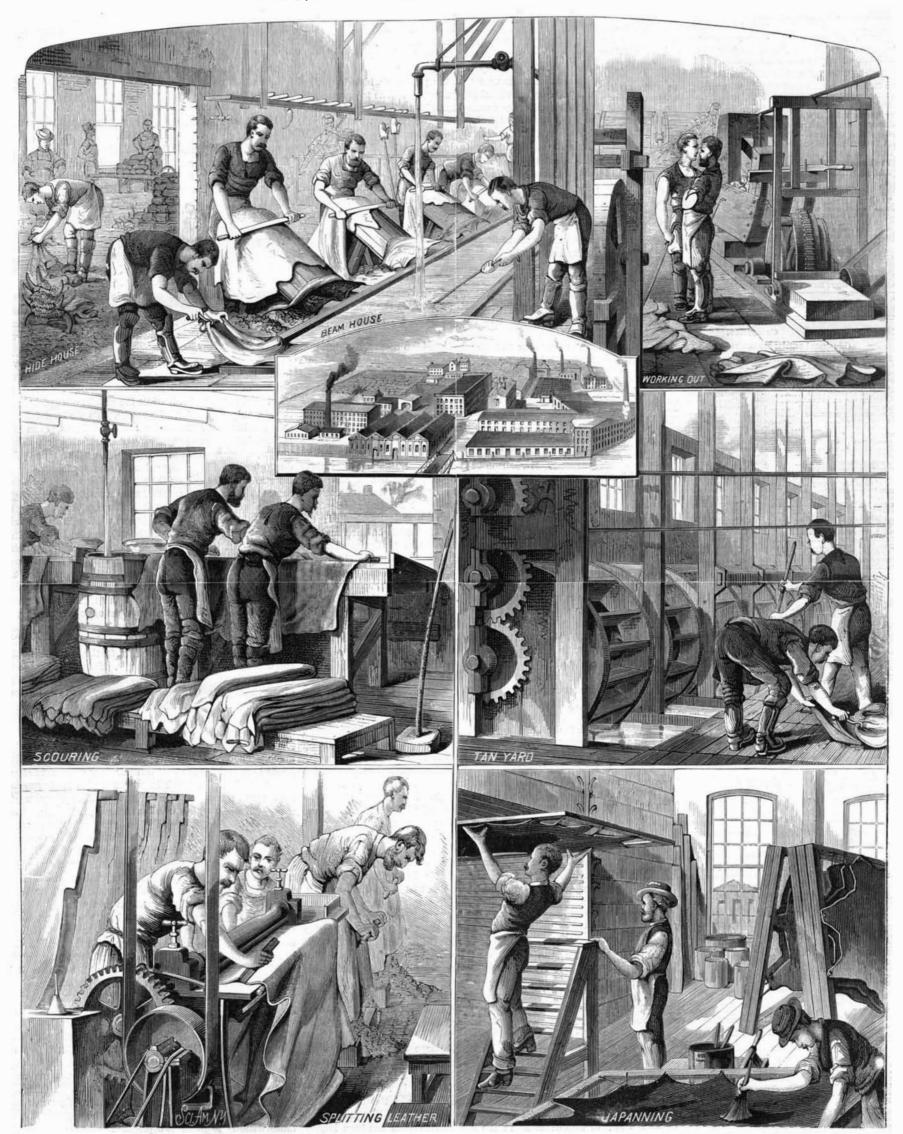


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LEATHER MANUFACTORY OF T. P. HOWELL & COMPANY. -[See page 413.]

# Scientific American.

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O. D. MUNN.

A. E. BEACH

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#### NEW YORK, SATURDAY, DECEMBER 27, 1879.

#### Contents.

(Illustrated articles are marked with an asterisk.)

Airica, future of 409	II
Air compressor, duplex* 410	L
Alizarine blue 411	L
American industries 413	Le
Ammonia on brass 411	L
Apples, to preserve (19) 417	M
Ballasting for railways 414	Po
Bigelow, Erastus Brigham 409	Pι
Boat-lowering apparatus * 412	R
Boat-lowering apparatus *	Re
Chemical nomenclature 413	Sc
Chinese, ebb of the 413	Se
Chinese rods, to make (17) 417	Sc
Cities. chief, 85 years ago 412	Sp
Cold wave. where it comes from. 414	St
Crawshay, Henry 409	St
Dairy fair, international 414	St
Diphtheria, treatment of 416	Tε
Earth's day increasing 410	T
Eggs, to preserve (19) 417	Te
Electricity for lighthouses 410	$T\epsilon$
Export trade increasing 413	Ti
Extending its use 413	To
Fish killed by electricity 412	T1
Flywheel explosion 409	Τı
Gun, hammerless * 411	Tı
Health at home 416	U
Household perils 411 Inventions, agricultural 412	W
Inventions, agricultural 412	Ϋ́
Inventions, mechanical 413	Zy
Inventions, miscellaneous 410	1

409 | Irradiation (23)... Tobacco
. Trade mark law, new.
Trade marks, stamps for . . . .
Trade marks, stamps for . . . .
Trade marks .
Trade

# TABLE OF CONTENTS OF

# THE SCIENTIFIC AMERICAN SUPPLEMENT

# No. 208,

# For the Week ending December 27, 1879.

Price 10 cents. For sale by all newsdealers.

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I. ENGÎNEERING —The Efficiency of Screw Propellers. Results of Experiments with propellers tending to show that the accepted theory of the increase of resistance with increasing velocity does not apply to extremely high velocities. 8 diagrams of curves, showing the efficiency of different screw propellers.

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TECHNOLOGY.—Fire-brick and Terra Cotta. By ANDREW McLean Parker I. The fire-brick process. II. The terra cotta process. A PARKER I. The fire-brick process. II. The terra cotta process. A valuable practical paper.

Bricklaying in France. Extracts from Artisans' reports on the French Exhibition of 1878. Characteristics of French brick work, wages of bricklayers, cost of bricks, tools, and materials.

Improved Tanning Process. Dr. Heinzerling's new time-saving and economical method.

Printing Recipes. "Steam" amber, dark brown, green, purple. Glycerine and Carbolic Acid for the Preservation of Hides.

III. HEAT, ELECTRICITY, ETC.—Coret's Metallic Thermometers. 2 figures. A new cheap and sensitive apparatus.

Breaking Horses by Electricity. De Foy's apparatus. 1 figure. A galloping horse suddenly brought to a standstill by the action of the Reynier's New Incandescent Electric Termometers. Reynier's New Incandescent Electric Lamp. A novel and simple arangement. 2 figures. Carbon holder and lamp in globe.

Electric Illumination. By M. TOMMASI.

IV. CHEMISTRY.—Determination of Potassa and Soda in Minerals. By W. KNOP and J. HAZAN. Ferric Hydrates. By Dr. D. TOMMASI. Active Matter of Malt or Maltinand Diastase. By M. DUBRUNFAUT. Tests for Traces of Mercury. By ED. TEUBER.

V. GEOGRAPHY, ETC.—The Proposed Mission in Central Africa. By Rev. JOHN O. MEANS, D.D. With map of Africa. An exceedingly valuable review of recent explorations in Africa, the present condition of the Continent, and the grounds for anticipating the rapid opening up of the entire country to civilization

Wonders of Geographical Evolution. Lessons to be learned mountains. The chronicles of the globe, and how they are to e read. The Great Glaciers of Eastern America.

The Great Gradiers of Eastern A. Remarkable Cave in Brazil.

Pilocene Man. By Dr. CHARLES C. ABBOTT. Review of Professor Whitney's memoir on Prehistoric Archæology. The missing link still missing.

Man nothing but man whether found in Pliocen, Post-plio-Geodes. The Geode District of the Mississippi Valley. Characteris-

VI. SOCIAL SCIENCE—Comparative View of American Products. Continued from No. 207. Progress in mining. The drift of population. Comparative advantages of the Eastern, Middle, Southern and Western States for mechanics. The great crops in different sections. Average yield of great cereals in the Eastern, Western and Southern States and average value of yield per acre: Value of sheep, cattle and hogs in Eastern, Western, and Southern States. Conditions of stable prosperity.

VII. MICROSCOPY AND MEDICINE.—Aspergillus in the Living Human Ear. By Dr. CHAS. HENRY BURNETT. Early observations of fungi growing in living tissue. Aural fungi. Microscopic features of asper-gillus. Macroscopic features. Symptoms. Etiology. Treatment.

VIII. HORTICULTURE.—Curl in the Peach.—Late Peaches.—Early Free-stone Peach.—Good Culture of an Orchard.

#### A YEAR'S PROGRESS.

During the twelve months now drawing to a close there failed to make a grand stir in the world. There can be indeed no stronger proof of the exceptional character of the Indian Ocean and elsewhere. present time than our proneness to accept such things as matters of course. It is only when era-making events become common that they cease to be remarkable.

The regular readers of the Scientific American do not need to be told at this late day what important, if not memorable, occurrences in the world of progress-commercial, industrial, and scientific—have characterized the past year. Having followed from week to week this record of the world's most effective thought and action, they are already possessed of the grand results of the year's activities. It may not be unprofitable, however, before closing the history of the year, to recall to mind some of the more significant of its events, some of the more notable movements of progress it has developed.

It is safe to assume that the progress which has added most to our individual enjoyment, as well as to our national well-being, has been connected with the wonderful improvement in industrial and commercial affairs which the year has shown. The country was never more generally and earnestly at work than to-day, and was never working to better advantage. And, although in certain quarters an over-eager speculative spirit forbodes disaster to many, there is every reason to hope that the solid industries of the land will not be seriously infected, or seriously injured by the natural and inevitable consequences of speculative 'booms.'

many important ones stand out most prominently; and the work of discriminating is made all the harder by the circumstance that the achievements first made known this year have greater regularity and evenness in the production. largely been, as usual, the final outcomes of long series of our scientific men, in the field and in the laboratory, remains unreported.

Three or four new metals have been discovered; but that sort of thing has ceased to excite general interest. While elements, another class has been working with no slight promise of success to show that several if not all of the ele-Mr. Crookes has been carrying forward his researches in connection with the ultra-gaseous state of matter, though character. Mr. Edison has made some valuable observations with regard to the behavior of highly heated metals in vacuo, and has materially improved the means of convert ing power into electricity. His electro-chemical telephone micro-telephone has been the basis of not a few more or less useful instruments of physical or physiological investigaelectric lamp has resulted in the discovery of many deposits posit is not mentioned. The development of the mines of gold and silver in the West during the year has been very rapid; and close at home we have the discovery in Westchester county, New York, of what promises to be of greater utility than any mine of gold or silver, namely, vast deposits been the addition made by the State surveyors to the accurate cal exploration in the West has been pushed forward not a

larly in the construction of long and lofty railway bridges which is rapidly approaching completion. The great work

posed tunnel under the Hudson. Several extensive ocean piers have been constructed at Long Branch and Coney have quietly happened not a few events which in times of Island. The mouth of the Mississippi has seen the practislower progress, when great projects and great achievements cal completion of the opening of its channel to deep-draught were less a matter of daily occurrence, could scarcely have shipping. A. new Atlantic cable has been laid, and other works of the same character have been carried out in the

These are but a few of the topics of more than temporary interest which the readers of the Scientific American will recall. To speak of the important projects proposed, discussed, or actually begun during the year-like the proposed ship railway across the Isthmus of Panama, for exam ple-would swell this article, already too long, beyond all reasonable limits. Besides, our readers do not need to be specially reminded of them. Enough appears at the hastiest glance to show that progressive men have not been asleep during the year, and that those who have cared to read about the world's real work have not lacked material for engaging their attention. This, not to speak of the hundreds of inventions described and figured in our pages; the numerous illustrated papers on our great industries; the illustrated papers on practical mechanics, and the many suggestions for inventive work that have been furnished from time to time.

#### STRENGTH, WEIGHT, AND FINENESS OF WOVEN FABRICS.

The last few years of particularly close competition in finding a market for all kinds of manufactured goods has rendered necessary very close attention to many little details which has before escaped notice, or were considered too trivial to be taken into account. It has been found, however, that these small items have often made the difference between a paying and a losing business, and, as is almost Of purely scientific events it is hard to say which of the always the case, the closer study given to the practical working up of stock, in order to make these savings, has made possible a higher standard of excellence, and secured

In the making of plain cotton cloths, as at present conpatient labors; while the larger part of the year's work of ducted in this country, we find an illustration of probably as great improvement in this direction as can be pointed out in almost any of our industries. It is but a few years since when all the yarn worked up was largely put in the goods by guess as to its weight and strength, or with very one class of chemists has been thus adding to the list of insufficient tests as to either point, and, although a certain number of threads to the inch was generally designed, this was not always obtained, while the weight of the fabric was ments are but variant forms of one matter stuff. Meantime largely only a question of average. To do business after this fashion now would be simply ruinous, even supposing that goods so made would meet the demands of apparently without making any discoveries of a radical buyers, who have been thoroughly educated on these points during the steadily falling values of all manufactured goods from 1873 to 1879. Now the yarn, almost from the time it ceases to be "roping," is tested as to its weight and strength, and, before it is ready to go to the loom, a very close standhas been rapidly developed and practically applied; the ard must be obtained. This is secured by frequent trials sonometer has grown out of his induction balance, and the for strength in a tester so nicely adjusted and so delicately balanced that it will determine the strain under which a thread will break even to the thousandth part of an ounce, tion. Mr. Edison's call for platinum for his long promised and by scales which will show the slightest variations. The different qualities of cotton, of course, give varying results of the metal in the West and elsewhere. A late dispatch as to strength, but the fineness of the thread, the number from Colorado reports the discovery of the rare metal ura of threads to the inch, and the weight of cotton to the yard nium in the Sacramento mining district. The ore is said to | (as also the amount of sizing or starch, which all our manurun 60 per cent; but the probable quantity of ore in the de- facturers use, though to a less extent than is done in England), must run exactly according to the specified quality and description of goods to be made. It is common enough for buyers to have little magnifying glasses, with the aid of which they can count the number of threads to the inch, but it is not so easy for them, after the goods are made, to of excellent emery. Another matter of local interest has determine the strength of the thread to a nicety, or tell how much of the weight has been added in sizing-at least, these knowledge of the geography and topography of the central are points about which very few of them trouble themselves parts of New York. The work of geological and geographi | much. The very low figures at which all kinds of cotton goods have sold for the past three or four years have caused little during the past season; and the Canadian geological the production of a much larger proportion of cheap goods survey has done much good work. Further north the expe-than usual. Manufacturers have sought in every way to dition in search of the remains of Sir John Franklin have make something which would sell for a small price. Their made valuable corrections in the map of the region north of efforts in this direction have given them a better gauge of Hudson's Bay. On the opposite side of the continent the the different points of superior or inferior goods than most Jeannette has made a bold and promising push into the unex- of those who handle their products have yet attained. It is plored regions within the Arctic circle north of Behring's true, we have heard frequently how much better our goods Strait. The safe passage of Nordenskjöld through the are than some of those made in England, and how much Siberian seas is the most notable event in northern explora more starch and sizing English manufacturers put in the tion. Prejvalski and other Russian explorers have been finished cottons they export, and, as to a considerable prodoing good work in high Asia. Major Pinto has crossed portion of the goods we make, we have no reason to doubt the African continent; and a large number of exploring their superiority. It is equally true, however, that our parties have pushed in various directions into the little manufacturers have nothing to learn from those in England known interior. The last report of importance mentions in the way of cheapening their goods, and in making a poor the discovery of the head springs of the Niger by a couple article look like something a good deal better than it is. While we keep from sending such goods abroad we shall In Australia, Forrest has made a bold and successful probably retain, and may even improve upon, the reputapassage across regions hitherto unexplored, discovering vast tion we have already obtained, but our foreign competitors tracts of farming and grazing lands where all was supposed will be so exceedingly watchful that any progress we make will only be a success well earned. In the goods made for In the field of engineering, a large number of important | home consumption, however, it will be well for buyers not undertakings have been brought to successful issue, particu- to take too trustingly anything offered them, on the broad ground that American cotton goods, because they are made and great tunnels. Among the latter is the famous Sutro here, are necessarily honest and well made. This used to tunnel, and we are almost able to add the St. Gothard, be the rule a few years ago, but our manufacturers have now learned so well how to cheapen their goods that all of improvement in the harbor of Genoa has been largely those wishing to place low priced fabrics on the market, advanced; considerable good work has been done in the and such too as will look as well as those of higher cost-Hell Gate channel of New York harbor, and on the pro-tare thoroughly informed as to the manner of doing it.

#### ERASTUS BRIGHAM BIGELOW.

of the great inventors whose genius has so largely helped to raise her industrial prosperity to its present high position. Thirty-five years ago all carpets were woven on hand looms. The cost of labor in this country made it impossible for American carpet makers to compete in cheapness with the work turned out by the ill-paid hands of England and France; and even then, the high price of carpets made them rather an article of luxury than one of everyday use and convenience. In 1842 Mr. Bigelow, after making several useful though less important inventions, perfected a series of devices for making the carpet loom automatic, so that the costly labor of man might be displaced by the cheaper labor of women or boys.

After many unavailing efforts to induce carpet makers to undertake the manufacture by the new method, Mr. Bigelow succeeded in persuading the Lowell Manufacturing Company to make the experiment, and in 1845 the successful weaving of ingrain carpets by power was demonstrated. Subsequently Mr. Bigelow achieved the invention of power looms for the weaving of Jacquard Brussels, and Wilton carpets. To apply these inventions the inventor was compelled, in 1848, to set up a factory of his own. This establishment, at Clinton, Massachusetts, has grown to be the largest in the world for the manufacture of Brussels and Wilton carpeting, in which the several processes of worsted spinning, dyeing, and weaving are united in one concern. We may also set it down to the credit of Mr. Bigelow's inventions largely that the United States now leads the world in carpet production.

Mr. Bigelow was born in West Boylston, Mass., April, 1814, and died at his home in Boston, Saturday, Dec. 6.

#### REMARKABLE FLY WHEEL EXPLOSION.

On the night of December 5, 1879, the Rensselaer Iron Mill, at Troy, N. Y., was the scene of a most remarkable accident. The newspaper report says:

"It was about 10 o'clock, and the 200 workmen were busily engaged at their various tasks. Suddenly the large fly wheel, 35 feet in diameter, and weighing 60 tons, exploded, it being separated into 10 pieces of about 6 tons each. Each of these pieces was hurled for some distance, several of them being forced through the roof. One passed through the air about 200 feet, and descended through the roof of a neighboring mill. Striking upon the iron floor, it bounded for a distance of 30 feet, settling within three feet of a nest of two boilers. Several workmen were about passing when the ponderous fragment entered, and their escape from death was narrow. James Wallace, a heater, was buried beneath a five ton piece of the wheel, and when extricated was still alive. He cannot recover, however, his skull being fractured, and he having been injured internally. In places the roof was completely destroyed. The damage will not fall short of \$10,000. Work will be necessarily suspended for two weeks or more. The escape from a boiler explosion was exceedingly narrow, a piece of the bursted wheel, weighing six tons, falling between two of another nest of boilers, and destroying a portion of the brick work. Had the mass crashed through the boilers, the loss of life would have been large. Another fragment descended through the roof, breaking a steam pipe and burying itself through the floor at a spot where a workman had been standing not five seconds before. The wheel had been in use 11 years, often subjected to inspection, and the cause of its explosion is a

We trust that the causes of this extraordinary accident will be investigated by competent mechanical engineers, and the whole matter explained for the public benefit. We should be glad to receive full particulars with drawings for publication, if any of our friends can supply them.

A somewhat similar occurrence took place in this city in June, 1876, at the Kuntz Brewery, Third Avenue. In this lb. We gave at that time an extended report of the affair, with drawings, which showed beyond all question that the accident was due to carelessness and botching in the original fitting together of the wheel.

If there is any one part of a machine that requires more inuse no other portion of an engine needs more frequent, careful inspection, and tapping, for the detection of flaws or the incipient loosening of parts, than the fly wheel. But we fear that both in the use and in the construction, carelessness is apt to be the rule and carefulness the exception.

# THE SCIENTIFIC AMERICAN FOR 1880.

Like all the rest of American institutions, the Scientific American closes the year with the most assuring prospects of prosperity in the year to come. There never was a time when our patrons in the scientific and industrial world were more numerous or more successful in their undertakings, or is a land of splendid possibilities. had more solid grounds for looking backwith satisfaction, or forward with confident expectation of increasing prosperity. The country has entered upon a period of successful activity which has made the past year profitable beyond precedent; and the coming years bid fair to surpass it in solid gains. Having taken possession of the vast and varied markets of our own land, our farmers, manufacturers, and merchants are reaching out to the earth's remotest ends, with every prospect of retaining and increasing their hold upon the world's most profitable trade.

From its intimate connection with all the great and grow-In the death of Erastus B. Bigelow, America loses another ing material interests of the country the Scientific America CAN cannot but share largely in the country's general prosperity; and the publishers are determined to make it more and more worthy of its position as the most popular scientific and industrial paper in the world. With a circulation of 50,000 copies every week, among the most intelligent and active men of the country, the men who are doing the country's best work and contributing most to its industrial and commercial activity, the Scientific American has a basis of permanent prosperity unrivaled among newspapers, and can offer to advertisers a medium for reaching customers unequaled in scope and directness. In addition, its monthly EXPORT EDITION, with a guaranteed circulation in all the principal cities and commercial centers in the world, is probably doing more to spread a knowledge of American pro ductive industry throughout the world than all other periodicals combined. An examination of any issue of our EXPORT Edition will show how widely its advantages as an advertising medium are appreciated by our great manufacturers and merchants engaged in foreign trade.

With reference to matters more strictly personal, it may not be improper to say that the increasing favor with which the Scientific American is received by intelligent readers at home and abroad is the surest guarantee that the work it is doing is approved by its numerous friends.

As its circulation increases the possibility of adding to the scope and value of the matter it offers from week to week increases proportionally; and it is the purpose of its publishers not to slacken their efforts to make the paper increasingly worthy of its name and reputation. One great advantage of its widening circulation is the wider range of information it receives with regard to scientific discoveries, trade prospects, and commercial changes, from its friends in all parts of the world; and just here we may properly express our thanks for such communication from United States consuls, travelers, the heads of foreign business houses, and others, who have thus added materially to the interest and value of our pages. It is enough, in the way of promise for the future, to say that the coming volume of the Scien-TIFIC AMERICAN will not be inferior to those of the past, and will be as much better as experience, increasing facilities, and strenuous effort can make it.

Among a number of valuable and interesting subjects in hand for early issues, we may mention an article fully illustrating the central office system of telephonic communication, which is becoming so important a factor in modern social and business life. The illustrated articles on amateur mechanics, which have been so favorably received during the past year, will be continued; so, also, will the valuable series describing and illustrating our great manufacturing industries, and a larger share of attention will be given to practical mechanics and improvements in the various arts and other productive industries.

The Scientific Supplement will, as heretofore, give, in addition to many valuable original papers on scientific and mechanical subjects, a careful selection of all the more important discussions in the various departments of science and art made in all parts of the world. As hitherto the Scientific American will publish every week a full table of the contents of the Supplement, so that those who are not subscribers to both papers may learn whether the Sup-PLEMENT contains matter which is of especial interest and value to them.

# THE FUTURE OF AFRICA.

What the eighteenth and nineteenth centuries have done for America the twentieth is likely to do for Africa. Civilization is attacking her ancient fastnesses from all sides. Europe is especially alive to the enormous capacities of the continent for trade. A score of more or less powerful missionary societies are bent upon the evangelization of its not so sent by Mr. Packer. The message was sent from swarming millions; and with the facilities for rapid progress case the fly wheel was only 9 feet in diameter, weight 3,600 furnished by steam and electricity the speedy conquest of the interior by Christianity and the arts of peace is all but and Railroad Company (of which Mr. Packer is superintenassured. Unlike the Americas, when first discovered, Africa dent), and from there it was transmitted to Mr. Packer's is well peopled by nations for the most part well advanced house by telephone-falling short of the newspaper report of industrial and commercial world. They are far enough adtelligence, skill, and minute care in its construction than an- vanced to be large producers of many things that the indusother, it is the fly wheel. And after the wheel is put into trial world has need of, and are equally well calculated to become large consumers of industrial products.

ways pushing inward along its ancient lines of traffic, the anxious fathers. To interest their children in things that suppression of its external slave trade, the pluck and energy are beneficial, thus to save them from bad company and of scientific, missionary, and commercial explorers, and the pernicious habits, is the constant aim of every faithful pagreat wealth of the national and international societies bent rent. One excellent means to this end consists in making upon the early evangelizing of the African peoples and the the SCIENTIFIC AMERICAN a regular visitor at your dwellcommercial development of the enormous natural capacity ing. Let it be in sight on your bookcase or table, and notice of the country, we may reasonably expect in the near future how quickly it attracts the young. Its pages are full of the an awakening in Africa as marvelous as anything the world most interesting, varied, and useful information, the study has yet witnessed. Dark as its present condition is, Africa of which insensibly excites the mind with a desire for more;

its newly opened regions with keen interest; or that the the SCIENTIFIC AMERICAN commences next week. Fathers, ecclesiastical world is showing the liveliest concern for the subscribe for your sons if not for yourselves. future of regions which promise to be the seats of great Christian nations,

For a comprehensive, exact, and trustworthy survey of the real condition of this vast continent, its physical and London, England, 1879, are the names of John A. Tobin, ethnological characteristics, the recent work of its numerous Engineer Corps, U. S. Navy, J. B. and N. G. Herreshoft, explorers, the prospects of the various missionary enter- United States America, all of whom were elected members prises on foot there, and the most suitable places for new at the last meeting.

undertakings, nothing could be more satisfactory than the paper read by the careful and learned recording secretary of the American Board of Christian Foreign Missions at the late meeting of the board of commissioners of the society at Syracuse. The paper is published in full in the current number of the Supplement, in connection with an excellent map of Africa, embodying the results of all recent explora-

### STAMPS FOR TRADE MARKS.

In another column a correspondent proposes a method by which Congress might give protection to trade marks incidentally, under its power to levy and collect taxes,

Briefly stated, the plan is for the Bureau of Internal Revenue to make and issue to each manufacturer, who should want protection, a special stamp bearing his trade mark, as is now done in the case of patent medicines; these stamps to be sold nominally for revenue, but really for that protection to the manufacturer which might be provided under existing laws against the counterfeiting of revenue stamps. The tax thus levied would be uniform throughout the United States, thereby conforming to the requirements of the constitution; but the payment would be optional with those who desired its indirect protection.

The suggestion is a clever one, but open, we think, to several serious objections. The stamps would be expensive, even were the government to furnish them at cost. The labor of attaching them to each article to be protected would add another large item to the expensiveness of the proposed method. And still worse, it would be quite impossible to make the stamp permanent. The trade mark on a piece of chinaware, for example, would lose half its value if it could not be wrought into the material or imprinted upon its surface so as to stay. The same may be said of most lines of metal manufactures, woodenware, and so on. A stamp for revenue purposes, on the contrary, is intended to be quickly, surely, and easily destroyed. The existing system of State registration, imperfect as it is, would seem to be less troublesome, cheaper, and more efficient.

#### Henry Crawshay.

Not six months ago we had occasion to notice the death of Robert Crawshay, the great iron master of Merthyr Tydvil, Wales. About a year before, his brother, Francis Crawshay, died; and now we have to note the death of Henry, the last remaining son of William Crawshay, the great iron king of Cyfarthfa. A full account of the yast establishments built up by the elder Crawshay and his sons was given in this paper last June. When he died he left the whole of his valuable property in the Forest of Dean to Henry Crawshay, Cyfarthfa to Robert Crawshay, and Treforest and Hirwain to Francis Crawshay. From the time he came into possession of this property until the depression in the iron trade Henry Crawshay continued to increase and improve his inheritance, the total amount of ore worked between 1860 and 1870 reaching nearly 400,000 tons. At the time of his death he was preparing to enter extensively into the tin plate trade. He was the nearest likeness to his father among the three sons, and had all his father's perseverance and intuitive power. He was rugged in manner, but generous hearted, and won the hearty reliance of all by his unswerving probity. He died November 24, aged seventy-six.

# Long Range Telephoning.

In a recent issue of this paper an exchange was credited with the statement that Mr. Robert Packer, "superintendent of the Pennsylvania Railroad," while traveling in Nebraska had conversed with his wife and friends at his home in Sayre, Pa., two thousand miles distant, by means of a telephone

We now learn on good authority that, though Mr. Packer's friends received his communication by telephone, it was Nebraska to Mauch Chunk, Pa., by telegraph; thence it was telegraphed to the Sayre office of the Pennsylvania Canal in civilization, and ready to become important factors in the the telephone's performance by some nineteen hundred and ninety-nine miles and a fraction.

# Our Sons Need Good Reading.

"I wish that my son had more of a taste for useful read-What with telegraphs along the coast, steamers and rail- ing and study." Such is the lament one often hears from and this desire, once fairly kindled, endures through life. It is not surprising, therefore, that commerce is studying expanding and ennobling the intellect. A new volume of

# Recognition of American Merit.

In the Transactions of the Institute of Naval Architects,

#### Mineral Oil and Electricity for Lighthouses.

The annual report of the Lighthouse Board says that the substitution of mineral oil as an illuminant has been made in many of the fourth, fifth, and sixth order lights. All of have had to be made, into which the supply of each station to an elliptical hoop, which surrounds the head and supports is placed. The great superiority of mineral oil as an illuminant over all other oils has induced the board to try the experiment of using it in the lightships. The oil used for this purpose is 300° of the flash test. It is thought that such oil, used in the Funck lamp, will much increase the usefulness of the lightships, and a great saving in the cost of oil will be made.

The board is desirous of making experiments to test the relative merits of the electric light and other illuminants. These experiments must be made in some lighthouse and on a sufficient scale to exhaust the subject. There are many machines for generating electricity, several of them of American invention, and the board wishes to test the principal ones. An appropriation of \$50,000 is asked for the purpose of making these experiments.

An appropriation of \$50,000 is asked for the construction of a first-class lightship, fitted with a powerful steam fog signal, to take the place of the lightship now off Sandy Hook, entrance to New York harbor. This is regarded as one of the most important light stations on our coast; and as an immense commerce flows past it, it should be marked by a vessel having all the modern improvements, to make it a more certain guide to the mariner. Should an appropriation be granted, the present lightship could be moved to a less important station.

### The Earth's Day Increasing.

In a recent lecture on "Eclipse Problems," Professor Charles A. Young, of Princeton, said, with reference to the observed increase in the rapidity of the moon's motion, that the discovery led at first to the opinion that the moon's orbit was growing shorter, and that ultimately the moon would come down upon us. More accurate calculation, however, shows that there is no danger of so disastrous a result. The moon is not coming nearer, but our day is growing longer, owing to the friction of the tides upon the earth's surface. The tides act like a brake, and slowly diminish the speed of the earth's rotation.

### THE DUPLEX AIR COMPRESSOR.

Although compressed air cannot, under ordinary circumstances, compete with steam as a motive power, the machinery necessary to its use has been perfected to such a degree that it has been extensively applied to mining, quarrying, and engineering purposes, and it seems to be the only available motive agent for such uses. Compressed air as a motive power has been the subject of a great deal of practical investigation and experiment, and the losses arising from increase of temperature by the compression of the air and the cooling by expansion, also losses due to the resistance of the valves, and dead spaces at the ends of the compression cylinders, have all been reduced, if not avoided

The annexed engraving represents the duplex air com-

Company, of 76 and 78 Center street, New York city. This machine, though quite plain in appearance, is of unusual strength and efficiency. We are informed that the performance of this engine is fully equal to that of the best engines in market. The dimensions of the compressor are as follows: Length of bed, 12 feet 6 inches; height of center of cylinders from floor, 18 inches: diameter of steam and air cylinders, 10 inches; stroke of pistons, 18 inches; length of connecting rod, 52 inches; diameter of wheel, 5 feet 6 inches; number of revolutions per minute, 133; cubic feet of free air compressed per minute, 436; weight of machine, 11,400 lb.

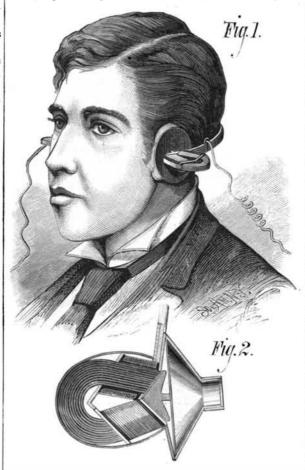
Steam is admitted to the steam cylinders by a slide valve having an automatic cut-off. The air cylinders are lined with composition, and kept cool by water which passes spirally around the cylinder from the center toward the ends. By this arrangement the air cylinder is

and eduction valves are made so that they can be removed the right to entail the home both lapse. without disturbing other parts of the machine.

The National Drill and Compressor Company build single and duplex compressors of different sizes, which may be of persons desirous of keeping up with the times should berun by direct connection with steam engines, as in the come regular subscribers to this paper. They will find it a engraving, and others which may be run by belts or gearing from the shafts of water wheels or other motors; they also contains a record of all the important discoveries and invenmake a variety of rock drills and mining machines which tions of this country, Great Britain, and other English speakare in use and well known in all parts of this country, and are widely and favorably known in foreign countries.

#### A NEW TELEPHONE.

In the telephone shown in the annexed engraving the inventor has made use of Jamin laminated U-magnets to secure great magnetic power with little weight. The ends of the these orders of lights would have been supplied except for magnet are cut off diagonally, and the poles are each surthe fact that it is found that the oil deteriorated when placed  $\mid$  rounded with a helix of fine insulated copper wire connected in the ordinary large oil butts in use, and many small cans as in an electro-magnet. Two of these magnets are attached

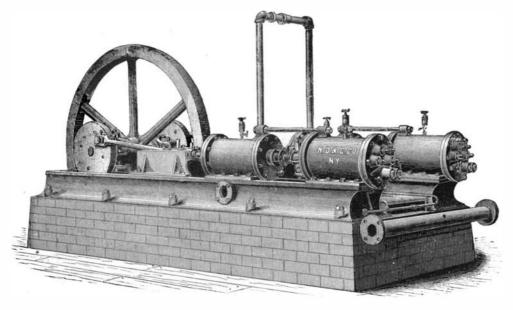


NOVEL TELEPHONE.

the diaphragms and ear pieces. Each diaphragm carries a light triangular armature, which fits the poles of the magnets and nearly touches them. The telephones are connected with each other and with the line. The operation is similar to the Bell telephone. The instrument shown in the engraving is arranged as a receiver to be used with any of the ordinary transmitters, but it may be arranged as a transmitter.

Mr. Andrew C. Hubbard, of Danbury, Conn., is the inventor of this telephone.

A NOVEL system of insurance for girls has existed for several generations among the Danish nobility of Copenhagen. A nobleman, upon the birth of a daughter, enrolls her name with the insurance society, paying at the time a fee, hames, with its outer end extending over the horse's head, and subsequently an annual sum, until she reaches twentyone. She then becomes entitled to a fixed income from the pressor manufactured by the National Drill and Compressor society, and to apartments in the large building of the asso- improved fire escape for attachment to buildings, which is



DUPLEX AIR COMPRESSOR.

kept cool without having water in the cylinder. The ciation, which is surrounded by gardens and a park. Should in such a way that they can be easily attached and detached. air piston is adjustable, and travels to within one thirty- her father die in her childhood, she may immediately occupy second of an inch of the cylinder heads. The induction the apartments. Should she die or marry, the income and

> MEN of science, students, inventors, and every other class paying investment, for the SCIENTIFIC AMERICAN not only ing countries, but translations from the French, German, and other foreign scientific and industrial publications.

#### MISCELLANEOUS INVENTIONS.

Mr. Judson S. Corbin, of Clinton, Iowa, has patented an improved gate, which is so constructed that it may be opened and closed by the wheels of passing carriages. It is simple, convenient, reliable, and not liable to be obstructed or get out of order.

An improved water closet cistern has been patented by Mr. Hugh Houston, of Pittsburg, Pa. The object of this invention is to provide an improvement in that class of automatic overflow cisterns for water closets, whose discharge is so regulated, by means of an overflow compartment or chamber and float and valve connected therewith, that the discharge occurs at regular intervals, and each time gives the water closet bowla sudden flush and thoroughly washes

An improvement in letter boxes has been patented by Messrs. Wauhope Lynn, of New York, and Gottfried Clasen. of Brooklyn, N. Y. It consists in providing the box with a tube extending from the slit at the top inward and downward, and closing the lower end with spring doors having arms in position to be operated upon by a plunger connected with the hinged door covering the slit at the top on the outside, whereby, when the outer door is opened to put a letter in the box, the doors at the end of the tube are closed, thus cutting off communication through the tube with the interior of the box; but when the letter is slipped through the slit and the outer door allowed to close, the inner doors open and permit the letter to fall within the box.

Mr. Theodore L. Wiswell, of Olathe, Kan., has patented a combined buckle and trace carrier, consisting of a metal skeleton buckle frame baving hooks located opposite each other, and having their ends bent inward, then forward and downward, to adapt them for holding the cockeyes of the traces securely when the latter are not in use, and yet permitting convenient detachment of the cockeyes when requiral.

An improvement in grooving irons has been patented by Mr. John W. Ammons, of Columbia, Mo. The object of this invention is to provide a plane iron which will chamfer off the outer corners of the groove simultaneously with the planing of the groove. It consists in a plate with beveled cutting edges combined with a grooving iron.

An improved swinging gate that is to be placed across a railroad track to keep cattle and other animals off, has been patented by Messrs. David A. Walker and John R. Smith, of Fort Benton, Montana Ter. It is to be opened by the contact of the pilot or cow catcher of the locomotive, and will close automatically immediately after the passage of the tram.

An improved combination tool, patented by Mr. Morgan H. Sly, of Shepardsville, Mich., combines several tools in one for the convenience of the mechanic, farmer, housekeeper, and others. It consists of a screwdriver, nail puller, wrench, nail hammer, wire cutter, riveting hammer, and pinchers combined in one tool.

An improved feed bag for horses, patented by Mr. Edwin Forbes, of Brooklyn, N. Y., has means for supporting feed bags in a convenient position for horses to eat from with out interfering with the natural movements of the head. It consists in a spring arm adapted for connection upon the and from which outer end the feed bag is suspended.

Mr. Patrick Gallagher, of Eureka, Nev., has patented an

so constructed that people can readily escape from the upper stories of burning buildings when the stairways may be rendered impassable by the fire.

Mr. Samuel H. Gregg, of Crawfordsville, Ind., has patented a fence panel formed of a long and short post, twisted wires, and hook headed bolts, arranged and applied in a novel way to form an inexpensive yet substantial fence.

An improvement in vises has been patented by Mr. Fortonato C. Zanetti, of Bryan, Texas. It consists in providing the clamping-jaws, which are secured to the lower end of the fixed jaws of the vise, with a spherical socket and adjusting-screw, to adapt the said jaws to embrace a ball on a standard attached to the bench, to form a ball-and-socket connection between the vise and bench.

Mr. Joseph Seiler, of Norwalk, Conn., has patented an improved device for connecting the mirror standards or supports with a bureau,

Mr. Charles F. Harvey, of Van Buren, Ark., has invented an improved attachment for the dashboard of wagons, and other vehicles drawn by horses, for holding the reins. It consists of an adjustable frame attached to the dashboard, supporting a horizontal bar, composed of two parts, the upper part being divided so that the reins can be slipped down between the two parts.

Mr. Samuel V. Kennedy, of New Haven, Conn., has patented a device for removing the metallic primer from an exploded cartridge shell, for applying a new primer, and for closing the shell tightly about the ball after it has been re-

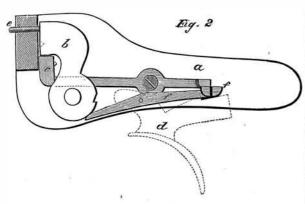
An improved implement for browning coffee, popping corn, and roasting peanuts has been patented by Mr. Stephen M. Poff, of Omaha, Neb. It consists in a pan made with a close top, having a hole in its top closed with a close cover having a perforated slide, three ribs or flanges upon the bottom, and a handle attached to the rear end.

An improvement in gates has been patented by Mr. Alonzo iron socket sunk into the ground and braced by extending arms; the gate is hung on rollers pivoted in a frame attached to the post, and provided with a ratchet bar which engages a toothed wheel connected with a helical spring. When the gate is opened the spring is wound up, and retracts when it

Mr. Philip W. Cassil, of New Athens, O., has patented an improved weather strip for doors. The invention consists in the combination with a main strip and the cap strip of bent straps engaging with hooks or staples, and serving to hinge the strip eccentrically to the door.

#### THE CLIMAX SAFETY HAMMERLESS GUN.

There can be very, little doubt now that it is only a matter of time when the hammerless gun, or gun with internal



hammers, will entirely, or almost entirely, supersede the ordinary gun with external hammers. The doubt with regard to hammerless guns has been whether they were as safe to use and as free from accidental discharge as the old style; and this doubt has had some foundation, for many of the hammerless guns are made with a locking bar which secures the triggers only, and allows the hammers to be jarred off and charge exploded when the locks have become worn or light in the pull off.

With the Olimax hammerless gun such an accident appears absolutely impossible, for not only are the triggers bolted automatically, but, as may be seen by reference to the engraving, there is a strong block, c, which rises in the front of the hammers, b, as the gun is opened, which block interposes between the hammers and the strikers, e, and thus prevents any chance of the former reaching the striker, and thus exploding the cap. This block, c, is operated upon by the trigger, d, the pulling of which removes the block, and allows the gun to be fired. So that not only is the gun secure when the triggers are bolted, but even when the gun is placed at full cock ready for firing. No jar or fall can explode the gun, for should the locks be jarred is a preliminary notice. If a small piece of brass or a few instead of upon the strikers.

making a gun secure from accidental discharge when placed at full cock. Probably more than half the accidents that occur with guns occur through some blow or fall, causing the hammers to fall and thus fire the car-

The principle of the Climax hammerless is also particularly well adapted for rifles of various kinds, there being no hammer to catch into anything when deer stalking or pushing through thick brushwood.

The breech fastening of this gun has not only the double grip bolt under the barrels, but also a very powerful grip formed by the top lever engaging a projection at the end of the rib. The lock is made upon the principle of an ordinary side lock, and is so arranged that the locks can be taken off like the locks of an ordinary gun. The rods which force the locks to full cock are completely under cover, so that there is no chance of water reaching the lock work. In this gun the jar given when firing heavy charges from one barrel cannot fire off the other barrel. This is an advantage which will be appreciated by sportsmen who have used large rifles with heavy charges. Fig. 1 in the engraving shows the

nal construction of the lock, and Fig. 3 shows the hammer, b, cocked, and the safety block, c, in position.

These superb guns are manufactured by Messrs. Holland & Holland, 98 New Bond street, London, England, a description of whose fine workmanship we gave an account in a recent number of the Scientific American.

# The Life of Railways and Rolling Stock.

The report of the Illinois Railroad Commissioners contains the following data concerning the average life of the rolling stock and superstructures of twenty-six roads: Locomotives,

15¼ years; passenger cars, 15¾ years; stock cars, 10 years; freight cars, 111/2 years; iron rails, 7 years; steel rails, 14 years; oak ties, 7 years; pine ties, 4¾ years; cedar ties, 5½ years; truss bridges, 9½ years; trestle bridges, 8 years; pile bridges, 9 years; joints and fastenings, 7 years; fencing, 81/2 years. One road gives the life of its locomotives as 8 years, and of passenger cars 15; another road reports the former at O. Dean, of Betbel, Vt. It consists in a gate post with an 24 years, and the latter at 20. Only one road puts the life of passenger cars as high as 20 years, and the lowest reported life rate of such cars is 8 years. The shortest life of iron rails is 3 years, and the longest 12; four roads report it as 10 years. Only four roads report the life of steel rails, and they give it as 9, 12, 15, and 20 years respectively. These data monia constitute this class of agents. The two first named the country.

#### Alizarin Blue.

G. Auerbach recently read a paper on this subject before the Chemical Society, London. He states: About eighteen months since a blue coloring matter was brought into the market as a substitute for indigo. It is now disused on account of its high price and its unstable nature when exposed to sunlight. The researches contained in this paper were finished in May, 1878. The author gives a résuné of previous work on the subject, and recommends the following method of preparation: 1 part of dry mono-nitro-alizarin, 5 parts concentrated sulphuric acid, and 11/2 parts of glycerine (sp. gr. 1.262), are mixed and heated gently. Reaction commences at 107° C., becomes violent, the temperature rising to 200°. Much frothing takes place, with evolution of sulphurous acid and acrolein. The whole mass, when frothing has subsided, is poured into water, boiled up and filtered, the residue being boiled out three or four times with dilute sulphuric acid.

The mixed filtrates are allowed to cool, and the blue separates in brown crystals. These are purified by mixing with water and adding borax till the solution becomes brownish violet, the blue with the boric acid forming an insoluble confpound. This residue is washed, decomposed with an acid, and the pure blue obtained as a violet silky paste. If required perfectly pure, it must be crystallized successively from its various solvents, high boiling naphtha, amylic alcohol, and glacial acetic acid. When pure it forms brown shining needles, melting 268-270°. It has the formula C<sub>17</sub>H<sub>11</sub>NO<sub>4</sub>. Salts were prepared and analyzed, but the results were not satisfactory, as it was difficult to obtain them quite pure. Bromine derivatives were also prepared and examined. The action of chlorine, zinc dust, acetic anhydride, etc., have also been studied. The author discusses the constitution of the blue, and thinks it must be closely related to the aldehydines discovered by Ladenburg, which are formed when aromatic orthodiamides act upon aldehyds.

# Ammonia on Brass.

John Y. McLellan, of Glasgow, writes to the Chemical

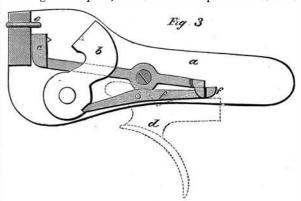
While experimenting on the action of liquor ammonia on various metals and alloys, with a view to determine the most suitable for the contraction of a certain part in an ammonia plant, I have met with a reaction on brass which, so far as I know, has not before been recorded and of which this note down, the hammers would simply fall upon the safety block | brass turnings be covered with liquor ammonia, sp. gr. 0.889, in a closely fitting stoppered bottle, and placed aside for a Too much importance cannot be given to this principle of few days, it will be found that the ammonia has acted on the of the United States began in Cincinnati, Ohio, December

on exposure to the air does not seem to be the result of oxidation, as on opening the bottle in an atmosphere of carbonic acid the same reaction takes place.

I am at present working up this subject in the hope of finding in what state this colorless solution of copper exists.

#### Household Perils.

Under this head the Boston Journal of Chemistry names several dangerous substances which find their way into households. There are two or three volatile liquids used in families which are particularly dangerous, and must be employed, if at all, with special care. Benzine, ether, and strong amdiffer considerably from those of roads in other sections of liquids are employed in cleansing gloves and other wearing apparel, and in removing oil stains from carpets, curtains, etc. The liquids are highly volatile, and flash into vapor so soon as the cork of the vial containing them is removed. Their vapors are very combustible, and will inflame at long distances from ignited candles or gas flames, and consequently they should never be used in the evening when the house is lighted. Explosions of a very dangerous nature will occur if the vapor of these liquids is permitted to escape into room in considerable quantity. In view of the great hazard of handling these liquids, cautious housekeepers will not allow



them to be brought into their dwellings, and this course is commendable.

As regards ammonia, or water of ammonia, it is a very powerful agent, especially the stronger kinds sold by druggists. An accident in its use has recently come under our notice, in which a young lady lost her life from taking a few drops through mistake. Breathing the gas under certain circumstances causes serious harm to the lungs and membranes of the mouth and nose. It is an agent much used at the present time for cleansing purposes, and it is unobjectionable if proper care is used in its employment. The vials holding it should be kept apart from others containing medicines, etc., and rubber stoppers to the vials should be used.

Oxalic acid is considerably employed in families for cleaning brass and copper utensils. This substance is highly poisonous, and must be kept and used with great caution. In crystalline structure it closely resembles sulphate of magnesia or Epsom salts, and therefore frequent mistakes are made and lives lost. Every agent which goes into families among inexperienced persons should be kept in a safe place, and labeled properly and used with care.

# Congress of American Potters.

The sixth annual convention of the Potters' Association

2. About a hundred manufacturers were present, representing all the prominent centers of the industry. The secretary reported that the past year had been an eventful one in the history of the ceramic art in this country. Never before had more rapid advances been made in any department of industry. Additions and improvements have been made to nearly every pottery in the United States. Several new ones have been built, and others are soon to be erected. Each manufacturer has seemed determined to succeed, and, bending all his energies to that end, the result has been a success far surpassing the most sanguine anticipations. With increased knowledge has come increased power, and the result may be seen in the quality and beauty of our productions, which are rapidly taking rank with the best products of other lands, and the old prejudice against American ware is now nearly a thing of the past. Especially in the decorative department has the improvement been marked. The demand for this class of goods has rapidly increased, and American artists have succeeded in producing results never before accomplished in this country. Some of the lady artists of Cincinnati are

We need in this country more art schools. The success of our industrial and commercial interests depends largely upon this. A cultivation of taste and a love of art would create a demand for wares of higher artistic order, and thus build up an industry which might in time rival the most beautiful productions of Europe. This holds good not only in the ceramic, but every department of industrial art.

FIVE SUNDAYS IN FEBRUARY.—It is interesting to note that in February next there will be five Sundays. This



HOLLAND'S CLIMAX SAFETY HAMMERLESS GUN.

exterior of the breech and the locks. Fig. 2 shows the inter- copper of the brass to such an extent as to produce a solution fast gaining a national reputation for their beautiful work. of a more or less characteristic violet color, due to the presence of oxide of copper held in solution by ammonia. If this solution be still allowed to remain undisturbed for a few days longer free from contact with the air, this violet color will gradually disappear, leaving a colorless solution, which, however, is no sooner brought into contact with the air by removing the stopper than the violet color is reproduced, and by again stopping the bottle and leaving it aside the same reaction occurs and may be reproduced over and over

The production of the violet color from a colorless solution occurs but three times in a century.

#### AGRICULTURAL INVENTIONS.

Mr. Reuben Graves, of Hope Town (Lostant P. O.), La Salle County, Ill., has invented an improved jointer for plows, which is so constructed that it may be adjusted to throw its furrow slice forward or sidewise or rearward. It may be leveled however its standard may be attached to the plow beam, and it may be adjusted to cut its furrow slice loose from the ground.

An improvement in grain planters has been patented by Mr. John W. Rykard, of Abbeville, S. C. The object of this invention is to furnish a simple, inexpensive, and effective seed planter or dropper for attachment to a plow, to be operated by the plowman.

Mr. William W. Sauls, of Denison, Texas, has patented an improvement in cotton choppers, which consists in combining a chopper with mechanism for operating it, and a brake and hand lever. In order that this machine may work properly it is necessary that the seed should be planted or drilled in a straight line. To insure this the inventor has constructed a planting attachment for the machine.

#### BOAT-LOWERING AND DETACHING APPARATUS.

The engraving represents an automatic brake for tackle used in lowering ships' boats, and for other purposes requiring a self-acting brake for controlling running ropes. engraving shows the apparatus in perspective in Fig. 1 and in section in Fig. 2. The brake is operated by the strain of the rope to which it is applied.

The curved lever, A, is pivoted on the pin, B, in a frame resembling that of a pulley block. A sheave, having one or more grooves, according to the number of ropes employed, is journaled in the lower part of the frame, and the curved lever carries a there is a sheave of small diameter, over which the rope passes on its way out of the apparatus. The rope passes over the upper and lower sheave upon one side, and over the roller carried by the lever on the opposite side, so that any strain on the rope tends to move the lever so that its lower end acts as a brake on the rope passing over the lower sheave. The device is supported by the external stirrup, and the pressure of the lever upon the rope is lessened by pulling on the rope attached to its outer end.

The apparatus is the invention of Mr. William A. Brice, of Paris, France.

# Steam on Pennsylvania Canals.

For several years efforts have been making to find an acceptable substitute for mules in hauling coal barges on the Pennsylvania canals. A new attempt will be made next spring. A steam canal boat is now in

be entirely of iron, except the cross beams and deck. It engine with a screw wheel. It is said that, by a new invention to be applied to the screw, there will be but little agitation to the waters, and the washing out of the banks will consequently be avoided. The boat will have a carrying capacity of 105 tons of coal when drawing five feet of water. If it works satisfactorily a number of them will be constructed.

# Tobacco.

# BY T. B. SPALDING, M.D., OF TROY, ILL.

In a recent essay before this society, I considered the action of alcohol within the human system, and on this occasion I am pleased to respond to your courteous invitation with observations on the action of tobacco. These agents might be profitably presented as almost identical in action, and shown to be largely accessory to each other's sins, but the temperance is waived for the physiological phase of the argu

Of tobacco's origin, its introduction, its composition, its cost, the extent of its consumption, and the processes of its human life.

ment of science, concur in classing tobacco among the nar cotic poisons, than which none are more deadly; indeed, like Aaron's rod, it has secure within itself the most magical and worst of all its rivals. Nicotia, sulphureted hydrogen, hydrocyanic acid! What a den of deadliest poisons, all having their habitat in this colossal curse, termed

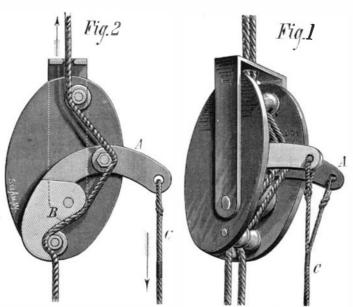
A poison is declared to be "anything whose natural action is capable of producing a morbid, noxious, and dangerous effect upon the organization of anything endowed with life." Thus we perceive the definition is the perfect picture of tobacco's action. Acquainted with this agent for over two hundred years, medical science, speaking with the tongue of every science, declares tobacco wholly innutritious, and further still, declares it nauseous; not only that, but noxious; and further yet, a repository of deadliest poisons. From this dictum there is no appeal; in its truth medical men are forced, by their culture, to concur. But even then they dandle with Delilah till shorn of strength, and science must still be summoned and held aloft for the healing of the

\* An address before the Madison County Medical Society.

nation. If tobacco is a poison, it ought to act as such, and it may be safely affirmed it has no other action!-no other use in medicine, than to depress vitality. Thus it nauseates, it paralyzes the nerve centers, producing relaxation of the muscular system, and produces such dreadful prostration that medical literature is full of warning, and abounds with reported cases of fatal poisoning by this agent. When medical science was in her cradle, and chloroform in the embrace of chaos, ere anæsthetics had come, as the olive leaf dove, to the ark of Æsculapius, surgeons soothed their suffering patients with powerful potations of tobacco, and thus they utterly prostrated the vital powers, relaxed the muscular system, and then proceeded to reduce laxations! How direful must have been a patient's difficulty, if half so dreadful and distressing as the remedy.

It may be affirmed and demonstrated of tobacco, what is strikingly exceptional, namely, that it alone of all the vegetable kingdom possesses two active principles—the one an alkaloid, and the other oil, and both the deadliest of poisons.

It has been urged in support of fashionable poisons, that because multitudes use them, therefore they can't be espe-The length be brought to tolerate it.



BRICE'S BOAT-LOWERING APPARATUS.

One fifth grain of strychnia, or one grain of morphia, will course of construction, to be put on the Lehigh and Delaware destroy life, yet, by constant and long continued use, the canal between Mauch Chunk and this city. The craft is to blunted susceptibilities of the nerve centers may be made so to tolerate these and like poisons that eventually enough will be eighty-eight feet in length, ten feet seven inches in may be taken to destroy fifty men. It is demonstrated in breadth, and will be propelled by a ten-horse power steam the observation of every one that the use of noxious agents, especially tobacco, begets a morbid appetite which demands that continually more of it may and must be employed to produce the same impression.

Such we know are facts respecting what is noxious, but is not the case with what is nutritious. Medical science is not satisfied with statements, but sounds the depths in search of a philosophy for asserted facts, and she declares, in this regard, that nutritious agents create and renew nerve cells and structures, and endow them with the finest physiological sensibilities, while noxious agents disturb the conditions essential to their renewal, and so benumb and paralyze their normal sensibilities, and produce inevitably the pathological and characteristic condition of requiring continually more of the disturbing poison to produce the same impression. With these truths we enter the most fascinating field in nature to consider the conduct of this agent in the laboratory of life. Nowhere has Deity evinced such evidences of an intelligent, divine supernatural as here presented in the adaptation of means to ends-in the perfect play of affinities and forces ever operative in the construction and depreparation, I purposely pass, to deal more directly with it struction, the waste and renewal, of this physical citadel in its physiological relations to the functions and forces of that enshrines an immortal soul. The whole sublime but being destroyed by a flash of lightning, is reported from sensitive train of transition involved in the conversion of Seck, Grand Duchy of Nassau. The Nassauer Bote states Eminent authority in every country and in every depart- solid food, first into fluidity, and under the auspices of vital that during a very heavy thunder and hail storm at night force, transformed upward through intricate gradations till it attains the climax of its course in other solid forms, either with various kinds of fish, the property of the pastor of the of flesh or bone or brain, and then the oxidation of these and the evolution of heat and force, is the perfect process of what we term digestion. The brain is the depot of life's dynamics! It is the sun of the physiological system which, with its accessory centers and nerve cords, receive and transmit to the system a force that propels the mightiest and minutest processes of physical life.

But the ability of these organs—as instruments of the mind—thus to receive and transmit this vital force, depends essentially on their structural health and perfection. Paralyze or impair the perfection or structural integrity of the brain, disturb the subtile harmony of those changes of waste and renewal ever operative and essential to its structural perfection, and at once its power is impaired to forcibly and healthily perform its functions; and this adverse influence is precisely the action of tobacco as a depressing poison. The proposition is plain, the truth is self-evident and irresistible, that, with the nerve centers thus benumbed and blighted, and the vital force impaired, then every digestive than 4,000,000.

process dependent on the harmonious action of vital force is weakened and discordant, and the physical and mental man is deranged to the extent that the physical machinery is injured.

The noxious influence of tobacco is more actively operative upon one class of persons than upon others. I may, therefore, for convenience, divide the victims of tobacco into two classes, assigning to the first class all those who do manual labor. These suffer least from fashionable poisons, because the deadening influence of noxious agents upon the nervous system is largely counteracted by physical toil, which strengthens the entire system and conduces to health; and thus it is that active poisons are thought to "kill slowly," and laboring people live long, apparently uninjured, and practice poisonous indulgences. In all this great and glorious class of humanity, however, may be found the fruits of tobacco's use, in the form of cancer on the lips and tongue, dyspepsia, constipation, and hemorrhoids. But let us consider the other class, wherein are included ladies and gentlemen of wealth, of fashion, and of leisure, those who live idle as well as those devoted to literary pursuits and cially dangerous; but professional science and experience purely sedentary occupations. Physicians, ministers, and teach that there isn't an agent in the entire armory of toxi- lawyers are of this class, and in all these we find paralysis cology, but the human system, by continued use, may at very prevalent, and that diversified and interminable train of nervous derangements whose name is legion. With con-

> stitutions enfeebled by physical inactivity and sensibilities heightened by social and literary culture, consider for a moment the effect upon these highly nervous natures. To all of this priceless portion of humanity the use of tobacco is unmixed evil and rapidly ruinous.

> Again, it is affirmed by eminent authority that tobacco is the most prolific, if not, indeed, the only source of delirium tremens.

> First, the ancients were entirely unacquainted with these terrible terrors of the inebriate, and the records beyond the discovery of tobacco (1560) reveal no case of mania a potu.

> Second, the normal action of tobacco is the pro duction of tremens, and the most frightful forms of delirium tremens are daily produced by the use of tobacco alone.

Third, it is rarely possible to find an inebriate who does not use also tobacco, and careful inquiry will confirm the statement that, with 90 per cent of such cases, the tobacco habit was first formed. Its influence deranged the nerve centers, an initial tremens was entailed upon the nervous system, which suggested to the morbid taste of the sufferer the soothing, sedative action of alcohol, and thus the allied agents forge for each other and fasten more firmly the chains of the servilest slavery.

1 have employed professional science to loosen the pillars of tobacco's position, and with authority and with argument have carefully criticised its action and influence on the functions and forces of organic life. Earnestly in this direction I invoke the sober judgment of scientific medicine, and when you shall have ordered tobacco to abdicate, then only will it fall from popular use and favor, and with that will end the ruin it has wrought.

In view of these truths, scientific and self-evident, in the name of science that classifies all knowledge, in the name of science that seeks the essential nature of things, in the name of science that truthfully interprets the teachings of nature, issue the edict of your eminent authority and drive from popular use and favor this poisonous plague, and when this is secured a heavenly halo of light, an ineffable effulgence, will open up over the poisonous wastes of the world a broad and bright and beautiful pathway of crimson and of gold, wherein garlanded angels will gladly gather, proclaiming "peace on earth and good will toward men," and from highest heaven all over the earth shall you cause to be heralded God's emancipation proclamation to a world that is wasting its highest and holiest possibilities in the ruinous, depressing practice of popularized poisons.

# Fish Killed by Electricity.

A correspondent of Land and Water says: A curious incident of the whole of the occupants of a small fish pond time, a flash of lightning struck a small pond, well stocked parish. The following morning the whole of the fish were discovered dead upon the surface of the water. They had all the appearance of having been half boiled, and crumbled to pieces at the least touch, just as is the case with fish after being boiled. Neither any external nor internal injury could be observed, the scales being intact and the swimming bladder filled and well preserved. The water in the pond was still muddy and dull the morning after the storm, as if the lightning had only then struck it.

# Our Chief Cities Eighty-five Years Ago.

The South Carolina and Georgia Almanac for 1794, a copy of which has fallen into the hands of the Charleston, (S. C.) News, contains a table in which the populations of the chief cities of the United States are set down as follows: Philadelphia, 42,520; New York, 30,000; Charleston, 20,000; Boston, 18,000; Baltimore, 13,503; Newport, 6,000. At that time the entire population of the country was less

#### AMERICAN INDUSTRIES .- No. 27.

THE MANUFACTURE OF LEATHER.

The industry which forms the subject of this article is of very ancient origin, and it is doubtful if there exists to-day a line of manufacture whose processes have suffered so little change in the course of time as that of leather making. It cannot be said that the leather of to-day is superior to that of a hundred years ago. it is true the processes have been improved, so that less time is required than formerly, but there is no radical change in the materials or methods of leather making. The machinery used in handling hides during the process of tanning, and the methods and ma chinery for treating the hides after they become leather, have been greatly improved, so that the manufacture of leather is now conducted in accordance with the spirit of the times.

The leather interest is one of the most important of our day, employing a greater number of hands than any other mechanical industry excepting carpentry and other wood working. The yearly product of the combined leather interest exceeds three hundred millions of dollars (\$300,000,000). Agriculture and the railroad interests alone surpass the leather interest in values created and involved.

It is not the purpose of this article to trace the history of leather making, nor to give all of the details of its manufacture, but to briefly describe one of the oldest, largest, and most successful leather manufactories in the country. We refer to the establishment of Messrs. T. P. Howell & Co., of Newark, N. J., whose works we illustrate on our title

This house dates its existence from the time when Newark, now a city of 130,000 inhabitants, was but a village of 8,000 inhabitants, and New York city was no larger than Newark is at present. The establishment was then small, and engaged principally in the manufacture of patent leather, then a comparatively new article in this country In 1848 the buildings of S. M. & T. P. Howell having been destroyed by fire, new ones were built on the site of the present works, and in 1855 the style of the firm was changed to T. P. Howell & Co. Since that date new buildings and improved machinery have been added as required, until the establishment ranks as one of the largest and best appointed in this country, and in the production of patent and enameled leather it is the largest in the world.

The buildings of the Newark tannery cover about four acres, and there is a tannery in Middletown, N. Y., owned by the same firm and doing the same kind of business.

In this establishment none but the choicest hides are used of which they have a regular daily supply, received by special train, and transferred to the hide house shown in one of the upper views in the engraving, where the horns and tails are removed, and they are trimmed and otherwise prepared for future operations. In preparing a hide for tanning, the first operation is that of soaking in water. For this purpose they are placed in large numbers in pools; from the pools they are taken to the beams, where fatty substances are removed; they are then placed in vats containing a lime solution and allowed to remain for a week. The lime dissolves the hair sheath and combines with the fat of the hide to form an insoluble soap. When the hair and the epidermis yields to the touch the skins are taken out and scraped on the beams, with a curved two-handled scraper called the unhairing knife. After the removal of the hair the flesh is removed by means of a knife similar to the unhairing knife.

After these operations, and before subjecting the hide to the tanning process, the lime as well as dirt and animal impurities must be removed. This is accomplished by first submitting the hide to a process called bating, and then working out the bate by means of washing and by the use of a sort of burnishing tool or rubber that is brought to bear upon the bide as it is laid over a beam. The washing is accomplished by beating the hides in a machine resembling a fulling mill, and tumbling them in huge wooden cylinders supplied with a stream of water. When the hides are removed from these cylinders they appear very clean and white; they are now ready for the process of tanning, and are conveyed to the tan vats, where they are immersed in a strong liquor prepared from the bark of oak and hemlock. Here the hides remain, with the exception of of San Francisco show that the arrivals of Chinese during short intervals of handling, for a period varying with the the year ending November 1, were 6,128, and departures purpose for which the leather is intended—from two weeks 8,746—of whom 6,229 went to China, and 2,517 to Honolulu to two months.

hides also. After the tanning is completed the hide is a few years ago, the estimate was 100,000. The total num- pentanitrodimethylanilin and nitronaphthalinsulphite are transferred to the curriers, who shave it on the rough ber of Chinese arrivals for the twenty years ending Decemflesh side, reducing it in thickness, removing irregularities, and making the rough side smooth and even. The skin 133,491. At this rate the Chinese cheap labor will soon be during this process is supported on a beam, the workman unknown in California. preventing the skin from slipping by pressing his body against the portion hanging over the end of the beam. The knife used for this purpose is wide and straight, having at one end a T-shaped handle, and at the other a straight one. It has a peculiar wire edge, kept in order by a burnisher. After shaving, the skins are thrown into fresh liquor, retanned, and then scoured. For this purpose they are placed upon large tables and worked with a tool called a slicker. one of the middle views, and the "slicker" is represented in detail in the upper portion of the view.

parts. The grain side is enameled in various colors, and is the registration of trade marks.

used for carriage tops and upholstering. The middle is japanned for carriage and harness use, and the flesh side is To the Editor of the Scientific American: used in shoe manufacture and for other purposes

The portion of the skin which is japanned is stretched on a wooden frame, and after receiving a black groundworkwhich is allowed to dry-a coating of japan varnish is applied and baked on. Patent leather is made in different colors for different purposes, and although this particular article is a specialty with this house, we are informed that with the exception of sole leather, there is nothing in the line of leather that is not made here.

It is gratifying to add that the vast product of this immense concern is not only used in the Uuited States and Canada, but is also shipped to all parts of the world. The firm commands a very large trade in England and her Colonies, South America, and all the principal foreign countries. They are as well acquainted with the demands of the foreign markets as with the requirements of their home trade.

Messrs. T. P. Howell & Co.'s New York house is located at 77 Beekman street.

#### MECHANICAL INVENTIONS.

A machine for hot-pressing cloth, in which the cloth is made to pass between a hollow press box heated by steam and an adjacent pressing cylinder, has been patented by Mr. Ernst Gessner, of Aue, Saxony, Germany. The improvement consists in the combination, with two or more cylinders and corresponding press boxes arranged to give a repeated pressure upon one side, or successive pressures upon opposite sides of the cloth, of a carrier belt, roller, or equivalent device, adapted to receive the cloth from one press box and prolong its travel in its passage to the next press box, whereby a sufficient time is allowed for the goods to become cooled before receiving the second hot-pressing.

An improved steam generator, patented by Mr. Dan Abell, of Carson City, Nev., consists in combining with a steam generator feed water pipes extending through the flues and projecting through an opening at the front and a cap for covering the ends.

Mr. Rosseel Payne, of Ox Bow, N. Y., has patented a plow that will remove the snow from a railroad track and deposit it either to the right or left of the track, as may be desired, by means of a wheel with cutters revolving in the vertical plane and attached to the forward end of a platform car.

#### Our Increasing Export Trade.

The following table from the annual report of the Chief of the Bureau of Statistics shows the greatly increased values of the exports of our principal domestic productions during the fiscal year 1879, as compared with the exports of the same articles during 1868 and 1878. It should be remembered that the increase in the value of the exports has been attended by a considerable fall in the market price of certain of the articles named in the table:

Commodities.	Value exported, 1868.	Value exported, 1878.	Value exported, 1879.
Agricultural impl'mnts Animals, living Bread and breadstuffs Coal Copper and brass, and m'n'f's of, not includ-	\$673,381 733,395 69,024,059 1,516,220	\$2,575,198 5.844,653 181,777,841 2,359,467	\$2,933,388 11,487,754 210,355,528 2,319,398
ing copper ore Cotton, m'n'f's of Fruits of all kinds Iron and steel and m'n'f's of, exclusive of firearms, but includ-	496,329 4,871,054 406,512	2,909,357 11,438,660 1,378,106	3,031,924 10,853,950 1,916,382
ing scales and bal- ances, sewing ma- chines, and fire engin's Leather of all kinds Mineral oil (illuminat'g) Provisions Sugar, refined	5,491,306 607,105 19,752,143 30,436,642 313,378 2,540,227	13,784,007 7,093,020 41,513,676 123,556,323 4,508,148 6,695,377	12,766,294 6,800,070 35,999,862 116,858,650 6,164,924 6,934,940
Total	\$136.861.751	\$405,433,828	\$428,422,164

The total value of domestic exports during 1879 was \$698,340,790, making a balance of trade in our favor of over \$269,000,000.

# The Ebb of the Chinese.

The Chinese in California have begun to go. The steamer that sailed from San Francisco for Hong Kong on the 15th, took 901 of them to their native land. The port statistics -the excess of departures over arrivals being 2,618. It is To hasten the process the liquor in some of the vats is estimated that there are 62,000 Chinese on the Pacific coast constantly agitated by large paddle wheels, seen in one of which shows that this population is decreasing instead of tetramethyldiamidodiphenylmethan and naphthyldimethylthe middle views, which not only revolve the liquor but the increasing, for when the anti-Chinese agitation was begun, amidophenylsulphon. If the latter is heated with nitric acid ber, 1878, was 230,430, and the departures and deaths

# Trade Marks.

The Committees of Congress have lately reported in favor

#### A Proposed New Trade Mark Law.

I believe it is admitted that the failure of the trade mark law to give protection is a misfortune to the manufacturing interests of the country.

I suggest that Congress has a right to give incidental protection to trade marks under the power to levy and collect

Let the Bureau of Internal Revenue print and sell, to every manufacturer who desires it, an internal revenue stamp, bearing the trade mark of that manufacturer, the same as is now done to proprietors of patent medicines. The cost of these stamps should be merely nominal, but their forgery should be visited with all the penalties now inflicted for counterfeiting revenue stamps. Fines could be divided between the owner of the trade mark and the United States, or otherwise, as found best.

This imposition of a tax would be uniform throughout the United States, and therefore conforming to the requirements of the Constitution, but the payment would be optional with those who desired its protection. Such protection could be made almost absolute under the revenue laws.

I would like this idea, which I have here crudely outlined, to be criticised by your readers.

W. A. BARTLETT.

Washington, December, 1879.

#### The Inspection of Steam Vessels.

In his annual report the Supervising Inspector-General of steam vessels makes the encouraging statement that notwithstanding an increase of 400 vessels to the steam merchant marine of the United States since 1875, and notwithstanding the largely increased passenger capacity of the steamers built since then, there has been a steady falling off in the number of fatal casualties. These were, during the past five years, as follows; 607 in 1875, 398 in 1876, 224 in 1877, 212 in 1878, and 177 in 1879.

Attention is called to the necessity of legislation in the matter of taxation for license fees for small steam pleasure vessels or vachts, which, even though they may be no larger than a common sloop's yawlboat, are compelled to pay the same fees for license as commercial vessels of 100 tons burden, which excessive tax has in many cases actually prohibited their use, as many persons desirous of owning such vessels for their own pleasure feel unwilling to pay a fee of \$25 yearly for inspection. In this connection Mr. Dumont

While I think it would be improper to exempt such vessels from the general requirements of the steamboat laws, however small they may be or however employed on waters open to competitive navigation, both for their own safety and for other vessels governed by said laws, I think that a fee of \$5 for the inspection of such vessels, say of twenty tons burden or under, would be ample, and would encourage the building of many more than are now used, thereby benefiting one of the great industrial interests of the country.

# Osage Orange Timber for Railroad Ties.

A correspondent sends a transverse section of Osage orange wood cut from a stick which, to his certain knowledge, had been lying for twelve years partly covered with earth in an old meadow. The heart wood is in perfect preservation. This timber, he says, is a rapid grower, and seems to be nearly imperishable in the ground; and he suggests that it would pay railroad companies to cultivate it for ties. Osage timber large enough for narrow gauge roads would grow, he thinks, in from twelve to fifteen years from Whether it would hold spikes well does not applanting.

# Uranium in California.

A dispatch from Fairplay reports the discovery of uranium in the Sacramento mining district. This mineral is found in Bohemia, but never before has been discovered in this country as far as known. The present discovery was made by H. L. Rice. The ore runs 60 per cent. Uranium is worth \$1,000 per ton. One of its principal uses is as a coloring sub stance in the manufacture of glass.

# Chemical Nomenclature.

The reports of the Berliner Chemische Gesellschaft of October 13, 1879, contains a note on the production of produced.

Ifthissortofthingiskeptup chemistry willsoonberesolvedintooneword.

# Extending its Use.

The flexible shaft, which so much resembles a snake, and which is used for operating drills and other instruments used of an amendment to the Constitution providing for the in dental offices for operations on the teeth, has proved to legalization of trade mark registrations, and it is expected be capable of doing heavy work, such as the boring of wood that the necessary bill will be promptly passed by the re- and iron. It is used also in the brushing of horses and catquired majority—two-thirds in each branch. The constitu- tle, cleaning and polishing plate glass, finishing morocco tional amendment will then be submitted to the consideral leather, and in boot cleaning. As described by a machinist, The department in which this work is carried on is shown in tion of the legislatures of the thirty-eight States, and when it "leads mechanical power into the more intricate ways adopted by three-fourths of the States, the new provision and remote corners heretofore only approachable by the will form a part of the organic law of the republic. There- human arm, and it is apparent that manifold applications of The leather made in this establishment is split into three after Congress will have power to make a general law for the flexible shaft will be made in the future that are not now thought of."

### The Solano-'The Largest Ferryboat in the World.

The projection of this great ferryboat for the transportation of passengers and freight across the Straits of Carquinez, from Port Costa to Benicia, California, was noticed in this paper some months ago. Now that it is completed and afloat California may boast of the biggest ferryboat in the world. The dimensions of the Solano are:

Length over all, 424 feet; length on bottom-she has no keel-406 feet; height of sides in center, 18 feet 5 inches: height of sides at each end, from bottom of boat, 15 feet 10 inches; moulded beam, 64 feet; extreme width over guards, 116 feet; width of guards at center of boat, 25 feet 6 inches; reverse shear of deck, 2½ feet. She has two vertical beam engines of 60 inch bore and 11 inch stroke, built at Wilmington, Del. The engines have a nominal horse power of 1,500 horses each, but are capable of being worked up to 2,000 horse power each. Upon the deck of the Solano are four tracks extending her entire length, with a capacity for carry ing forty-eight loaded freight cars, or twenty-four passengercoaches of the largest class. The rudders are worked by hydraulic steering gear, operated by an independent steam pump. These rudders are connected with the ordinary steering gear, so that in case of any disarrangement of the hydraulic apparatus the vessel may be guided by it. The advantage of this improvement is that the immense craft can be handled with ease by one man, whereas, if the ordinary wheel and system of steering were used, six men would be required at the wheel.

### Lake Erie Vineyards.

The islands at the western end of Lake Erie and the neighboring shores of Sandusky Bay are largely devoted to the production of grapes and wine. The Sandusky Register's annual report, just published, for 1879, shows that there are in this district 4,000 acres planted with vines, the yield for the year being in round numbers 16,000,000 pounds of grapes. The wine houses report a production of 1,526,400 gallons. Of this by far the greater part is Catawba, which holds its own as the favorite American wine in spite of the efforts to popularize native red wines made from the Concord grape, the Ives seedling, and other varieties.

The Register estimates that not more than one million gallons of pure juice has gone with the million and a half gallons of wine. Some of the dealers, it says, make no secret of the fact that they use spirits, sugar, and water largely, and claim that this doctored stuff is more acceptable to their customers than pure wine.

# NEW CAR STEP.

The annexed engraving shows an improved folding step applied to passenger cars to facilitate the ascent and descent that evidence is rapidly accumulating to enable us to de-

of passengers from the platform, and to avoid climbing and jumping in getting on and off the cars. The folding step is connected with the lower car step, and when in position for use it is supported, when let down, by a yoke that passes under the fixed step.

The folding step comes within a foot of the ground, and permits of making the risers of all of the steps shorter, and the steps are of course much easier than the ordinary ones. When the train is ready to start the steps are turned up out of the way by means of a lever, which also holds them. In this position the steps cannot be injured or broken off by obstructions on the road or by snow or ice in the winter. Another important feature is that the step when folded up forms an effectual barrier against jumping on or off the train while it is in motion, and prevents a class of accidents that have been alarmingly frequent. Another advantage is that the step may be let down at one end of the car only, thus compelling passengers to enter at that end, and admitting of a more thorough scrutiny of the passengers and a complete inspection of the tickets.

This invention has been thoroughly tested, and the steps are now in use by the Delaware and Hudson Canal Com-

Further information may be obtained by addressing M. E. Skerritt, No. 4 High street | termine positively the source of the cold aerial waves which | the American people. Touching the scope for profitably Albany, N. Y.

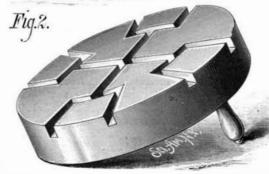
# Ballasting for Railways.

With reference to "Roadmaster's Difficulties," a correspondent writes that there is no material for ballasting so good as the screenings of coal from mines or yards, either alone or mixed with some hard stone.

#### NEW STONE-DRESSING TOOL.

The dressing-tool shown in the accompanying engraving was recently patented by Mr. Louis C. Gilmore, of Shearman, Texas. Fig. 1 represents the upper side, and Fig. 2 the under side of the tool, showing the radial and angled grooves. The tool consists of a circular plate having in its upper surface a cavity or basin communicating with the grooves in its under surface by a central aperture. A handle is fixed to the upper surface of the tool at one side of the center. When the tool is in use the cavity in its upper surface is filled with sand or emery and water, and it is moved





GILMORE'S STONE-DRESSING TOOL.

by the handle in an elliptical path, giving it a gyratory motion. This double motion of the tool greatly facilitates the operations of sand rubbing and polishing, and the grooves are of suitable form to distribute the abrasive material to the best advantage, and to retain it until it is used.

This tool is inexpensive, and may be used for the succes sive operations of sand rubbing, gritting or honing, and pol-

# Where the Cold Waves Come From.

Meteorological observations have now become so extended foreign markets.

the severest cold exceeds by ten degrees that experienced by explorers in high arctic regions. This is also the region of the highest barometric pressure known in winter; and from it, doubtless, proceed the waves of intense cold which play so large a part in our winter experiences.

#### The International Dairy Fair.

The second international dairy fair was opened in the American Institute building, December 8, with a fine display of dairy products, cattle, and machinery. The exhibits included butter, cheese, dairy cattle, implements and machinery for butter and cheese making, and agricultural designs and models for creameries, cheese factories, dairy buildings and farms.

In his opening address Mr. Francis B. Thurber gave the following facts and statistics collected by him during a recent visit to Europe:

The number of milch cows in Germany, as given by the	
latest statistics, is	8.961,221
In France	4,513,765
Great Britain and Ireland	3,708,766
Denmark	800,000
Sweden	1.356.576
Norway	
Switzerland	
While in the United States the latest statistics and esti-	•
mates make the number of milch cows about	13,000,000

The quantity of butter and cheese per cow produced in the different countries varies so largely that no trustworthy average can be made, and the statistics, which embody only the quantities exported and imported, give but little idea of the total production. Some idea of the magnitude of the interest, however, may be formed from the fact that in this country alone, during the year 1878, three hundred and forty million pounds of cheese were produced, and nine hundred and sixty million pounds of butter. Of this but 3.9 per cent of the butter was exported, while of the cheese 41.6 was exported. Denmark, with but sixty million pounds total production of butter, exports thirty millions, or 50 per cent.

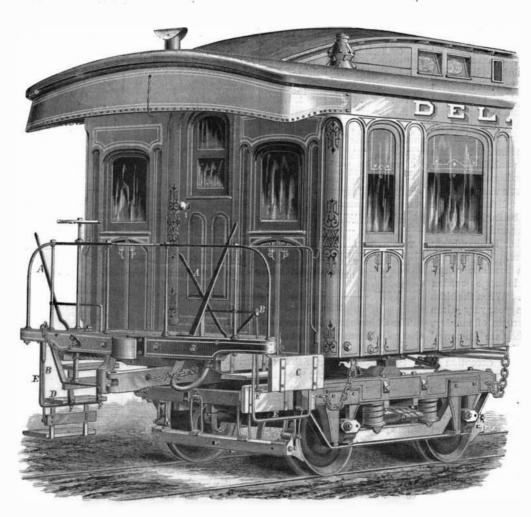
These export figures illustrate an important fact—namely that American dairymen have appreciated and catered to the tastes of cheese consumers in the great market of the world. Great Britain, while they have neglected to study the wants of the same consumers of butter. There is undoubtedly a difficulty in transporting butter long distances and delivering in perfect condition, but this is a difficulty which can be overcome, at least in a great degree. The great difficulty has been that so small a proportion of the immense production of butter in the United States has been of good quality, that really fine butter has commanded higher prices at home than abroad, and there is quite a sufficient quantity of poor butter to be found in most of the

Butter makers in other dairy countries have, however.

made great progress in improving their product, and the average quality is much better than it was five, or even three years since. Improved dairy appliances and machinery, much of it of American origin, have been extensively introduced both on the Continent and in Great Britain: more attention has been paid to using the best salt; government ald airy schools have beenestablished in the continental dairy countries, even Russia having the enterprise to take this step, and scientifically educated dairymen are furnished by these schools to the principal dairy districts of their respective countries. Margarine butter, or oleomargarine as it is called here, has also assisted in bringing about this result, as it competed successfully with the poorer grades of ordinary butter, and obliged European butter makers to make an effort to produce a superior article.

In Great Britain, the amount of intelligent effort which is being directed toward the improvement of dairy products, especially butter, is surprising, and if American butter-makers would enlarge their foreign market, they must in the same manner strive to increase the supply of good butter which is produced, and thereby lower prices to a point which will enable us to compete in the principal butter markets in the world. That we have the ability to do this no one can doubt who knows the progressive spirit of

sweep across our country during the winter season. The enlarging the variety of cheese made in this country, Mr. indications are that we owe them to the great area of high | Thurber remarked that a prominent English dairy authority has said that "cheese is made in the dairy," meaning thereby that almost any variety of cheese can be manufactured in countries other than those in which it originated. This has been proved by the successful manufacture in the United mometric reading in January is 41° below zero, and where States and in France of the Gruyère, which, as we all know,



# IMPROVED CAR STEP.

barometer in Northeastern Siberia, where the pressure sometimes exceeds 31.50 inches, and the temperature falls as low as 76° below zero. The pole of greatest cold is in the neighborhood of Yokutsk, on the Lena, where the average theroriginated in Switzerland. It has also been proved by the could walk. I took a pair of strong glasses and followed it successful manufacture in Russia of the English Cheddar confirms this assertion, for its manufacture has been so successfully domesticated in the United States by our German fellow-citizens that, as suggested by a member of the Paragraphers' Association, "the difference from the imported article cannot be told unless you are off to the windward three miles.'

#### THE SEA SERPENT ACCOUNTED FOR.

BY DANIEL C. BEARD.

The New York Sunday Sun of November 30 gives the following description of the Sandy Hook monster, as related by eye witnesses, who are all members of a Sandy Hook life saving crew

Samuel Kittell was the first to see it. He says: "I looked out and saw a large head and portions of the body of a most terrible looking monster. It was wriggling slowly along like a snake, the head and several portions of the body showing above the water. It was not a whale, as there was not more than twelve feet of water where it was, and a whale as large as that would necessarily have been in view all the time. But this thing would disappear altogether at intervals. No fin could be seen anywhere on the back. The body looked round and much larger than a pork barrel. It was of a blackish-brown color. I am sure it was not a whale, but cannot say what it was. It was a stranger to me."

along the beach. It was not more than 300 yards from the and the Dutch Edam cheeses, and even the odorous Limburg | shore. With the glasses the head looked as large as a hogshead. The front of the head looked square, and was about three feet high, with a projection two feet long extending from the top of its head. The eye toward the shore was as large as the top of my hat, was shiny black, and had a white edge. It had a very fierce look. . . . From the head to the tail it was at the least calculation 300 feet long. It was moving along the water the same as an eel. The head and several parts of the body were constantly out of the water. It was some species of serpent. It was certainly not a whale. . . . This thing did not spout, and showed no fins on any part of its body excepting on the tail, which was formed like that of an eel."

Well authenticated facts now prove that nature produces monsters as wonderful and startling as the most vivid imaginations of the romancer can invent. Victor Hugo's devil fish has its counterpart in the great cephalopod which was for a long time on exhibition in the New York Aquarium.

There is no doubt, in my mind, that the monster lately seen off Sandy Hook by the crew of the life-saving station was no other than a large cephalopod. That these animals often attain enormous dimensions is a well established fact, but that this one was "three hundred feet long" is scarcely probable.

One seen in the neighborhood of Van Diemen's Land is

1st. The body is large and round, and described as resembling sometimes a cask, and again a bale of goods.

2d. The eyes are large and staring.

3d. The arms or tentacles are of great length, and have a snake-like appearance and motion.

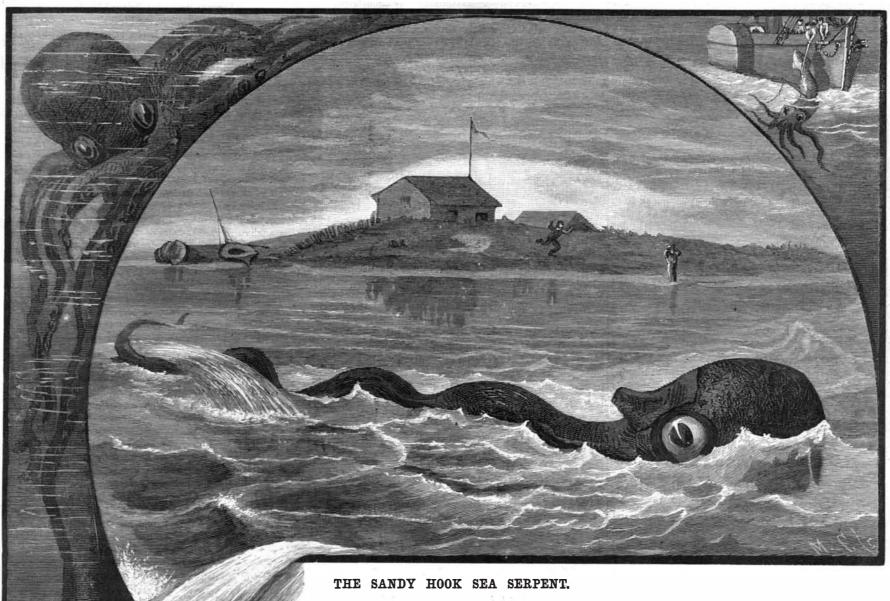
On comparing these peculiarities with the descriptions of the Sandy Hook leviathan, as obtained through the enterprise of the Sun from eye witnesses, the similarities, even to the expressions used, will be apparent.

The fin, or what was supposed to be the serpent's tail, can be readily accounted for by the fact that in some species of the cephalopod the longest tentacle widens and flattens at the end, and might easily be mistaken for a caudal fin. When moving through the water these animals bring their many arms together in a line, thus affording the least possible resistance, and propel themselves by ejecting water from their siphons.

Imagine one of these horrible creatures, with its sac-like body half submerged in the shallow water, its large protruding eyes above the waves, swimming with its long snakelike arms or tentacles trailing far behind, and you have a very fair picture of the wonderful gigantic hydrophidian or marine serpent of which we have had such thrilling ac-

#### A Singular Specimen,

Mr. E. L. Wood, of Eastland City, Texas, sends us a described as resembling a cask, its long arms having the ap- drawing and description of a curious bone, through which



George Lohsen makes the following statement: "I took the glasses and ran down to the water's edge and leveled the glasses at the monster's head. The front of the head was square, with a projection about two feet long extending from the top of the head. The eye was seven or eight inches in diameter, of a shiny black, and it appeared bulged out considerable. There looked to be a white rim around it. The animal's length was at least 300 feet from the head to the tail, as seen by us, not making allowances for the crooks in the body."

Harry Foster, another of the crew, says: "I got up and looked out, and saw the devilishest looking fish I ever put my eyes on. It was moving along about as fast as a man exist, and that their main characteristics are as follows:

pearance of snakes wriggling upon the surface of the water. | passes an iron ring, now on exhibition in a drug store in that This creature, says Kent, was probably a large poulpe or town. It appears to be a shank bone, the iron band being octopus. In December, 1861, the crew of the French corvette Alecton, engaged in battle with a calamary, whose body alone was estimated to be twenty feet in length, and its weight 4,000 pounds! It escaped, leaving a portion of its flabby body in the possession of the brave sailors, who were rough and serrated. The band is about 12 inches in circumonly restrained from following it in small boats by the officer in command, Captain Boyer.

October 26th, 1863, two fishermen noticed off Great Bell Island, Conception Bay, what they supposed to be a large bale of goods from some wreck. It was not until they actually struck it with a boat hook that they saw the terrible staring eyes of an immense poulpe; two of its numerous arms were thrown across the boat; one of the men severed these with a hatchet, the creature then moved off backwards. The amputated arms left in the boat were brought to St. Johns. The Rev. Mr. Harvey, who was the first to examine and describe these limbs, found that one fragment measured nineteen feet, although a large portion of it had been destroyed before it was rescued from the fishermen, and there is no way of determining how much more remained attached to the body of the animal.

Many other well authenticated instances could be enumerated to prove the immense growth of this family of marine monsters, but those given are sufficient to establish the fact that these "monarchs of the ocean," as Kent calls them, do

so interlocked with it that to separate them one or the other would have to be cut or broken.

Mr. Wood says: "The side of the bone encircled by the band has a smooth appearance, while its opposite side is ference, 2 inches wide, 3% of an inch thick, and is beveled from its upper edge downward.  $\,$  At the square opening near where the bone is supposed to have joined the hoof, and extending upward several inches, is a porous formation, of the appearance and consistency of bone. Did the iron band pass through the foot and ankle, and is this linking together the result of ossification?"

# The Last Number.

This issue closes another volume of this paper, and with it several thousand subscriptions will expire.

It being an inflexible rule of the publishers to stop sending the paper when the time is up for which subscriptions are prepaid, present subscribers will oblige us by remitting for a renewal without delay, and if they can induce one or more persons to join them in subscribing for the paper, they will largely increase our obligation.

By heeding the above request to renew immediately, it will save the removal of thousands of names from our subscription books, and insure a continuance of the paper with-

#### New Tanning Materials.

We translate the following paper from the Chemiker Zeitung:

The number of the tanniferous matters introduced into trade has been of late decidedly increased. This result is due in part to the penetration of travelers into uncultivated lands, and partly to the fact that the old traditional astringents have become scarcer and dearer. The oldest known and formerly almost exclusively used wares, such as oak bark and sumac, are now insufficient for the demand, so that many substitutes have been found necessary, both in dyeing and tanning. These have almost exclusively been derived from foreign lands. Many were to be found at the Paris Exhibition of 1878, and have excited the attention of practical men. Some of them have since taken a place in the market, and others deserve to be brought into use. This induces us to make a brief mention of some kinds.

Species of Acacia.—These trees, natives of Australia and Africa, are known for their tanniferous bark, their pods, and their gum. The tanning barks known in commerce are nearly all derived from Australia, and are known as mimosa bark. Their percentage of tannin ranges from 15 to 32, but the kinds generally imported average 28 per cent, or two and a half times as much as good oak bark. The Australian kinds are: Acacia harpophylla, a very rich sort, from Queens land; A. cunninghami, the black wattle, from Queensland; A. mollissima, likewise known as black wattle; A. retinoides, from Victoria; A. pycnantha, or gold wattle; A. subporosa. from Victoria and New South Wales, one of the poorest sorts; A. penninevis, the hickory acacia, with about 20 per cent of tannin; A. decurrens, also called wattle tree; A. melanolylon, the black wood of Tasmania and New South Wales; A. dealbata, the silver wattle of Tasmania; and A. leiophylla. All these species are in use in Australia, and are imported into Europe, and especially into England, under the name of mimosa bark. Those preferred on account of their large proportion of tannin are: A. harpophylla, mollissima, pycnantha, leiophylla, and cyanophylla, the four latter of which average from 24 to 32

The writer remarks that as no German merchant obtains these barks except via London, it may be important for German merchants to know that there is a nearer and more convenient source of these valuable barks in Algeria. [Not surely nearer than London? In this French colony the Australian acacias, and especially the four last mentioned, have been cultivated for some years. The seed pods of the acacias, with the exception of A. leiophylla, are very rich in tannin. The production in Algeria is very trifling in comparison to that of Australia, but the plantings are being extended, and the trees grow quickly.

Algeria is a land very suitable for tanning materials; Pistacia lentiscus grows there in quantity, especially in the department of Oran. The rind is poor in tannin, but the leaves contain 12 to 15 per cent. This tannin has little color, and might be used by dyers in place of sumac. The leaves are oval, pointed, and are easily ground and extracted.

The rind of the cork tree (Quercus suber) is a rich Algerian tanning ware containing from 12 to 16 per cent of tannin. It forms in Algeria extensive woods, but the true bark is never stripped till the trees are too old to yield cork, when they are cut down. This applies also to the cork trees of Sardinia and Spain. The bark is chiefly sent to France, Italy, and England.

The evergreen oak (Quercus ilex) is being rooted out wholesale in Algeria to make room for the cultivation of wheat. The kermes oak (Quercus coccifera) is being treated in the same way. The root bark is very rich in tannin, and is extensively used for tanning in the south of France.

A bark which at the Paris Exhibition excited some attention by its high percentage of tannin is the suobar. It contains 24 per cent, is obtained from Pinus halepensis, and grows in Tunis. It occurs in pieces, which in form and color (?) resemble potsherds. It dyes a brown-green with iron mordants.

Besides the quebracho wood, South America furnishes four other important tan wares. The algarobilla of Chili is the pod of Balsamo carpum brevifolium, a tree which grows trade. It is used in Europe, especially in North Germany, for tanning, and is preferred for uppers and harness leather, as it imparts a peculiar softness. Its importation is at present suspended owing to the war between Chili and Peru.

Chili furnishes two other tanning materials, one of them bark of Persea linguy, a tree belonging to the family of the tain. The floors should have carpets only round the beds, patient to take each morning on rising a tumblerful of Chilian province Valdivia, for tanning the so-called Valdivia as simple and as scanty as was possible, the chairs free of a teaspoonful of table salt.

leather, which is now imported in quantities. Some years all stuffings or covers that could hold dust. Of all things, 'This simple aperient,' the doctor adds, "I frequently ago attempts were made to introduce this interesting and again, the room should be kept clear of vestments not in employ in cases of constipation, and generally find it efficient tains 20 to 24 per cent of tannin, as well as a considerable temperature of about 60° F. should be maintained, as far as error."

quantity of a slimy matter, which is very important in tanning operations, as it promotes the swelling of the hides. There is also a small quantity of soft fatty matter of a peculiar odor. In the south of Chili there are inexhaustible forests of the Persea linguy, so that we may hope there may soon be found more importers of this useful bark, which by its rapid action in tanning, and by the weight of the leather produced, may assist the European tanners to withstand Chilian competition. While this bark is used for sole leather, the rind of Laurus peumo is used in Chili for tanning uppers. This latter bark has not yet been imported into Europe on the large scale.

Another Chilian bark is that recently imported under the name of Churco bark, Oxalis gigantea. In the first place this bark is not derived from any species of Oxalis, and an Oxalis gigantea does not exist. It is now known that this bark is obtained from the roots of a large species of fuchsia (Fuchsia macrostemma). The percentage of tannin is on the average 24 per cent, and the color of the watery extract is a dark brownish yellow.

Several other South American barks were to be seen at the Paris Exhibition, which were really worth importation, though they are at present neglected. We mention in the first place the Nancite bark, from Malpighia punicifolia. This bark, known also as Manquitta bark, contains from 20 to 30 per cent of a very light colored tannin, and comes from Nicaragua. The same region exhibited the Nacascolobark, obtained, according to some, from Pernambuco wood (Casalpinia echinata), and according to others from the divi-divi tree (Casalpinia coriaria). It contains only about 3 per cent of tannin.

In Venezuela there are also several barks rich in tannin. That of the "roble colorado" (Tecoma pentaphylla) contains 27 per cent of tannin, accompanied by a considerable quantity of an orange-red coloring matter, which is also soluble in water. It is met with in large, thick pieces. The mangel bark (Rhizophora mangel) comes likewise from Venezuela, and contains, if obtained from young stems, 24 to 30 per cent of tannin, and much red-brown coloring matter. old, thick bark is poorer in tannin. The cuspa bark, also from Venezuela, is poor in tannin. Peru yields the pods of a shrub, locally known as pay-pay (Inga fenillei). They are large, thick, and deep reddish brown, and contain 24 per cent of a tannin, which is almost colorless, and admirably adapted for the uses of the dyer. It deserves to be imported. -Chemical Review.

#### Health at Home.

At the recent Sanitary Congress at Croydon, England, the president, Dr. B. W. Richardson, F.R.S., gave an address on "Health at Home." That there was no place like home was a saying peculiarly appropriate to his subject, for the river of national health must rise from the homes of the nation. He would lay down a few golden rules for securing health at home. First he would put sunlight. Whether your home be large or small, give it light. In a dark and gloomy house one could never see the dirt that polluted it; unwholesome things got stowed away and forgotten, the air became impure, and soon some shade of ill health was engendered in those persons living in the house. Not only was the mind saddened in a home that was not flushed with light, but sunlight was of itself directly useful to health. The practice of placing sick people in dark and closely-curtained rooms was alike pernicious to body and spirit; and, moreover, he had found by experiment that certain organic poisons analogous to the poisons which propagate epidemic and contagious diseases were rendered innocuous by exposure to light.

He would next refer to the allied topic of night and hours of sleep. If it were good to make all possible use of sunlight, it was good equally to make as little use as possible of artificial light. Artificial lights, so far, had been sources of waste, not only of the material out of which they were made, but of the air on which they burned. In the air of the closed room the present commonly-used lamps, candles, and gaslights robbed the air of a part of its vital constituent, and supplied in return products really injurious to life. Gaslight was in this respect most hurtful, but the others were wild in rocky districts of Chili. The natives gather the fruit bad when long kept burning in one confined space. The before it is perfectly ripe. When they are fully ripe the fewer hours after dark that were spent in artificial light the epidermis breaks easily, and the tannin, which forms a yel- better, and this suggested, of itself, that within reasonable low, crumbly layer under it, is lost. The pods are nearly limits the sooner we went to rest after dark the better It plication of heat these were killed, and when the solution cylindrical, and resemble those of the locust tree. They was of the greatest importance in a healthy home to let every contain 40 to 60 per cent of tannin, and a small quantity of person have a separate bed, and the clothes should be light kept free from particles of dust, would remain pure for an a yellow coloring matter. The tannin is readily soluble in and warm. As the bedroom was the room in which one unlimited period; but if a fly were to dip its leg in fluid concold water. The present price is about £28 per ton, but the third at least of the whole life was passed, that ought to be taining living organisms and then into the pure liquid, the production does not exceed 200 to 300 tons. The harvest the room on which most trouble after health should be betakes place in February. Valparaiso is the center of the stowed. The rule followed was the reverse of this. The hours. bedroom should be so planned that never less than 400 cubic feet of space should be given to each occupant, however good the ventilation might be. The walls should be colored with distemper or with paint, that, like the silicate paint, could be washed three or four times a year. The windows very important and the other capable of becoming so. The should have nothing more than a blind and a half muslin cur-Laurineæ, serves in South America, and especially in the without valances from the beds. The furniture should be water—cold, to prevent nauseating—in which was dissolved useful bark into Europe, but unsuccessfully. Now it is im- use. From time to time a fire should be made in every bed- There is great advantage in starting the bowels and in keepported by way of Hamburg, and has given very good results room, that a free current of atmospheric air might sweep ing them in a soluble condition, particularly in cases of nerveverywhere. The bark is red-brown, soft, and very porous, through it from open doors and windows. Dry scrubbing ous disorder in women, as it sometimes clears up obscure and can, therefore, be easily extracted with water. It con- was by far the best mode of cleansing the floor. An equal points in the case, and at all events eliminates one source of

possible, throughout the house, a free access of air, and, above all, dry.

His last rule he would take from the more strict of our Jewish fellow-subjects, that of a complete household-cleansing once a year; the cleansing of every article, great and small; of every wall and floor, door and lintel; and the removal and destruction of all organic refuse, however minute.

#### The Treatment of Diphtheria.

Dr. Thomas Gurney, senior physician to the City Dispensary, London, makes the following contribution to the Lancet: "Since I have held the position of physician to the City Dispensary I have had considerably more than one thousand cases of disease of the throat under my care, many of which, both in public and private practice, have been cases of diphtheria. About this, by far the most serious disease of the throat, we have much to learn. The stiffness in the neck, the disturbance of the circulation, the rapid rise of temperature, before any affection of the throat is observed, all point to its being a blood poison calling for prompt and decisive treatment.

"The two questions that arise when called to a case of diphtheria, as, indeed, in all diseases, are: How does the disease tend to kill the patient? and, How does nature endeavor to rid herself of the disease?

"Diphtheria tends to kill by suffocation and by its poison exhausting the vital energy. Suffocation may be either accidental, or as a natural result of the throat affectionaccidental if, when the membrane is thrown off, it becomes lodged in the larynx; natural if the swelling inside the throat shuts off the supply of air to the lungs. Nature will attain the mastery over her enemy if the strength be kept up and the deposits arrested. With these points to guide us we know that the arrest of the disease and nutritious support are our great aim. To succeed in this I have adopted a respirator made of the ordinary shape and size, the front being minutely perforated. Inside of the respirator I have two or three perforated plates inserted, between which I place common tow (not cotton wool); I then drop on each of the layers of tow ten to twenty drops of a solution of carbolic acid, creosote, and glycerine. Should the patient tire of these, I use turpentine or iodine. I place the respirator over the mouth, and keep it continually applied. My next idea is to provide the patient with warm moist air. To do this I have two kettles of water kept boiling on the fire; attached to the spouts of the kettles I have an elastic tube of an inch caliber, at the end of which is a spray-like nozzle, which I put immediately under the mouth of the patient. By this means I get my disinfectant remedies carried moist to the throat. As a sedative to the pain I know nothing so comfortable to the patient. Previous to this I take care to give an active purge, which usually removes offensive stools of effete, poisonous matter. Internally I give aconite in frequent small doses—two to four minims of the tincture; at the same time freely supporting the strength with milk, cream, and eggs, with or without brandy, and beef tea ad libitum. As a drink I recommend patients to take as much chlorate of potash in solution as they can without vomiting. I have found chlorate of potash highly beneficial in all cases of a low typhoid character. If this is objected to, I advise the juice of lemon to be taken-by many thought to be a specific for diphtheria. Should the system be very weak, I prescribe belladonna instead of aconite; but I find better results from the latter. As soon as the urgent symptoms have subsided I order strychnia, with or without nitro-hydrochloric acid—this not only being the best tonic, but also preventing the paralysis which so often follows diphtheria. I have found this treatment to be highly beneficial, but, knowing the tendency there is to rheumatism after this terrible disease, I never forget our friend the bicarbonate of potash."

# Zymotic Contagion.

Professor Tyndall asserts that diseases are propagated not by effluvia or sewer gas, but by solid particles discharged into the atmosphere by currents of air or gas. This he proved by the following experiment: He cut up a piece of steak, steeped in water, heated it at a little above the temperature of the blood, then strained off the liquid; in a short time this fluid became turbid, and when examined through a microscope was found to be swarming with living organisms; by the apwas filtered he obtained a perfectly pure liquid, which, if whole would be swarming with animalcula in forty-eight

# Table Salt an Aperient.

Physicians have for a long time known that common table salt is an efficient aperient in ordinary cases of constipation. In a lecture on a case of nervous affection, Dr. Weir Mitchell, of Philadelphia, said that he had recommended the

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Presses, and Dies that cut 500,000 fruit can tops without sharpening. Ayar Machine Works, Salem, N. J.

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tations called Phœnix. Greene, Tweed & Co., N. Y. The Baker Blower ventilates silver mines 2,000 feet deep. Wilbraham Bros., 2318 Frankford Ave., Phila., Pa. Steam Excavators. J. Souther & Co., 12 P.O. Sq. Boston.

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For Superior Steam Heat. Appar., see adv., page 406. All makes and sizes of Steam Hammers bored out. L. B. Flanders Machine Works, Philadelphia, Pa.

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No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration

Any numbers of the Scientific American Supple-MENTreferred to in these columns may be had at this office. Price 10 cents each.

- (1) A. D. writes: 1. The cistern water we have here, when tested with the permanganate of potassa (distilled water solution), is of a brick dust color instead of a rose color. What is the cause of this? Is it due to the tinned roof or to the cement of the cistern? A. Probably the latter. 2. Do you know any defecate, and draw off the clear oil. Repeat the treatmethod of restoring the red color which has faded on my Russian leather portmanteau? A. No.
- (2) C. B. asks for a recipe for making a balls, that would not be expensive, and also a recipe for coloring. A. Melt together over a gentle fire in an as to recover the metal in a shape for reusing? A. The boats. 50 different varieties, adapted to every class of iron pot: pitch, 1 part; guttapercha, 2 parts; orange metal cannot be recovered from the dross in the way sugment of the control shellac, 5 parts; add to this 6 parts of white lead (lead carbonate) in impalpable powder, and stir until a perfectly homogeneous mixture is obtained; then cast and turn out. Color with the aniline dyes mixed with dilute alcoholic solution of bleached shellac.
  - (3) G. R. asks how to blue gun barrels. A. This is best done by submitting the barrel to heat until the required color is secured; but it may be done in a manner by applying to the barrel a little nitric acid, and allowing it to act upon the iron until a blue film appears, then wash the barrel thoroughly and oil it.
  - (4) J. G. asks: 1. Is there an ink that will dry quickly, or if there is not, can there be one compounded that will dry quickly, and print as nicely as that used in printing bank notes? A. Try the following: Shellac, 6 ounces: borax, 1 ounce; water, q, s; boil together until perfect solution is effected, and triproduce the desired color. A little alcohol will make the liquid flow more readily and dry quicker, but an excess must be avoided. 2. Please explain the principle of the steam injector? A. For a full explanation of the injector, see p. 99, Vol. 40, of Scientific American.

(5) E. P. M. asks: What would be the proper distance to place a bell from the ground, in order to convey its sound the greatest distance? A. A bell should be placed well above surrounding buildings, and if possible above trees. This subject is fully treated on p. 299 of current volume of Scientific

- (6) P. B. asks: 1. What should I use to give a white and smooth surface to statues of plaster of Paris, after coming from the mould? A. Warm the cast and suspend it in melted white wax. The operation should be repeated until the wax is no longer absorbed. It is then allowed to become perfectly cool, when it may be polished. 2. How long should plaster of Paris be mixed with water before casting into the mould? A. Sprinkle the plaster into the water with which it is to be mixed. As soon as it settles to the bottom pour off most of the water, stir the mixture, and stuff is used to make the plaster figures have a yellow tint (straw color)? A. Mix a little finely ground yellow ocher with the plaster, or stain the dry cast with a tincture of annattoor turmeric.
- (7) "Woodworker" asks: Is there any danger of explosion from fire coming in contact with the fine dust of poplar and hard wood, blown through a Sturtevant blower into a shaving receiver or room? Can you give an instance of explosion of fine wood dust? A. There was an explosion of fine wood dust in the Pullman Palace Car Works in Detroit, Mich., a few years since. It occurred under about the same circumstances as you describe.
- (8) C. F. C. asks what is the equivalent of a horse power. A. 33,000 lb. raised one foot high per minute
- (9) C. R. P. asks: Can you give us a substitute for alcohol for heating shoemakers' tools? It must heat well and not smoke the iron. A. There are several heaters in market using kerosene as fuel.
- (10) W. W. S. asks: Is a building roofed with tin, corrugated iron, or other metal covering, less liable to be struck by lightning than if shingled, and if so, why? A. A building roofed with tin is not less liable to be struck by lightning than a shingle roofed building. If neither house were provided with a lightning rod, the tin roofed building, if struck, would be the safer, because the lightning would be likely to divide and spread over the metal, and find its way to the earth by several different paths on the exterior of the building, water leaders, gutters, etc. The woodenroof offers no such facility as metal for the spread or division of if so, how should it be applied? A. The tan bark can be the electric charge, but is apt to tear its way through the building to the ground in one path.
- (11) S. H. writes: 1. I have a spring which has 20 feet fall, with 500 feet of 34 inch pipe running to my house; how much pressure have I? A. 9 lb. per square inch nearly. 2. Will it run a 6 gallon churn, and what kind of a wheel would be best? A. Address makers of water motors who advertise in our columns.
- (12) O. J. H. asks: 1. Will the painting of wrought iron steam pipes with one coat of asphaltum varnish diminish permanently the heat-radiating power of such pipes. A. No. 2. Is there any other painting material preferable to asphaltum varnish for the purpose ing it easier to keep them clean? A. No. 3. Considering only the economy in fuel consumed for heating by steam, would it be advisable to use no paint of any kind at all? A. All radiating surfaces should have a dark color. Paint will do no harm provided it is dark and not too thick.
- (13) J. A. M. asks how to calculate the proper thickness for cast iron head for wrought iron boiler, 36 inches diameter, 75 lb. pressure per inch.  $\, {f I} \,$ fail to find it in Haswell or any other work of that kind which I have. A. You will find rules in "Wilson on Steam Boilers." In practice the thickness is more the result of experience than calculation, as much allowance must be made for possible defects in casting; the usual thickness is  $1\frac{1}{8}$  inch to  $1\frac{6}{8}$  inch.
- (14) J. N. H. asks: Are graphite, plumbago, and blacklead one and the same thing? A. Yes.
- (15) D. R. asks for a method by which to deodorize some pistachio nut hair oil, held by me in bulk, bought in London in 1872. There is only about a quart left, but it has become rancid, and can undoubtedly be deodorized. A. Try the following: agitate the warm oil with about one per cent each of caustic lime and calcium sulphite (sulphite of lime) in powder, ment, if necessary.
- (16) H. W. writes: I am melting a great composition that would be hard enough to make pool of oxide and dross. Can you give me any information gested. This dross, which consists chiefly of a mixture of tin oxide and finely divided metal, is usually calcined and sold in this condition as putty powder. The metal can be recovered from the dross by mixing the latter with, say, one third its weight of fine coke or charcoal, and heating the mixture in large luted crucibles gradually to full redness. The reduced metal remaining with the unconsumed carbon may be separated by pounding the mass and sifting out the carbonaceous matters, and remelting the granular metal at a low heat.
- (17) F. A. B. asks for the receipt for making what are called Chinese rods, and which upon being burnt diffuse a delightful odor. A. 1. Gum benzoin. 6 parts; balsam of tolu and powdered sandal wood, each 4 parts; powdered tragacanth and labdanum, each 1 part; powdered niter and gum arabic, each 2 parts; cinnamon, 12 parts; light charcoal (linden), 48 parts. turate with this enough good iron black or nigrosin, to Form into a smooth ductile mass by aid of heat, mould and cool. 2. Gum benzoin, olibanum, and stirax tears), each 12 oz.; niter. 9 oz.; charcoal, 4 lb.; moistened with solution of 2 oz. tragacanth in a quart of rose roses, pure neroli or orange powder, 1 oz. Oils of cloves Book.

and nutmeg, essence of vanilla, cascarilla, etc., are sometimes added in addition to the foregoing.

- (18) G. L. D. asks: What is the greatest depth the sea has been sounded-actual, not supposed? A. 4.655 fathoms by Commodore Belknap, U. S. N., and 4,575 fathoms by the Challenger (English) expedition.
- (19) P. C. B. asks: 1. How can eggs be preserved so as to keep good for the winter? A. Pack the eggs in a brine consisting of a saturated solution of salt in lime and water. The lime water is prepared by agitating soft water with enough lime to impart to it a milkiness, allowing this to settle in a covered vessel, and drawing off the clear lime water. 2. How can apples best be kept good from fall to the winter and spring? A. The apples to be preserved should be selected with due regard to their time of ripening. A Rhode Island greening, for instance, which ripens in January, can by the following method be preserved in good flavor until pour it immediately. 3. Please state what kind of March or April, but not longer, whereas a northern spy, golden, or Princess Russell, or any late ripening variety, can be preserved in full flavor until the following August or September, though they must be promptly used after opening. The method of preserving the fruit is as follows: Select only perfect fruit, envelope each tightly in two separate wrappings of any thin paper, pack; them in clean firkins or air tight barrels, and head them in securely, air tight. Thus packed apples may be preserved in a perfectly sound condition for a year or more, though, as before remarked, if kept much beyond their regular time of ripening they will lose in flavor. 3. Which is the best way to preserve whole heads of cabbage so as to keep good in the winter and spring? A. Keep them in a dry place, in well aired barrels. 4. I have a copper ore which assays as follows: Copper, 63'76; iron, 10:50; sulphur, 25:57; gangue, 0:10; total, 99.93. The ore carries about 1 3-5 ounces gold per ton (=0.005 per cent) and some silver. How can I best and cheapest smelt it, say 75 or 100 lb. ore at a time? A. It will probably be necessary to chlorinize the ore and submit it to the amalgamation process. Consult Phillips' "Metallurgy of Gold and Silver."
  - (20) A. C. writes: I have been trying to make some varnish, but have failed so far, and want to know what is wrong. I put two ounces of bleached lac into a bottle, and covered with alcohol; it swelled, and I added alcohol till it filled a pint bottle. It is now a curdy mass with some fluid on the top of it. I warmed it and stirred without effect. What is the matter? A. Try 95 per cent alcohol.
  - (21) C. R. asks: Could I convey ground tan bark from the mill to leaches by means of a blower: propelled by a blower if it is dry. If it is mixed with water, a centrifugal pump should be used. If you employ a blower, the bends in the pipe which conveys the tan bark should be of long radius.
  - (22) S. B. F. writes: We have a machin ist that says a belt will slip less on a pulley that has not been turned than on a very smooth pulley. Is he correct? A. According to the experiments of Hoyt & Co... a belt will drive about 50 per cent more on a polished face iron pulley than on one with a rough face.
- (23) A. E. F. asks: Why is it that the light. side of the new moon appears larger to the naked eye than that portion made visible by the earth's light? of giving the steam pipes a better appearance and mak- The line of the moon's surface is seen in the bright position, corresponding in size to the outlines of the dark side. It being supposed that the moon has no atmosphere, how do the sun's rays produce this effect? A. The phenomenon observed by you is called irradiation. It is due to the fact that impressions of bright objects on the retina extend beyond the outline of the image. Irradiation differs in different people, and even in the same person it is different on different days. It also increases with the luminosity of the object. The electric light affords a marked example of this phenomenon. The source of light, which is scarcely more than a mere point, appears a miniature sun. An incandescent platinum wire looks many times larger than its actual size.
  - (24) A. B. C. asks for the best compound or simple substance with which to impregnate baked wood for insulators for telegraph lines. A. Plunge the wood for a few minutes in hot paraffine.
  - (25) E. H. S. asks: Is a telegraph wire a protection to a building if the wire is well insulated and has good ground connection? A. It might be a protection, but it would be very limited, as a telegraph wire of the usual size is not large enough to conduct a heavy lightning discharge.
- (26) J. E. K. asks: 1. Does the density of the atmosphere affect the velocity of falling bodies? A. Yes. 2. To illustrate: Suppose a cup of water or oil to deal of pig tin and lead, and soon accumulate a large pile there is a pressure of 60 lb. per square inch, if the cup be suspended in the top of an air receiver in which was upset, would it require a longer time for the fluid to reach the bottom than it would if the air was of ordinary atmospheric density? A. It would.
  - (27) B. A. asks: Which is preferable for bolting foot blocks to joists, overhead-34 bolts extending through block and joist with nut on end, or, 34 wood screws extending through block and into joist 6 or 8 inches, sound hemlock joists-i. e. I mean which would be the easier drawn down or out-joists 12 inches thick? A. Through bolts and nuts are to be preferred; but if you use wood screws they should be at least 1/8 inch larger than the bolts.
  - (28) B. F. T. asks: 1. How can I make a paint for crockery, etc., that hot water will not wash off? A. Porcelain (or white ware) may be painted in enamel, that is, the design painted in metallic oxides and burned in (see Spon's Practical Receipts). Any ordinary paint that can be applied will not stand much washing, especially if hot water and soap are used. 2. How can I paint on cloth without sizing it and not have the paint spread? A. It is necessary to use size, un less the cloth is waxed.
- (29) G. E. W. asks: What mode of measurement do you get the tonnage of a ship? A. You will water. To this may be added, if desired, essence of find rules for tonnage in "Haswell's Engineer's Pocket

(30) S. A. S. asks: How can I clean rust from the iron plates of a hydraulic press, so as to leave the plates perfectly clean and free from chemical odors? A. Try dilute sulphuric acid, say 1 part of acid to 10 of water. Wash the plates thoroughly after the application of the acid.

(31) S. E. W. asks (1) if lump lime will slake in oil. I want it for painting a large ice house as an improvement on whitewash. A. The slaking of lime is due to the formation of a hydrate of limewhich reaction water is essential. Lime may be made into an emulsion with oil, but this emulsion is very different from the hydrate formed by water. 2. Also please send me the number of your paper that contains a description for making rubber stamps. A. See p. 1226, No. 83, Scientific American Supplement

(32) M. B. S. B. writes: My engine cylinder is 31% inches long by 11% inches in diameter. What sized boiler do I require? A. Your boiler should have from 10 to 15 feet fire surface, according to the pressure you wish to carry and speed of engine.

(33) E. A. D. P. asks: 1. What is meant by aperture? Is it the diameter of the object glass, or the opening of the diaphragmin the eye piece? A. It is the diameter of the clear or exposed portion of the objective. 2. For an object glass of 2½ or 3 inches diameter, how many lenses, of what size, and how far apart (measured perpendicular to their plane sides). will form the best eyepiece for ordinary astronomical purposes? A. You do not give focal length of your objective. It is probable that the answer to J. W. S. (14), p. 403 of current volume, will assist you.

(34) L. P. B. writes: I desire to send a stream of oxygen through water. Please inform me how I may do the same? A. Pass a glass tube from the oxygen reservoir to the bottom of the vessel. When the gas is placed under a light pressure it will force its way through the liquid.

(35) C. R. M. writes: I have an 80 horse power boiler, carrying 65 lb. of steam, runs a 65 horse engine, also supplies jacketed kettles, coils in tanks for heating water, steam tables, etc.; they are all connected to a narrow steam trap that discharges into a tank. Near the tank I have a double connection, by which I can shut the water from the tank and catch it in a pail and weigh it. Now, how many pounds of water per hour discharged by said trap ought to constitute one horse power? Can you give me a standard and reliable rule? A. There is no rule which will apply; a fairly good steam engine will furnish one horse power by consump tion of 22 lb. steam. We think you might assume 22 to 24 lb. water per horse power.

(36) A. P. asks: 1. What tension will 1/2 inch boiler stand? A. It depends upon the diameter of the boiler and quality of the iron. 2. At what density does sea water form a deposit? A. Deposits of lime will commence, say, at 11/2 densities by salinometer, and of salt at about 21/2 densities. 3. How far from the first row of tubes must the gauge cocks be? A 3 to 4 inches. 4. How will salt and fresh water act when being mixed in boilers? A. The mixing will tend to make the water foam.

(37) F. W. D. asks how photographers prevent the disagreeable odor from collodion, etc., from becoming prominent? I cannot use it without scenting up all the surroundings. A. The odor cannot be diminished or cloaked; the annoyance is obviated by using the collodion only in a well ventilated closet.

(38) M. E. H. asks for the process of treating ships' sails so as to preserve them from mildew and decay. A. Saturate the fabric with a boiling solution of card soap 3 lb., water 5 gallons. Press out excess of the solution between rolls, and digest for two hours or more in a solution of lead acetate 3 lb., water 2 gallons. Finally rinse well in water and dry rapidly without over-heating.

(39) H. K. & J. O. B.—Ordinary so called washing fluid is prepared by warming together one part of washing soda (commercial carbonate of soda) and two parts of lime in about 30 parts of soft water, and after the suspended carbonate has entirely subsided decanting the clear liquid for use. Aqueous solutions of water glass, soap, starch, chlorinated soda, borax, etc., are often added in various proportions.

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

N. B.-No 1, feldspathic rock containing crystals of feldspar.—D. D. B.—Magnetite; if free from phospho rus and titanium an excellent iron ore.-A. S. T.-It is an impure ferruginous clay of little value.

[OFFICIAL.]

# INDEX OF INVENTIONS

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

November 25, 1879,

AND EACH BEARING THAT DATE.

Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, or any patent issued since 1867, will be furnished from this office for one dollar. In ordering please state the number and

Air compressor, J. Clayton Air or vacuum railway brakes, diaphragm for, B. L. Stowe 221,980 Amalgamating apparatus, vacuum, J. Absterdam. 221,990

Amalgamating pans, device for discharging, E. 

	Amalgamating pan, E. Coleman	222,
	Auger, hollow, W. A. Ives	222,
	Axle, car, S. D. Webster	222,
	Bale tie, R. M. Pattillo	222,0
	Bale ties, upset or turn over buckle for, J. L.	,
. !	Sheppard	221,
	Bag fastener Giles & Bryant	999

Barrel safety attachment, J. T. Flynn 222,029
Barrels, rack for tiering F. Stitzel 221,945 Bed, invalid, J. H. Archer..... 221,952 Binder, temporary, W. A. Amberg (r) ...... 8,980 Binder, temporary, E. H. Thompson (r) 8,981
Bolt drawing machine, T. D. Wilson 222,112 Bolting cloth, cleaning, W. H. Moses ...... 221,932 Boot and shoe heel burnishing machine, Z. Beaudry 221,954 Boot and shoe sole edge burnisher, S. Jacobson. 222,052 Boring tool, A. F. Temple 222,101
Bottle, nursing, Michales & Bald 222,070 Box heads, machine for finishing, N. L. Seelye... 222,083

Brush, C. L. Pond..... Brush for washing carriages, etc., A. T Gerike.... 222,031 

 Buckle, G. G. Bugbee
 222,007

 Buckle and trace carrier, combined, T. L. Wiswell
 222,114

 Bung, W. H. Stewart
 222,094

 Burr holder and spirit lamp, combined, T.S. Waters
 222,107

Button hole cutter, M. L. & G. M. Sanborn ...... 222,080 Calendering paper, etc., machine for, Schlatter Carbureter, J. Wayland. 221,948
Card, visiting, F. Oechsli 221,933
Carpet linings and similar fabrics, machine for

 
 Carpet Imings and similar Tabrics, machine for making, J. C. Gray
 222,037

 Carriage top, J. N. Hazelip
 222,043

 Cartridge capping implement, G. A. Barnes
 222,000

 Cartridge loading apparatus, J. H. Murray
 221,971

 Castings, malleable iron, J. E. Atwood
 221,996
 Cattle chute, J. T. & R. A. McCoy

Cement, manufacture of artificial hydraulic or 222,004

Chuck, G. B. Kirkham. 222,056 Churn operating machinery, W. N. Rhodes. 222,076 Cigar lighter, automatic, C. Crook.221,911Clasp, C. E. Johnson222,055Clothes line hook, F. G. Slemmer222,086 Collars and cuffs, making celluloid, A. A. Sanborn 221,977 
 Cotton and hay press, H. C. Green
 222,038

 Coupling, D. W. Clark
 221,908

 Cupola furnace, E. C. Atkins
 221,995

 Currycomb, E. Harris
 221,962

 Dental engine, E. T. Starr
 222,093
 Dentist's chair, E. T. Starr..... 222,092

Dish washing machine, S. Walker 222,103
Ditching machine, J. D. Comstock 221,910 Draught equalizer, R. A. Thompson 221,982 Drawing table, W. Holden 222,047 Fence wire stretcher, Clark & Orris ...... 222,013 Firearm, magazine, A. Burgess. 222,08 Firearm, magazine, J. M. Marlin 222,064 

 
 Sanderson
 221,978

 Garment supporter, H. P. Andrews
 221,951
 Gas apparatus, vapor, J. Savage ....... fixing retorts, heating benches of, T. F.

Fish boner and scaler, A. J. Whitney...... 221,949

Gold from auriferous deposits, machine for ex-

 Gun, magazine, F. Y. Sunderland.
 222,098

 Hame fastener, J. P. Bell.
 222,002

 Hat sizing machine. E. Beesley...... 222,117 Hay rake, horse, S. Ritty ..... Hinge, P. Hurm ...... 221,963

Hinge spring, G. M. Jewett 221,964
Hoe, G. W. Cloyd 222,015
Hoe and cultivator, combined horse, B. B. Small 222,087 Horses, device for stopping, I. J. Warner ...... 222,105 Hub, vehicle wheel, S. P. Ruggles..... 221,976 Jacket can, Mason & Bergman ...... 221,927

Jointer and cutter, combined, H. E. Wisner ...... 222,113 Lance, bomb, J. A. Brand...... 222,003 Medical compound, G. Collins. 221,909
Millstone supporter and driver, O. J. Bollinger... 221,906 Mosquito net, etc., apparatus for stretching and

Spencer (r) 8,977
Packing, steam, G. C. Phillips 222,074
Painting fence wire, apparatus for. F. C. Taylor. 221,981 Paper pulp from wood, making, S. M. Allen ..... 221,992 Pavement, concrete, C. M. Warren (r). 8,982
Pavement, street, E. Devilliers. 222,025 Pharmaceutical apparatus, J. T. West .... Photo-negative engraving, Bachman & Peckin-

Pipe, machine for the manufacture of spiral .. 221,938 Planter, Jorn, G. D. Haworth. ...... 222,042

Planter, seed, B. Richardson ...... 222,078 Plow, R. Adamson...... 221,901 Pressure generator, hydrocarbon, H. H. Eames... 222,027 Printing machine, chromatic J. McNaught. .... 222,069 

 Pump, A. W. Woodward
 32.116

 Pumping system, atmospheric, W. P. Barclay
 221,903

 Ratchet wrench, J. Woolford
 221,989

Refrigerator and water cooler, combined, M. B. Rowlock, T. Dowling ...... 221,914 Sash fastener, R. Lee .... 221,967 

 Sash fastener, R. Lee
 221,966

 Sash holder, Leguay & Vallottou
 221,966

 Sample box, F. F. Atkinson
 221,994

 Saw machine, drag, W. N. Kyle
 222,057

 Sawing machine, drag, Thompson & Gray
 222,027

 Screw, jack, R. Fjellman..... Screw machines, extractor for metal, H. S 

Sewing machine button hole attachment, J. F. 

 Shoe, F. S. Stark
 222,091

 Shoe horn, M. F. Coon
 222,020

 Show case, H. G. Derr, Jr.
 221,913

 Slate, M. F. Sullivan
 221,947

 Sled, J. H. Dennis.... 222,024 Spring clasp for braid and ribbon packages, H.

Staples, apparatus for inserting, bending, and 

tile or corrosive liquids through or from, O. H. Krause ..... Sulphocyanides, apparatus for making, Tcherniac 

 Jacobs
 222,053

 Tile machine attachment, P. Ozmann
 221,934

 Time lock, S. Shaw
 222,084

 Tobacco chopper, E. Hain
 222,039

 Tobacco, manufacture of plug, P. J. Sorg
 222,090

 Tomb, McMinn & Filbey.
 221,969

 Toy money box, C. B. Bailey
 221,998
 Toy money box, L. Kyser..... 222,058 

 Vacuum engine, B. Goldmann
 221,961

 Vapor burner, E. F. Bogers
 221,937

 Valve, slide, E. S. Chapell
 221,956

 Valve, steam engine slide, E. S. Chapell
 221,955

 Vehicle spring, J. Krehbiel
 221,925

 Velocipede, P. Denham
 222,022

 Veloctpede, II. Hassenpflug.
 221,917

 Vessels, air port for, T. D. Wilson.
 222,111

 Water closet valve mechanism, W. M. & J.Smeaton 222,088

 Weather strip, W. St. Charles
 222,095

 Weed turner, J. D. Cates
 222,011
 Wells, clamp for elevating tubing in oil, G.W. Fair 221,958

Wool press, Willis & Funkhouser ...... 222,110 

# DESIGNS.

Coffin plates, E. H. & J. H. Eldridge........................ 11,526 

# English Patents Issued to Americans.

From November 18 to November 25, inclusive Curtain roller, H. L. Judd, Brooklyn, N. Y. Fountain pen, A. T. Cross, Providence, R. I. Money received, apparatus for preventing fraud in, G.

Beadle, Syracuse, N. Y. Steam engine. W. F. Goodwin, Stelton, N. J. Sulphate of lime, manufacture of, Z. C. Warren, New Vork city

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the Huaca of Ocharan, the largest burial mound in the
valley, inclosing 117 acres. The great Inca Temple of
the Sun, in the Valley of Lurin, and its dimensions. The
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earthquakes that have taken place on the Peruvian
coast. The extraordinary Masonry composing the walls,
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The geologic changes that have taken place in Peru;
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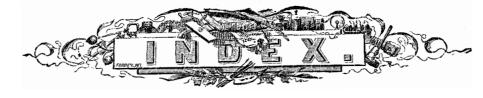
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Ache ron .spar torpedo vessel 69	Lamp, electric, Reynler's 194 Leather factory, Howell & Co.'s, 407	MISCELLANY.	Boats, to propel	Collisions at sea	Enamel for iron(33) 28 Engine for boats(23) 43 Engine for boats(23) 43
Acheron, spar torpedo vessel	Lenses.       159         Letter press, lock.       117         Lightning arrester.       (5)       91         Linen Com pany, Willimantic.       351         Lock, nut, improved.       86	Figures preceded by a star (*) refer to illustrated articles.	Bodler coil	Color of matters, reflect of   130	Engine, power of
Amalgamator, new	Machines, drying	A Absinthe, baneful effects of 234 Academy of sciences, National 313	Boilers, flue and tubular (9) 11 Boilers for yachts (21) 27 Boilers, test for (28) 204 Boilers, to prevent rusting (19) 59 Boilers, use of petroleum in (19) 208	Commercial marine, world's	Engines, traction, on com. roads. 191 Engineering, Am. future of
Ancient keys. 25 Astronomical notes 180, 881 Aswail, the 55	Mara, the.   39   Mara, the.   20, 54, 95   Meridian, circle, the.   111   Metal spinning.   95   Meter water, new.   34	Academy of sciences, N. Y	Bonto, carching the	Compressed air vessels	Engranu again invaded
Baptismal font.       265         Barb r's chair, new       246         Barrel hoop, novel.       221         Barrel lifter, the       327         Battery, cheap       (10)         91       310	Milk, skimming.       178         Mill, an unproved.       54         Miter cutter, ew.       134         Mot th, house builder.       348         Motor and meter, new.       278	Acoustics, opp. for discoveries in 81 Activity not energy 90 Addrondack survey, the 152 Advertisers, a fact for 377 Advice to bathers 25	Brain growth     298       Brain of an anthropologist     309       Brass manufacture     380       Brass, to cast on iron     (17) 283       Brass, to clean     (16) 27	Copper mining in New Mexico 26   Copper to amalgamate (18) 107   Copper to granulate (35) 60   Copying ink, black (23) 267   Copying pad, ink for (8) 299	Exhibition a novel. 181 Exhibition at Sydney, opening. 293 Exhibition of sanitary appliances 18 Exhibition, Swiss, a. 18 Expansion, metal. (19) 267
Bessemer steel	Motor, tramway, new	Africa, future of       409         Africans, white       103         After graduating—what?       89         Agamemnon, launch of the       260         Age of the world       200	Brass, to lacquer.       (27) 188         Brass work.       281         Brass works, Scovill       375         Bread, baker's vs. home made (8) 139         Breadstuffs and provisions       225         Bread tuffs and provisions       250	Copying processes, new 234, *325 Copyrighting fruit 193 Corkscrew and bottle faucet *291 Corrosion of the metal tin 216 Cotton bales, covering for 145 Cotton factories for the South 345	Expedition to the Red Sea 250 Exploration of Western Asia 48 Explosion in a Bessemer shop 181 Explosive, Austrian, new 9 Explosives, compara, strength of 202
Bridge, St. Louis	Narica, the 87 Nut lock, improved 86	Allanda wood. 199 Air as a stimulant. 25 346 Air chamber, proportion of . (25) 92 Air compressor, duplex	Bridge, English chan'l, proposed 182 Bridge, iron, pushing acrossariv. 273 Bridge of old rails. 346 Bridge, St. Louis. \$370 Bridge, St. Louis. \$370	Cotton goods, Amer., quality of 3 Cotton mills in South Carolina 26 Cotton, some facts about 280, 329 Cotton thread, American 104 Cotton by white labor 399	Export trade, increasing. 413 Export trade in staves, etc. 121 Extending its use. 413 Eyeplece for telescope. (14) 403
Cabinet, Arabesque.         281           Cabinet seat, improved.         325           Calculating attachment, new.         231           anal towing, Belgium system.         143           Candle, novel.         262	Oni cabinet, improved	Alarm, electric       (34) 172         Alcohol by electricity       328         Alexis St. Martin       63         Alizarin blue       411         Alloy, new       21	Bridge, susp., btw. N.Y. and Bkln       48         Broken coal, to unite       (23)       283         Brok er's agency, the       341         Brom ine in the U.S       240         Bronze casting in wax       103	Cottons, American, for India. 234   Conch pearl 321   Coupe cars for London 121   Cow, deaf-mute, a 86   Crabs of Cape Verde Island 165	Falence*108 Faience.French*233
Candlestick, new.       378         Car, steam, novel.       50         (ar step, new.       414         Cartridge, Tyler.       224         (arving attachment for lathes.       243         Car wheel borer worties!       240	P Palissy plate	Aloes as a dressing for wounds	Bronze, manganese	Crayon drawings, to fix.     (28) 300       Cream, who will can?     138       Credulty, scientific     3       Crickets stop a train     7       Crocodile oil     253	Failure, threatened, of silk crop. 34   Fail of 260 feet, a
Chair, barber's, new	Pavement rammer, steam	Amateur mechanics*20, *54, *95 America, discovery of	Building timber, diseases of 3 Bureau of national survey 91 Business of the patent office 293 Butter package wanted 138 Butter, to distinguish from lard. 47	Crooke's experiments	Farming implements in Morocco 35 Farm wages and cost of living 152 Fashion, new, foot jewels 395 Fat secreted by the liver 295 Feed pump, freaks of (13) 107 Fence nost, iron, new *149
Clock, pneumatic. 5   Clock, Rosset's. 226   Coal tipping machines. 290   Comet. Swirt's. of 1879   116   Copying process, new 325   360	Pistoriand packing, new 38 Plowing by electricity 41 Plow, mammoth 294 Pneumatic clock 5 Pocketbook, recording 246 Polar expedition, new British 183	American carvings, ancient 9  American competition 90  American dental convention 145  American gynecological society 215  American industries 278  278  278  278  278  278  278  278	C Cabinet, Arabesque	Curing beer by injecting brine 181 Curiosities at the Smithsonian in. 85 Currents of Ampere 244 Cutch, use of, in boilers (22) 155 Cutlery, American, in Sheffield 97 Cut-off new *102	Fences, metallic 257 Ferry boat, big, California 145 Ferry boat, pig, San Francisco 22 Ferry boat, steam, first 132 Fever and ague 346
Corsider and and obtte lateet. 231 Crusher, sectional-cushioned. 306 Cuff holder new 19 Cut-off, new 102 Cycloscope, the 131	Polar pantograph, the         66           Portable engine, new         19           Potato digger, improved         66           Powder post insects         261           Press, a new         166	American ind'ies, Sec. Evarts on 149 American institute exhibition. 84 97, 111, 130, 154, 184 American institute fair 209, 256 American institute of architects. 353	Calico printing       401         Camella japonica, seeds of       35         Camphor, electrical       311, 322         Canal across the Isthmus       36         Canal mowing machine wanted       105	Cutting Packing Company 148 Cyanogen with hydrogen 197 Cyloscope, the *131	Filaria snake 66 Filters (20) 155 Fire, colored (22) 28 Fire dept. of Topeka, Kan. 101 Fire engine improvements 307 Fire prines self-monalling 3
Decoys for wild fowl	Press, machine & process, Jones       22         Press, oak, Gothio       185         Pressing machine, improved       82         Progress at Menlo Park       52         Projectile, new       395         Propeller screw, new       130	American manufactures in Cuba. 101         American philological associat'n 106         American science association 161         American tariffs 104         American trade revival 264         American way the	Canal or snip railway? 64 Canal towing, Belgium system	Daniell, a home-made	Fire escape, new
Discoveries, remarkable, Crooke. 232 Drag sawing machine. 230 Drag sawing machine, new. 21 Drawing apparatus, prospective. 307 Drilling scow. United States. 31	Probelling apparatus, new	Ammonia bath, the 80 Ammonia, intravenous inj'n of 69 Ammonia on brass 411 Ammon, sulph. of cop. in neural 2 200 Anaconda, crushed by an. 354	Cape of Good Hope       264         Car step, new       *414         Carbolic acid, discovery in       169         Carbolized air       50         Carbon for batteries       (19) 300	Decease of two Am. shipbuliders 49 Decisions relating to patents. 346, 84 Lecoys for wild fowl	Fire, curiosities of
Drying machine	Punching and shearing press 179  R  R	Anesthetics, action of	Carrica papaya       231         Carp, cultivation of       383         Carpeting the Mississippi       308         Carriage pigeons       6         Cartridge, Tyler       *246         Car steam povel       *50	Devil's darning needle, the 100, 148, 194 Devil's plant, the	Fish, cross-breeding among
Electrical generator, Edison's 239, 242 Electric current regulator, new. 101 Electric lamp. 274 Electric lamp for English shilling 233	Railroad tock, portable, limp. 118 Railroad tie, new	An inventor victorious.         9           Animal rubber.         415           Anthracite coal in Mexico.         5           Anthracite, fossil footprints in.         87           Antidote to poison.         147	Car, twin cylinder 293 Car wheel borer, vertical *210 Car wheels, paper 301 Cars, action of on curves 331 Carving attachment for lathes *243	Diphtneria, treatment of	Fish, Passaic, destruction of 4 Fish, transparent 291 Fisheries of the United States. 289 Fishes, poisonous 199 Fishway, new *275 Flange counting, new *775
Electric lamp, new 4 Electric lamp, new form of	Rheostat, improved. 147 Rotary motion. 216 Rotary pump, novel. 6	Anti-1at. 344 Antiquities from Chiriqui 38 Anti-vaccination folly 304 Ants, curious facts about 71 Applerot, cause and prevent'n of 343 Anti-vaccination folly 304 Anti-vaccination folly 304 Applerot, cause and prevent'n of 343	Castor oil, to sweeten and purify (19) 283 Castor oil, to test	Disinfectants, how to use them. 179	Flexible toys. (7) 403 Flies, ichneumon. 8 Flint imp'm'ts of the Aborigines 48 Floors, asphalt and timber. 20 Flour mill, largest. 291
Elevated railways, progress of 255 Elevators, floating 207 Engineer's transir, improved 214 Engine, portable, new 19 Engine, steam, Exeter 51	Sad iron and fluting roller, comb. 102 Sanitarium, Holloway 215 Saw gumming, improvement in. 86 Scaffolding screw 134 Genus dungarness 134	Ants, curious facts about. 77, 14, Applerot, cause and prevent'n of 343 Apples, to preserve. (19) 417 Aqua-regia on platinum. 216 Aquaria, chem. and phys. of. 118 Aquarium, cementfor. (25) 59 Architectural designs, copying. 314 Argan oil. 208 Arsenic in the brain. 244 Arsenic in water colors 42, 131 Art, industrial, in New York. 4, 131 Art, industrial, in New York. 208 Asynalt and timber floors. 20 Assphalt and timber floors. (27) 172 Assays. (27) 173 Assays. (27) 174 Assays. (27) 175 Assays. (27) 175 Assays. (27) 176 Assays. (28) 177 Atlantic cable, new 377 Atlantic cable, new 377 Atlantic cable, new 377 Atlantic temperatures. 183 Antropine and philocarpine. 312 Audiphone, another. 342 Aurora borealis. 314 Aurora, the 183 Australian exhibition 100 129 Australian railway, new 345 Azores, geysers of the 37	Cave, remarkable, discovery of. 262           Cavern, inscribed, in Wisconsin. 40           Caves, mountain, Cumberland. 181           Cedar posts, to preserve. (35) 108           Cellar drainage. (21) 1	Double stars, colors of   138	Flour mills, horizontal, French*243 Flour mixed with min'rl substan. 154 Flour, new process
Fajence	Scovill Manufacturing Co.'s W'ks 375 Scow, drilling, United States. 31 Screw driver, improved. 358 Sea cow, great, of Horida. 279 Sea serpent, the great. 415 Sewer gas stopper, new. 49	Arsenic in the brain	Cement acid proof       (4) 12         Cement for belting       (26) 349         Cement for leather       (6) 283         Cement for meerschaum       (9) 283         Cement, rubber       (9) 27         Cement to resist kerosene       (4) 171	Drawing apparatus, perspective*307 Drawing tools, to protect from rust	Fine and tubular boilers(9) 11 Flying dragon, the
Fire lighter, automatic, new	Sewer gas stopper, new	Assays	Cements for furnaces (3) 283 Cental system, the 52 Central park zoological collect'n 17 Chair, barber's, new *246 Chair, window cleaning *342	Drawing tools, to protect from rust	Foot pounds, energy in
Flange coupling, new	Siver-place ware, linaur. 01. 307 Sleeping-car berth, improved. 307 Soap manufactory, views of. 335 Spar torpedo-vessel, Acheron. 69 Spindle, an improved. 327 Spot on disk of Jupiter 180 Steam-fitter, young, hints to. 355	Atlantic, passage, quickest. 19 Atlantic temperatures. 183 Antropine and philocarpine. 312 Attraction 312 Autora horealis 314 Aurora horealis 314	Chanoine dam at Pittsburg 392 Charleston's great fire of 1861 345 Chelloangloscopy 329 Chemical nomenclature 413 Chemical telegraph solution (24) 124	Dynamometer, electrical 276	Fountain, discharge for (28) 124 Four hours in the dark 145 Fourth of July snow 49 Fourth of July 186 Fox, flying 2825
Flying fox 295 Fork and spoon, combined 66 Fountain, discharge for (28) 124 Fox, flying 295 Frog, five-legged, a 165	Steam-fitter, young, hints to 355 Steam heating, the Holly system 1:4 Steam whistle, improved. 117 Steel, Bessemer. 127 Stone dressing tool, new. 414 Stovepipes, improvement in. 262	Aurora, the       133         Australian exhibition       .100, 129         Australian railway, new       345         Azores, geysers of the       37	Chemicals, nome	Earthquake, disastrous, in Sicily. 9 Earthquakes, depth of. 26 Earth's day increasing. 410 Earth's the, magnetic poles. 2 Easton bridge, repair of the. 85	Freckles, to remove
Gas exhauster governor, new	Straw-cutter, improved. 118 Sun's, the, radiant energy 53 Sun, the, a source of power 67 Sweeper, new. 339 Swelled trunk palm, the. 151	B  Babbitt metal	Chicle	Easton bringe, repair of the. 85 Eclipse of 1880. 17 Eddystone lighthouse, new. 145 Education, mechanical, advan. of 52 Egg holder, new. *899 Eggs, counterfeit. 400 Eggs, rotten, artificial 386 Eggs, to preserve. (19) 417 Ejector, Friedmann's. *319 Electrical alarm compass. 81 Electrical abalance, the 88	Foot pounds, energy   10   10   10   10   10   10   10   1
Glassware, ancient	T         Tadpoles       343         Tamaring, the       215	Band saw. wooden pulleys for (7) 187 Bank of England notes. 85 Baptismal font \$\text{**265}\$ Bark lodge, how to make. 134 Barometer handkerchiefs. (23) 288	Chlorophyl.   244   Christian era, beginning of12 403   Chrome, iron on	Eggs, rotten, artificial 386 Eggs, to preserve (19 417 Ejector, Friedmann's 319 Electrical alarm compass 81 Electrical balance, the 98 Electrical experim't rem'kable, 166	Furni in man. 128 Fusing metals without fire. 247
Glassware, Anteint. 31 Glassware, Roman. 31 Goat Intelope, Japanese. 135 Grain trade of New York. 218 Grinding mill, improved. 83 Gun, hammerless. 411 Gun, the Thunderer's. 130  H  Harris-Corliss Engine. 175 Haymaking, artificial. 288 Hoop, barrel, novel 140 Horse elipping machine, new 210 Horse elipping machine, new 210	Tarsier, the	Barroneter tune, to nil (1) 261, 292 Barrel hoop, novel	Cider, to preserve sweet (14) 251 Cinchonidine in quinine (5) 251 Cincinnati exposition, the 192 Cincinnati industrial exhibition. 64 Cities, chief. 85 years ago 412	Electrical gyroscope	Game, caution about shot in 200 Gas exhauster governor, new *15 Gas lighting experiments 115 Gas mains, cast iron 378
Haymaking, artificial 358 Hoop, barrel, novel 291 Horse clipping machine, new 210 Horse detacher, 1ew 378 Hose coupling, improved 15	Thick-thighed walking stick. 7 Tongs, hardening, improved. 398 Tornelia. 71 Torpedo experiments, new. 257 Tracing apparatus, Pratt's. 385	Battery, gravity       (3)       43         Battery, Grenet       (14)       299         Battery, Leclanche       (37)       28,       (17)       139         Battery, salts formed in       (10)       27       172         Battery solution       (27)       172	City horses.       165         City, toy, a.       5         Clambake, pre-historic       229         Clay, white, to color       (21)         Cleopatra's needle, moving       322	Electricity, atmospheric, laws of 197 Electricity for lighthouses	Gas well and carbon factory.   352     Gases pressure (f (19) 27     Gear, compounding (37) 44     Gear-dressing machine *150     Gelssler's tubes, photo. of spectra 182
Hose nozzle, new	Traction engine, novel 382 Tranway, self-laying 163 Transmitter, Blake 274 Transmitting motion, de vice for 166 Treadle motion, novel 384 Transmitter 186	Batteries, EM. force of. (3) 172 Batteries, EM. force of. (3) 123 Batteries, to prev. evap'n f'm (1) 299 Beard, an extensive. 273 Bee farm, large. 279 Bells (2) 399	Cleopatra's needle, preserving	Electric lamp	Gelatine negatives 177 Gelatine plates, developing 395 Gelatine, purifying 361 General Wool monument. 185 Generator, electrical, Edison's. 276
Thex, the	Tubular piles.     147       Tug coupling, improved.     34       Tuning fork, resonant.     293       Tying-in machine.     398	Beits, oil for       (24)       43         Benzoate of soda       396         Bessemer, Sir Henry       6         Bessemer steel       *127, 297         Bessemer steel interest       192	Clocks, a couple of 132 Clothing, manufacture of 282 Cloth paper, to make fireproof 218 Cloth, to waterproof 525 Clover seeds, how to save 170	Electric lamp, smoke of. 20 Electric light	Geologi, speci. from Luray cave. Sl Geranium oils, adulteration of. 329 Geysers of the Azores. 337 Geyser well, Kane. 233 Gila monster. *339
J  Jewelry, electric	Valves, manufacture of	Best goods always pay best   338	coal, anth., elect of exposure on 100         Coal, anthracite, in Mexico.       5         Coal crop, the.       118         Coal, origin of.       402         Coal crop, the.       118         Coal, economical use of       125	Electric light in photography *47 Electric light, photography by the 57 Electric light, water power for .(3) 299 Electric motor(29) 188 Electro-magnet, large	Gliding on glass
K           Kansas whirlwind         1           Keys, ancient         25	Walking stick, thick-thighed 7 Whbasin valves, impro vd 35 Water meter, new 34	Bitten by a skunk, but alive	Coal, formation of.       33         Coal near Hudson's Bay       291         Coal on the Pacific coast       35         Coal tar, to remove       (38) 44         Coal-tipping machines       *290	Electro-plating	Glass, to cut a hole in
Lace fan	Water wheel, improved 35 Whale and the grampus 167 Whirlwind, Kansas 1 Whooping cough, cause of 397 Windmill, new 291 Wing covering machine 291	Blastengine. **522 Blowing upriver snags. 163 Blowpine, electric. 70 Blushing and blanching. 152 Boating, overland. 121 Boatlowering apparatus **150	Cocnineal insects, facts about 325 Cocoanut milk, new use for 115 Codfish trade, California 68 Coffee pest, specific for the 152 Cog-wheel, a large 176 Cold a, how to stop 906	Elevated railway extension. 273 Elevated railwaynuisance. 313 Elevated railway, Philadelphia. 296 Elevated railways, cost of. 310 Elevated rail's, foundation plate, *338 Elevated railways. progress of. *955	Glue, liquid. (1) 315 Goat antelope, Japanese. 135 Gold and silver, imitation. 103 Gold and ilver, year's product. 377 Goldbeater's skin. (16) 107
Harris-Corliss Engine	Woodcock, singular habit of. 383 Work table implement, novel 118 Wrench, a new	Boat, propelled by steam jet. (1) 59 Boat, surf, new *198 Boat, motors for (44) 44	Cold wave, where it comes from 414 Colic, treatment of 295 Collision, strange, at sea 194	Elevators, floating *207 Emery wheels, solid (30) 43 Employment 21	Cold, to extract

Gopher trap wanted	Latties, milling attachment for. '38 Lattin and Greek, study of	200	Propeller (32) 60 Propeller screw, new 130 Propellers arms of (82) 219 Propelling apparatus, new 283 Prosperous times, signs of 226 Protagon 226 Pruning and grafting implement 398 Pulleys (7) 219 Pump, boiler feed, improved 150 Pump, rotary, novel 160 Pump, chain, improvement in, 379 Pumps, duty of (11) 107 Punch and shear, combined 194 Punching and shearly press 194 Purple foot future scalaries 296	Snowballing in July 153 Snow storms in India, remark 330 Soap, hard, 365 [188 Soap manufactory views of 355 Soap mine, natural 74 Social Science Association. 193, 218 Social Science Association. 193, 218 Sodiam, spectrum of 23 Solars spectrum, new map of the 136 Solano, largest ferryboat 414 Soluble glass 242 Sorghum in the West 333 Sound, velocity of 365 Sound weves 397 South America, extension of 28 South Pass, great ship enters. 321 Spar torpedo vessel Acheron 59 Speaking, public, on 25	Tortoise shell, to solder
Gun, the Thunderer's #130 Guns, powerful. 265 Guns, powerful. 265 Guns, powerfol. 264 Gutta percha, to dissolve	Lesseps and the canal. 178 Letter boxes, electrical 116 Letter press, look 1117 Letters patent. 962 Life, long, to attain 111 Life, the science of 111 Life, the science of 111 Lighting the Capitol by electric. 261 Lightining arrester. (14 59, 5) 91 Lightining, inductive action of 116 Lightining, protection from. 272 Lightining protestion from 272 Lightining rods. (20 59, (22) 155, 334 Lighting rods. (30 59, (22) 155, 334 Lighting rods. (30 59, (22) 155, 334 Lighting rods. (30 59, (32) 165, 334 Lighting rods. (30 59, (33) 108 Linen spice vs. alcohol 275, (33) 108 Linen company, Willimantic. *551 Linen to starch. (7) 315	Oriental sam and mud baths. 320 Ornaments, bogoak. 178 Otooyon, the. 231 Otter, the 327 Our ferry traps 165 Oxygenating water 211 Oxyhydrogen blowpipe. (8) 403 Oxyhydrogen light (19) 27 Ozokerite or mineral wax. 153	Q Queen, office of the	Specimen, singular 424 Spectacles, use of, delayed 244 Spectroscope, powerful 25 Spectroscope, powerful 25 Spectroscope, powerful 25 Spectrum of so dium 223 Speeds, fast. 266 Spectrum of so dium 223 Speeds, fast. 266 Spectroscope 25 Spectrum of so dium 223 Speeds fice yachts. 25 Spectrum of so dium 223 Speeds fice yachts. 25 Spectrum of so dium 224 Spectrum of so dium 224 Spectrum of so dium 224 Spines of fice yachts. 25 Spines of fice yachts. 25 Spines of the cactus, invisible 186 Spitting paper 6 Spontaneous combustion 6 Spontaneous ignition 178 Spot on disk of Jupiter 33 Spontaneous ignition 178 Spot on disk of Jupiter 36 Stable, improved, for horse railw 99 Stalning pine 170 Stable, improved, for horse railw 99 Stalning pine 215 Stable, to remove, from hands 21 Stable, to remove, from hands 21 Starch, explosion of 151	Trance a long. 25 Transfer ornaments. (9) 235 Transfer ornament, new form of 182 Transmitter, Blake. *274 Transmitting motion, device for 166 Treadle motion, novel. *334 Treasury, fortifying the 100 Tree, giant. *135
Heating, horse cars, plan for. 383 Hectograph ink. (14) 347 Hedges, white willow. 215 Hog cholera. 339 Holster, 1,500 horse power. 117 Holes in hard steel. 102 Hop, a substitute for. 396 Hop plant, use of the. 87 Horn, to color. (2) 283 Horn, to stain. (10) 283 Horn, to stain. (10) 283 Horse-clipping machine, me. *210 Horse crazed with tea, a. 231 Horse detacher, new. *378 Horsnails, machine-made. 88 Horse-power rent. (6) 107 Horses, unshorten. 55	Lobsters for the Pacific coast. 55 Locomotive engine driving. 382 Locomotive, lifetime of a. 69 Locomotive, lifetime of a. 69 Locomotive, lifetime of a. 69 Locomotive, the . 310 Locomotive, the . 310 Locomotives, freless. 379 Locomotives, freless. R. 311 Logs, a big jam broken . 130 Longevity, comparative . 10 Longtude of the United States. 66 Lotus, the, in New York 243 Lumber district, prosperity in the 182  Machines drying	Palisty plate. 265 Palmetto fiber for paper. 35 Palmetto fiber for paper. 399 Panama ship railway, proposed. 160 Paper, albumenized. 261 Paper collars arsenic in 149 Paper from grass. 311 Paper, splitting. 6 Paper, to render, acid proof. (25) 403 Paper trade, export. 244 Paper, water and fireproof. 326 Paper water and fireproof. 367 Paper	Railway risks   55     Railway signals   (15) 267     Railway sleepers, glass   201     Railway speeds   201     Railway speeds   199     Railway speeds   115     Railway traveling   French   277     Railway wheel   arunaway   121     Railway wheel   arunaway   121     Railways   16   61     Railways   16   67     Railways   16     Railways   17     Railways   17     Railways   18     Railways	Stars, tunmensity of the 330 Statistics, immigration 164 Statuettes, to metallize 22 Steam engine, economical 26 Steam engine, economical 26 Steam engine of the future 10 Steam fitters, a few words to 17 Steam fitters, a few words to 17 Steam heating in Troy 164 Steam heating surface (1) 235 Steamheating, the Holly system 114 Steam jet in smokestack (15) 11 Steam launch (5) 59, [19] 124	U Upholstery, to clean
Household perils.  How business is now done. 58 How to print letters 82 Hughes' micro, and Blake trans. 380 Human volce, the 167 Humming bird's nest, a 118 l'uxley on pluck and endurance. 169 Hydraulte ram (20) 188, (8) 251 Hydraulte ram, new 288 Hydraulte ram, new 283 Hydraulte ram, new 283 Hydraulte ram, sower of (17) 252 Hydrhodic acid 55 Hydromotor 223 Hydrophobia successfully tre'd 144 Hyglenic effects of air. 85	Magnetism and electricity   201	Patent laws, improved	Razor strops	Steam vessels, inspection of   413     Steam whistle, improved   *117     Steam whistling, Deculiar   (31), 108     Steamboat, small   (31), 108   324     Steamer, coastwise, largest   345     Steamer, Cunard, new   358     Steamer, Steamer   (28)   92	Virginia's oyster trade. 164 Volcanic products of the Pacific. 359 Volcanoes, active, in Java. 5 Volcano of Agua, ascent of the 170 Voyage, a rapid. 129
I	Menhaden fish guano 344	Pens and pencils, manuf. of*308 Pens, machine made, origin of. 356 Pens, water	Roadmasters difficulties   321	Stovepipes, Improvement in*262 Stoves, American, in Eingland	Wages and prices in Belgium. 152 Wages and prices in France. 152 Wages and prices in Germany. 276 Wages and prices in Gt. Britain. 298 Wagon hardware trade. 358 Walking stick, thick-thighed. *7 Wallut, to stain. (5) 267 Wapiti, the. 383 Wash basin valves, improved. 358 Wash for brick-thigheroved. 328
India rubber, how obtained	Metals, transparency of	Photo-decoration of metals. 282 Photo-plates, gelatine. 197 Photo-printing, carbon. 281 Photo-printing, carbon. 281 Photo-typie, new process, new. 281 Photo-typie, new process of. 104 Photographic patterns. 117 Photographic patterns. 118 Photographic patterns. 168 Photography spirit, Heddey's. 81 Photography by the electric light 57 Photography, changes in. 47 Photography, changes in. 47 Photography in natural colors. 260 Photography in natural colors. 260 Photography in metals. 250 Photography of flashing signals. 250 Phylloxera, the, in France. 27 Physical science, philosophy of. 381 Phano and organ factory, Beatty 381 Plano and organ factory, Beatty 381	Sanitary appliances, exhibt'n of. 18 Sanitary Cart. Eads wanted, a. 97 Sanitary yconventions in Michigan 339 Sanitas. 290 Saw blades, to braze. (22) 300 Saw dust, to utilize. 377	Stovepipes, Improvement in	Water meter, new. *34 Water pressure of, in pipes. (6) 11 Water purification of. 25 Water supply of Philadelphia. 304 Water supply of Philadelphia. 381 Water supply pipes. (26) 188 Water, to purify. (12) 43 Water, to test. (21) 43 Water to test. (21) 43 Water tower, the 24 Waterproof blacking. (7) 831 Waterpoof cating paper ves. (11) 251 Waterproof page 26 26 26 27 Waterproof page 27 26 27 27 27 27 27 27 27 27 27 27 27 27 27
International dairy fair	Mississippi letties finished 49 Mississippi letties, work on 240 Mississippi letties, work on 240 Mississippi river commission 161 Missouri river, the 42 Mitercutter, new 134 Molecular chemistry 120 Monsters, ancient, some 247 Moth, house-builder 343 Motive power, England's 241 Motor and meter, new 2773 Mouth Hood smoking 84 Mowing machine, canal 148 Mucilage (27) 12 Muffling contriv., Harrington's 33 Multiplication, abbreviating 14 Mushrooms, poison 23 Musical instrument, new 320 Musical instrument, new 320	Pier, Coney Island	Scaffolding screw *134 Scale in boilers (36) 60 Scarus Inacamaia. *23 Science as applied to tanning. 322 Scientific Amer as an educator. 376 Scientific American for 1880. 499 Scientific American in Italy. 97 Scientific American in Italy. 97 Scientific American in Turkey. 401 Scientific Teredulity. 3 Scientific redulity. 3 Scientific redulity. 3 Scientific Provides (45) Scovill Manufactur. Co.'s works.*375 Scow, drilling, United States. *31 Screw driver, improved. *358 Screws, to nick. (2) 267 Sea cow, great, of Florida. *279 Sea level changes. 168 Sea lion, baby. 77 Sea screpent, the great. *415	Table salt an aperient	Water, hard vs. soft.   69, 89   Water, impure.   248   Water meter, new * *34   Water pressure of, in pipes. (6) 11   Water purification of
88, 102, 116, 134, 146, 168, 181, 198, 210, 230, 243, 263, 275, 294, 306, 325, 338, 357, 378  Inventions, recent, a few	Nusta	Plating, silver	Sea water in chronic catarrh. 238 Sea weeds asfood. 344 Sealing wax. (25) 267 Seeds. (25) 267 Seeds. (25) 267 Seeds (25) 267 S	Technical science in New Zeal d. 192     Telegraph cables, ocean	Wicks, incombustible
Ivy poisoning	Niagara river, sounding   193	Poisons, solonaceous. 88 Polar expedition, American. 48 Polar expedition, new British. *183 Polar pantograph, the. *66 Polar sea, Siberian, naviga. of. 379 Polarization of batteries. (7) 843 Polyphemus the. 306 Pompano, a remarkable. 218 Porpolses and gulls. 280 Portable engine, new 29 Postage stamps, how printed. (13) 11 Potassic iodide, to estimate. (16) 91 Potato digger. improved. *66 Potters, Amer., congress of. 411 Powd'd substances, pressure on. 154 Powd'd substances, pressure on. 154 Powder-post insects. *261 Powders, luminous. 248 Power, transmission of. (31) 204 Precision instruments of. 386	Ship railways	Telephones, current in	Wood polish. (20) 448 Wood pulp making. 243 Wood, rotten, as a pest breeder. 49 Wood stains. 147 Woodcock, singular habit of. *383 Wooden railway, thousand dol. 17 Worcester free institute, the. 128 Work and wages in Lowell. 813 Workmen, more needed. 293 Work table implement, novel. *118 World's fair, proposed. 277 Woven fabrics, strength of, etc. 408 Wrench, a new. 278 Writing telegraph, the. 90
Intelligent workmen needed	Obelisk, Egyptian, for New York, 273           Obituary:         296           Boyden, Uriah A	Preserve your papers   280	Silver mines of Arkansas	Togatsoo   poisoning   229     Tobacco   cotton, corn, and wheat 402     Tobacco   option in Germany   164     Tobacco   option in Germany   164     Tobacco   outsitutefor   (26) 43     Tomato   plant,   uice of   168     Tongs, hardenin g, inproved   *388     Tools, care of   326     Tornado of Apr. 14, '79, Missouri   51     Tornelia   170   181   181     Tornelia   370   181     Torpedo   osats, fast   379     Torpedo   catcher, the   310     Torpedo   catcher, the   310     Torpedo   Lay, the   249     Torpedo   Vessel, French, new   34     Torpedo   Vessel, French, new   34	Yarn, to soften       (23) 252         Year successful, a       244         Year's progress, a       408         Yellow fever       154, 160         Yellow fever, disinfection of       184         Yellow fever, Stille on       112         Z       Z         Zincography       (12) 235         Zinc, to purify       (4) 187         Zoological collection, Cen. Park       17         Zoological pardens for N. Y       256         Zymotic contagion       416

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