MINNN \& CO., Solicitors of Patente, 361 Broadway, New York.
BRANCH OFFICES. - No. 622 and 624 F Str BRANCH OFFICES.-No. 622 and 624 F Stre

PATENT RIVETED MONARCH RUBBER BELTING.
Best in the woorion.
Specially adapted for PAPER MILLS, SAW MILLS, and THRESHING MACHINES.
THE GUTTA PERCHA and RUBBER MFG. CO. York, Chicage,


TFNKINS BROE, VAIVES, Gate, Globe, Angle, Check, and Safety.
MANUFACTURED OF BEST STEAM METAL. The Jenkins Disks u.

To avoid imposition, see that valves are stamped "Jenkins Bros."


B ELMONTYLE OIL provent rust on hifh


ICE-HOUSE AND REFRIGERATOR Directions and Dimensions for construction , with one
Illestration of cold house for preserving frith from
season to sea son. The air is kept dry and pure through



ICE-HOUSE AND COLD ROOM.-bYR.



VELOCITY OF ICE BOATS. A COLLEC
 faster than the wind which propels them. IIlustrate
with 10 explanatory diagrams. Contained in SCIENTIFI
AMMRICAN SUPLEMENT, No. V14. Price 10 cents. T
be had at this offce and fromall newsdealers.

## 

SPRING MOTORS.--DESCRIPTIONS of various spring motors for $\begin{aligned} & \text { pehicles. Coler. } \\ & \text { pugh's spring motor for street cars. } \\ & \text { Lari }\end{aligned}$
Lor more's spring
Other motors.
in SCIMNTHIT
Pricelocents.
newsdealers. motor Por cars.
Illustrated with
AM
To bercan had at
 gontator
No taine
No
from all Latri-
notor
tained
om 7.3
ali Published Weekly, 83.20 a Year; 1.60 six Montha. This unrivaled periodical, now in its forty-first year, antinues to malutain 1 ts high reputation for excellence, scientific publication.
Every number contains sixteen large pages, beautifully printed, elegantly illustrated; it presents in popular sty le a deseriptive record of the most novel. interesting, tures it showsthe progress of the Wurid in respect to New Discoveries and Improvements, embracing Machinery, Mechanical Works, Engineering in all branches, Chemistry, Metallurgy, Electricity, Light, Heat, Archi-
tecture Domestic Economy, Agriculture, Natural Histecture, Domestic Economy, Abrcalture, Natural Hisfor discussion, thought, or experiment; furnishes hundreds of useful suggestions for business. It promotes
Industry, Progress, Thrift, and Intelligence in every , Progress, Thilt, aud community where it circulates.
The Scientific American should bave a place in every Dwelling, Shop, Offce, School, or Library. WorkPresidents, Officials, Merchants, Farmers, Teachers, Lawyers, Physicians, Clergymen, people in every walk
 Terms for the United States and Canada, $\$ 3.20$ a year;
$\$ 1.60$ six months. Spectimen copies free. Remit by Postal Order or Check.
MUNN $\& \quad$ CO., Publishers, MUNN $\underset{361 \text { CO., Publishers, }}{\text { Broadway, New }}$ York.

## Trition

Scientific American Supplement. te and distinct publication from 'THIS SCIENTIFIC AMerican, but is uniform therewith in size, every number
containing sixteen large pages. The Scientific Amcontaining sixteen large pages. The Scientific Ama very wide range of contents. It presents the most reent papers by eminent writers in all the principal deBiology, Geology, Mineralogy, Natural History, Geography, A rchæology, Astronomy, Chemistry, Electricity,
Light. Heat, Mechanical Engineering, Steam and Railway Engineering, Mining, Ship Building, Marine Engineering, Photography, Tećchhnology, Manufacturing Industries, Sanitary Engineering, Agriculture, Hoftigulture, Domestic Eeonomy, Biography, Medieine, etc.
A vast amount of fiêsh and valuable information perA vast amount o friesh and valuable informathon per-
taining to these ania allied subjects is given, the whole profusely iflustrated with engravings.
The most important Enyineering Works, Mechanisms, and Manufactures at home and abroad are represented and described in the SUPPLEMENT.
Canada, 85.00 a year, or one copy of the SCIENTIFIC AMERICAN and one copy of the SUPPLEMENT, both mailed
for one year for $\$ 7.00$. Address and remit for one year for $\$ .00$. Adares and remit by postal order or check,

MUNN \& Co., 361 Br ScIENTIFIC AMERICAN.
To Joreign Subscribers.-Under the facilities of post dire by post direct from New York, with regularity, to sub-
scribers in Great Britain. Inde. Australia, and all other Russia, and all other European States; Japan, Brazil, Mexico, and all States of Central and South America. Terms, when sent to foreign conntries, Canada excepted, \$4, gold, for Scientific American, one year; $\$ 9$, gold,
for both ScIentific Ammrican and Supple for both Scientific Ammrican and Supplement for
one year. This includes postage, which we pay. Remit MUNN \& CO.. 361 Bro
PRINTIING INKE, THE "Scientific American". is primed with CHAS.
ENEU JOHNSNN CCO.S NKK Tenth and Lom
Sts. Phila.. and 47 Rose St., opp. Duane At., N. $\mathbf{Y}_{\text {. }}$

