

SCIENTIFIC AMERICAN

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STATIONARY BEAM ENGINE.

One of the engines driving the machinery at the American Institute Fair was a fine beam engine, the exhibit of Thomas F. Rowland, of the Continental Works, Greenpoint, Brooklyn, N. Y. It is an automatic cut-off beam engine, having a diameter of cylinder of 15 inches and a length of stroke of 30 inches. At 85 revolutions per minute, 80 pounds initial pressure, and cut-off at one-quarter, it is rated at 90 horse power. The diameter of the fly and pulley wheel is 8 feet, and it has a 30-inch face. It weighs 11,300 pounds.

The engine is very strongly built, the cylinder, column, and main pillow block resting on a heavy bed plate. The beam is of wrought iron, neatly ornamented. The cross-head, fitted with brass gibs, is carried in cast iron slides. The crank shaft is of the best hammered iron; the piston rod, wrist pin, beam centers, crank pin, and all wearing journals are of steel. The valve levers, and bell cranks, and smaller parts of the cut-off gear are steel castings nicely finished.

The valve gear combines all of the advantages of an automatic cut-off gear generally, with the particular merits of the well known Corliss, and of other forms of valve gear of the disengaging type, with several points of special merit.

In this form of valve gear there are but two steam chests, from which the steam is admitted to and exhausted from the cylinder by means of a circular valve. The cut-off valve, also of the circular class, is located on the back of the main valve, and is operated through the hollow valve stem of the latter. The main valves are worked by bell cranks which receive a positive motion from a single eccentric. The cut-off valves are operated by levers which move simultaneously with the main valve cranks during the forward stroke through the intervention of a pawl which engages with a projection on the cut off lever. This pawl is tripped, as in the Corliss gear, by means of a cam at a point of the stroke which is determined by the governor; the cut-off valve is at once closed by means of a spring attached to the main valve crank and acting upon the cut-off valve lever; a small air dash pot carried by the main valve crank serves to cushion the cut-off gear and prevents all undue jar. A fixed buffer stop arrests the motion of the cut-off lever as it travels with the main valve

crank during the return stroke, and insures the proper opening of the cut-off valve and the re-engagement of its lever with the pawl at a definite point just previous to the beginning of the new stroke.

The power required to effect the cut-off is quite small, since the cut-off valve is balanced during the operation. The range of the cut-off is very liberal, and comes well within any demands that may be made upon it by variations in the load.

The entire valve gear is exceedingly simple and compact, and presents nothing that would make it liable to disorder. Engines with this form of cut-off have now been in continuous actual operation upward of two years. This valve gear is known as the Twiss Patent.

A New Source of Glucose.

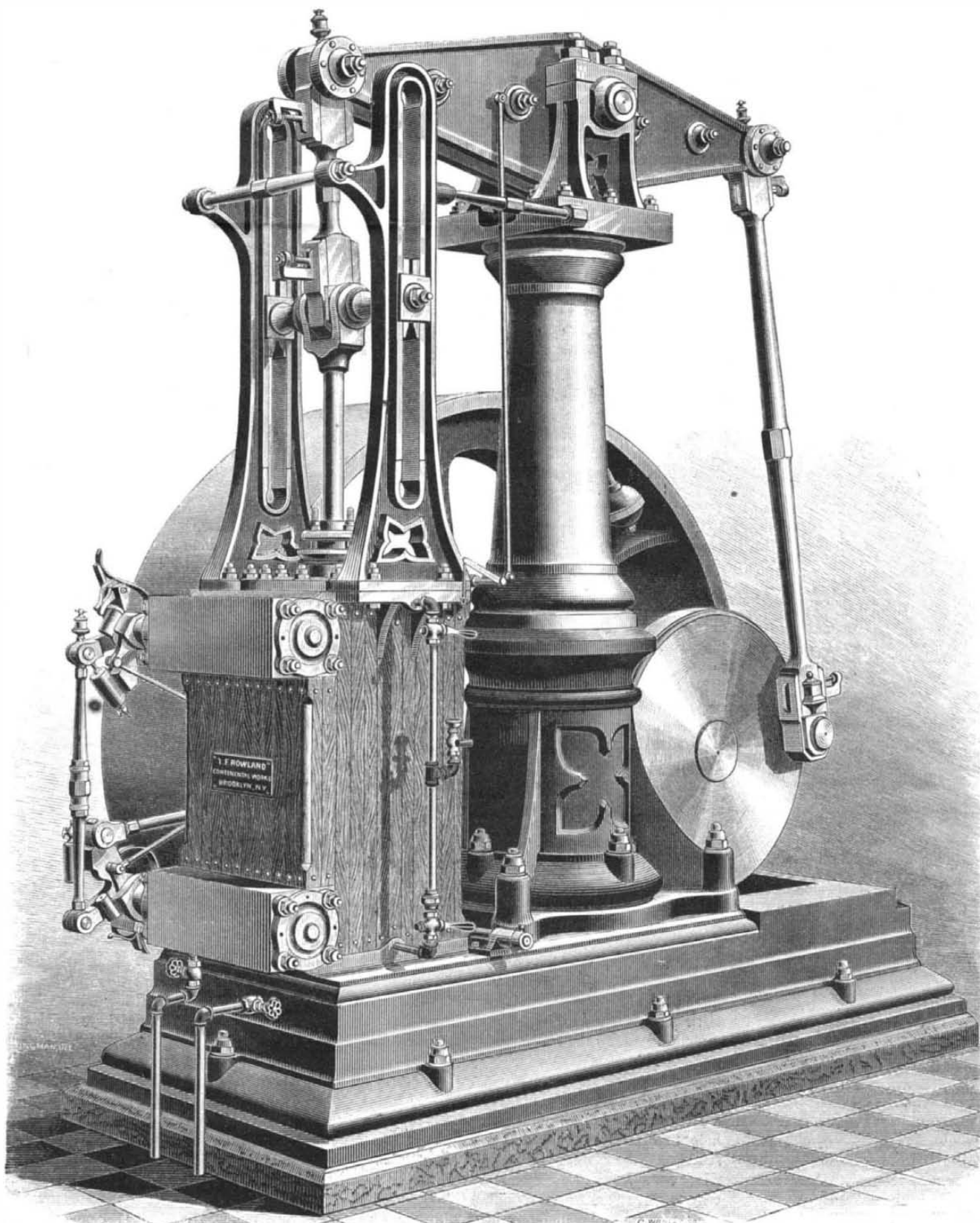
A company has been formed in Philadelphia to manufacture glucose from cassava, the source of tapioca. As at present manufactured from corn, the average yield of corn being taken at 35 bushels to the acre, the glucose product is about 1,000 pounds to the acre. The yield from cassava is reckoned to be fully twenty times as great. The company's

expectation will doubtless bear considerable paring down. They say that well-authenticated evidence is at hand to the effect that 20 tons of cassava to the acre is no unusual crop in Florida. This, at 56 pounds to the bushel, would give a yield of over 700 bushels per acre, or, at the rate of 30 pounds of glucose per bushel, would produce over 21,000 pounds of glucose per acre. A comparison of the yield of glucose from corn and cassava shows that 1,000 acres of corn yields about 500 tons of glucose; 1,000 acres of cassava yields about 10,000 tons of glucose.

New Method of Compulsory Alimentation.

When insane patients refuse to take food, Keppelmayer advises the following: The patient, being placed on a perfectly horizontal couch without pillow, one nurse holds the head, another the outstretched arms, and a third the legs. A soft rubber Jacques catheter No. 10, with a large lateral opening near the tip, is well oiled, introduced through one nostril, and slowly and gently pushed on as far as the pharynx. Here it usually meets with an obstruction. Without using any force, very gentle pressure is now exerted

until an act of deglutition is excited by which the catheter is propelled into the stomach. These catheters are of such a length that, when the tip has entered the cardiac orifice, the other end hangs from four to six centimeters outside of the nostrils. A hard rubber canula having now been fixed in the projecting extremity, a syringe with a capacity of about half a liter, and filled with fluid food, is fastened to the canula and the contents slowly injected into the stomach, after which the apparatus is withdrawn. Should the manipulator lose patience when the catheter is obstructed at the entrance of the pharynx, and use undue force, the tip of the instrument is liable to deviate from the proper course, and suddenly makes its appearance between the teeth. This maneuver once acquired by a patient, subsequent attempts at catheterization will require particular patience and care in order to succeed. The chief recommendations of this method of forced alimentation are its simplicity and the impossibility of causing an injury during its execution. Keppelmayer also recommends the employment of large-sized soft rubber catheters, provided with a large, smooth opening at the tip for administering enemata.—*Med. Chirurg. Rundschau.*



NEW BEAM ENGINE BUILT AT THE CONTINENTAL WORKS, GREENPOINT, BROOKLYN, N. Y.

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NEW YORK, SATURDAY, DECEMBER 31, 1881.

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THE SCIENTIFIC AMERICAN IN THE WORKSHOP AND ENGINE ROOM.

It is a common practice among intelligent manufacturers and other employers of mechanics and engineers to encourage their men to read the SCIENTIFIC AMERICAN. Some go further and take care to insure such reading by presenting their foremen and other men in responsible positions with annual subscriptions to the paper.

The practice is politic as well as kindly. It is safe to say that no mechanic or engineer can read the successive numbers of the SCIENTIFIC AMERICAN for a year without receiving suggestions if not specific instructions touching the work he has in hand, likely to be worth to his employer many times the price of the paper.

Take for illustration the single series of illustrated papers on boiler explosions published during the current year. In each instance it has been the aim to discover, if possible, the exact conditions and causes which led to the disaster, and to set them forth in the description and the engravings so plainly that the most inattentive reader could not fail to receive useful suggestions, if not material information. The habitual consideration of the conditions and results of boiler explosions, on the part of men who have charge of boilers, must of necessity make them more critical of their own work, more cautious, and more intelligent, both in detecting signs of weakness in boilers and in pursuing a course calculated to preserve the integrity of the boilers in their care. In view of the necessarily limited personal experience of the majority of firemen and engineers with respect to the management of boilers, the practical value to them of articles like those referred to can scarcely be overrated, while their indirect value to the owners of such boilers in lessening the risks of disaster bears no comparison with the small amount of a year's subscription to the SCIENTIFIC AMERICAN.

It is well recognized that an important factor of the prosperity and peculiar excellence of the manufacturers of this country has been the superior intelligence and inventiveness of American mechanics, their fertility of resource, and promptness to meet new problems with new devices, the fruit often of a breadth of knowledge of what is going on in other branches of industry not common among the mechanics and artisans of other countries.

That American workmen are so little hampered by the narrow trade rules and customs which make the introduction of improved methods and appliances so difficult elsewhere, may be largely attributed to the more general custom here of reading for information, particularly industrial books and newspapers.

The part which the SCIENTIFIC AMERICAN has taken in this connection during the past thirty-seven years is one of which we have reason to be proud. For more than nineteen hundred successive weeks this paper has carried its freight of information and influence to every part of the land and to many foreign ports; and we do not believe that in a single instance has it been other than a messenger of intelligence and influence for good.

Thanks to its acquired position and the generous support of its numerous patrons, the SCIENTIFIC AMERICAN is able to set before its readers from week to week an amount of information and a fullness of engraved illustrations such as no other industrial paper can begin to rival.

SAFETY CAR COUPLINGS.

Our recent remark, that in spite of the two thousand patents on car couplings, there is yet an unsatisfied demand for an automatic coupler, is disputed by a correspondent. The trouble lies, he says, not in the lack of invention, but in the indisposition of the railway companies to adopt them, or even to consider their possible merits. He says: "So long as human life is as cheap as they (the railway companies) figure it, there is no likelihood of any improvements being adopted to prevent the killing off or crippling of employees; and so long as they can call it 'carelessness' or 'accident,' they do not want a remedy, unless some one would change all their couplings in one night and without expense to the roads."

This is putting the case with a directness that will seem little less than brutal to the railway authorities; to those, however, whose lives are in daily, it may be hourly, peril in making up trains—a hazard that existing appliances might largely if not entirely obviate—our correspondent's statement of the case may not seem at all too severe.

Our correspondent adds: "When you talk with railway magnates about a change they say it is impossible, for the reason that the new coupler would have to be adopted by all the roads, and the change would cost too much and occasion great loss of time. It all simmers down to this: Human life is too cheap. From talking with those connected with railways, I do not think it would take them long to find something to fill the bill if they were compelled by law to make the change."

As mentioned in this paper last week, a hearing has been accorded the inventors and owners of automatic couplers by a Connecticut State Committee, whose report may greatly help to determine the fate of a bill before the General Assembly of the State, requiring the Connecticut railways to adopt some form of safety coupling. If the problem is as easy to solve as our correspondent thinks, a practical beginning may soon be made in compelling the use of such devices. If the adoption of safety couplings can be secured in one State, the value of legislative attempts to save the lives and limbs of train-men will be established, and other

States will follow suit. The change may be delayed, but it must certainly come, and the longer the delay the greater will be the cost of it.

THE SCIENTIFIC AMERICAN SUPPLEMENT.

For the convenience of the readers of the SCIENTIFIC AMERICAN we give in this, our last issue for the year, a catalogue of some of the many valuable papers contained in back numbers of our SUPPLEMENT. Any of these numbers can be had whenever required, either by sending to this office or by ordering through a newsdealer. The catalogue embraces a most extensive range of scientific subjects; and, what is better than all, most of the papers cited contain recent information upon the matters of which they treat. Does any reader wish to inform himself as to the most recent progress in Mechanical Engineering? He will quickly be able to post himself by reference to the admirable address of Prof. R. H. Thurston, given in full in SUPPLEMENT 308, and that of Sir William Armstrong in 307. Does he wish to acquaint himself generally with the present condition of research in respect to Biology, Embryology, Anthropology, Geology, Paleontology, Geographical Discovery, Astronomy, Light, Color, Applications of Electricity, Economic Science, Education? Let him consult the recent address of Sir John Lubbock, given in full in SUPPLEMENT 301, copies of which he may obtain for a dime.

This catalogue is a minor exhibit of the astonishing advance which is constantly being made in scientific research and discovery.

Labor Statistics.

The third annual report of the New Jersey Bureau of Labor Statistics, just published, shows a fairly encouraging state of affairs. It shows that the average amount spent by workingmen in a year is \$455.27, and the average amount earned \$498.53, leaving an average saving of only \$43.26 in a year. The expenses also include sundries, tobacco, liquor, physicians' and druggists' bills, and other similar items. The report says that the truck system—compulsory dealing with stores in which the employers have an interest—is nearly abolished in the State, and that nearly all the wages are paid in cash. The average number of hours per week during which labor is performed is sixty. During the past year there was a marked diminution in the number of days lost through inability to obtain work. The average was forty from this cause, while last year it was eighty-seven. The average from sickness was seventeen. Wages have also advanced in most occupations, the average for men this year being \$1.78 as compared to \$1.45 last year. A fact shown in the report is that a great many laboring men depend for substantial assistance upon their families; indeed, that nearly all wages-earners receive aid in this way.

Gold and Silver in 1881.

In his annual report just issued the Director of the U. S. Mint estimates the world's production of gold for the calendar year 1880 at \$107,000,000, and of silver at \$87,500,000. The consumption of the world in ornamentation, manufactures and the arts is estimated at \$75,000,000 of gold and \$35,000,000 of silver. The estimated circulation of the principal countries of the world is placed at: Gold, \$3,221,000,000; full legal-tender silver, \$2,115,000,000; limited tender, \$423,000,000—total specie, \$5,759,000,000; paper, \$3,644,000,000, making the total circulation, including the amount held in Government treasuries, banks, and in active circulation, \$9,403,000,000.

The production of gold and silver in the United States during the past fiscal year is put down as—gold \$36,500,000, and of silver, at its coining value, \$42,100,000—a total of \$78,600,000. Manufacturers of jewelry and other articles and materials of gold and silver reported a consumption of over \$10,000,000 in gold, and nearly \$3,500,000 in silver. The Assay Office at New York delivered to the manufacturers during the year \$5,700,000 of gold in bars and \$5,100,000 in silver. Taken together they appear to indicate a consumption of at least \$11,000,000 in gold and \$6,000,000 in silver. The Director estimates that the special circulation in the United States at the close of the fiscal year amounted to \$440,000,000 in gold and \$171,500,000 in silver.

On the first of November, 1881, the amount of specie, including bullion, in the mints and assay offices, available for and awaiting coinage, was \$563,000,000 of gold and \$186,000,000 of silver—a total of \$749,000,000.

Umbrellas and Pepper.

The umbrella trade grievously threatens the existence of the pimento plantations of Jamaica. An official estimate made in Kingston, last fall, reckoned that more than half a million umbrella sticks were then awaiting export to England and the United States. These sticks were almost without exception pimento, and it is not surprising to be informed that owners and lessees of pimento walks are becoming alarmed at the growth of a trade which threatens to uproot, in a few years, all their young trees. The export returns for the past five years show an average of 2,000 bundles of sticks sent out of the island annually in the ordinary course of trade, and the returns for the first three-quarters of 1881 show an export of over 4,500 bundles, valued at \$15,000. When it is remembered that each bundle contains from five hundred to eight hundred sticks, each of which represents a young bearing pimento tree, the extent of the destruction may be realized.

THE WORLD'S COTTON TRADE.

Statistics gathered by the Department of State, and soon to be distributed, make the cotton product of the several cotton-growing countries to exceed three and a half billion pounds a year. Of this amount there is furnished by the

United States.....	2,770,000,000 pounds.
East Indies.....	407,000,000 "
Egypt, Smyrna, etc.	269,000,000 "
Brazil.....	44,000,000 "
West Indies.....	16,000,000 "
Total.....	3,506,000,000 pounds.

The figures show that the United States produce nearly four-fifths of the cotton crop of the world, and we know that the yield is steadily and rapidly increasing. Its chief rival, though a long way behind, is as notably declining. In 1875 the area under cotton in India was 11,450,000 acres; in 1878 it was only 8,000,000. The yield to the acre in this country is nearly four times that in India.

According to an English authority, Mulhall ("Progress of the World," London: 1880), the value of cotton manufactures made by machinery is annually as follows:

United Kingdom.....	\$561,170,000
United States.....	233,280,000
Germany.....	106,920,000
Russia.....	102,060,000
Other European countries	310,860,000
India.....	34,020,000
Total.....	\$1,348,310,000

It is estimated that the number of yards of cloth made every year in the primitive way with hand looms exceeds that of machine-made goods. The hand woven cottons of China, for example, amount to over seven billion yards a year.

The latest trustworthy statistics of cotton manufactures obtained by the State Department show that the principal countries employ over one and a half million operatives, as follows:

	No. of Operatives.	No. of Spindles.
Great Britain.....	480,000	40,000,000
France.....	210,000	5,000,000
Germany.....	130,000	5,000,000
Russia.....	180,000	3,500,000
Other European countries.....	250,000	6,600,000
Total European.....	1,250,000	60,100,000
United States.....	181,000	10,900,000
India.....	80,000	1,250,000
Total.....	1,511,000	73,200,000

The American figures include some 10,000 overseers, clerks, mechanics, watchmen, etc. Deducting these, to place the estimates on an equality with those of Europe, the department finds that the English operative runs about 83 spindles, the American 64½, the French 24, the German 39, the Russian 19. Thus far it would seem that the English operative is more efficient than the American. This, however, is not true, as the following important facts will show: Every American spindle consumes annually 66 pounds of raw cotton, while every British spindle consumes only 32 pounds. Every American operative, therefore, works up about as much raw material as two British operatives, turns out \$1.50 worth of goods to the British operative's \$1 worth; and even in piece goods, where the superior quality and weight of the American goods are so marked, the American operative turns out 2½ yards to the British operative's 2½. Moreover, the average price of British and American cottons exported during the year 1880, as given in the customs valuations of England and the United States, was as follows: Piece goods, plain—British, 5-52 cents per yard; American, 8-48 cents. Prints—British, 7-68 cents; American, 7-83 cents. This establishes the greater efficiency of the American operative. The difference in wages is somewhat against the American manufacturer in comparison with the English, but this is only to the greater benefit of the American operative. A comparison of wages of English and American operatives shows as follows: In Lancashire and in Massachusetts, per week: Spinners—English, \$7.20 to \$8.40; American, \$7.07 to \$10.30. Weavers—English, \$3.84 to \$8.64; American, \$4.82 to \$8.73. Average wages in Massachusetts of all employes: men, \$8.30; women, \$5.62; male children, \$3.11; female children, \$3.08. In Lancashire: men, \$8; women, \$3.40 to \$4.30. Hours of labor in Lancashire, 56 per week; in Massachusetts, 60. Thus it is seen that, although English labor is somewhat cheaper than American, the greater efficiency of the American operatives and their longer hours of work equalize the whole question of labor, while the American operative is better paid than the English.

England commands the markets of the world, and is the only country, except Switzerland, that more than supplies the home demand.

The annual imports of cotton goods of the European countries are as follows: France, \$21,000,000, against \$11,500,000 exports; Germany requires 3,000,000 spindles more to supply her home demand; Russia imports \$15,000,000, but it is probable that she will supply her home demand in a few years; Sweden, Norway, Denmark, and Belgium import \$13,500,000; Holland exports \$6,000,000 in excess of her imports; Switzerland exports \$10,000,000 in excess of her imports, and is, besides England, the only European country independent of foreign manufactures; Spain, Portugal, and Italy import \$20,000,000; Hungary, Greece, Turkey, and Roumania import \$40,000,000. The present Asiatic, African, and Australian demand can be estimated by the exports of England to those countries plus the present comparatively small exports of the United States. Great Britain exports annually \$310,000,000 worth of cotton goods, the output of

35,000,000 spindles, which is more than are run by all the other manufacturing nations combined. She exports to Asia annually \$136,791,000, to Australasia \$8,674,000, and to Africa \$19,091,000.

The imports of cotton manufactures to the United States are nearly three times as great as the exports. In 1880 they were:

	Imports.	Exports.
Piece goods, plain.....	\$1,020,000	\$5,835,000
Piece goods, printed.....	1,180,000	2,956,000
Hosiery, shirts, and drawers.....	7,515,000	—
Jeans, denims.....	1,068,000	—
All other manufactures.....	19,146,000	1,190,000
Totals.....	\$29,929,000	\$9,981,000

For the fiscal year ending June 30, 1881, there was an increase over 1880 of exports to the amount of \$3,539,869.

The excess of imports consists of fancy goods, in the production of which the English mills excel. In piece goods the American mills supply the home demand and are exporting every year greater quantities. In 1880 we imported only 9,466,000 yards of plain piece goods, and exported nearly 69,000,000 yards; of printed piece goods we imported 9,346,000 yards and exported 38,000,000 yards. The imports of print goods are confined to specialties.

The present inability of American cotton manufacturers to divide the markets of the world with Great Britain is due, in the opinion of the Department of State, to the following advantages enjoyed by the British manufacturers:

1. Possession of the world's markets.
2. The system which has belted the world with entrepôts, chiefly colonial, for the reception and distribution of English goods.
3. A steam marine that covers every sea and gives direct and speedy communication with every port.
4. Vast capital, enabling the manufacturers to keep large stocks on hand and to give long credit.
5. A far-seeing and far-reaching spirit which impels the manufacturer to continue trading even when he loses, until he tires out the opposition.

The remedy, plainly, is to follow the British example. But there is another fact that must be considered. Great Britain sends goods to Africa and sells them for 4-51 cents a yard, to India for 4-84 cents, to China for 5-26 cents. All these are, of course, adulterated goods. It is estimated that out of the \$280,100,000 worth of piece goods exported from the United Kingdom in 1880 not more than \$60,000,000 worth were pure goods. Pure American goods cannot compete with these adulterated English goods so long as the buyers prefer the adulterated goods at the low prices. The question comes up, Shall our manufacturers adulterate their goods or shall they persistently try to introduce pure goods? The consuls are almost unanimous in their opinions that after a fair trial can be had the people of Africa and Asia will prefer American goods at higher prices.

What Invention May Do.

The possibilities of science when applied to the industrial arts are so very great that careful people hesitate to state them for fear of exciting ridicule. So, in articles which have recently been published in London as well as in New York, a humorous turn has been given to some of the possible results of inventions in these days.

Were an Englishman of the time of Elizabeth to have been told that water would be supplied to every house by means of pipes, that a combustible gas would be distributed in a similar manner from a central reservoir, that messages would be sent across continents and under oceans in a few minutes, he would have set down his informant as a lunatic, or, at best, the very wildest of dreamers. The man of today would be quite as incredulous if told what inventions and applications of science may do for the people of 1981.

One writer ventures to predict that in the twentieth century electricity will accomplish marvels which now seem too absurd to seriously set forth. Chops and steaks will be cooked by electric sparks so as to make the Frenchman's *cotelette à la minute* a reality. The fruits of the earth will be multiplied enormously by the use of electric light behind colored glass. Fruits and vegetables will be grown all the year round, winter and summer, day and night, so that the field which now produces a hundred bushels of any product will yield ten thousand. We now cook our food, but take our air and water raw, and through these two elements come all the disorders and contagions which afflict humanity. In the future water will be distilled and prepared for human use, and thereby purified from all germs of disease, while air will not be breathed by human beings until it has been cleared of all noxious qualities, after which it will be admitted to the glass-covered streets and dwellings in which the man of the future will live. Houses and places of business will be situated in immense inclosed edifices, the air of which will not only be rendered wholesome, but delightful to the sense of smell. Summer and winter, so far as extreme cold or extreme heat is concerned, will be abolished, as the temperature can be controlled by artificial means, and all parts of the globe will become equally inhabitable. Day will have no attractions over night, for the artificial lights will be more pleasing than any which the great luminary of day can give us. Then, of course, the air will be navigated, which will help to change the appearance of the surface of the earth, for the great cities will then be situated on healthful hilltops, instead of on the insalubrious plains below. With the great motors shortly to be discovered, huge mountain chains which obstruct man's progress

in any direction can be leveled, while the ice packs around the two poles can be liquefied and made navigable.

All this seems wild enough, but no doubt very great changes will occur. If food can be produced by improved methods, with less cost, the problem of poverty is solved. If machinery continues to replace hand work, the hours of labor must be shortened and its value increased; but to accomplish this, a social revolution will be needed by which labor-saving machines will be worked for the benefit of the laborer, and not in competition with him.—*The Hour.*

The Expansion of Water by Heat.

Herr P. Volkmann has in the *Annalen für Physik und Chemie* compiled the results of Hagen, Matthiessen, Pierre, Kopp, and Jolly, on the expansion of water, and has obtained the following mean results for the volume and density of water at various temperatures:

Temp.	Volume.	Density.	Temp.	Volume.
0 degr. C.....	1.000122	0.999878	15 degr. C.....	1.000847
1 ".....	1.000067	0.999933	20 ".....	1.001731
2 ".....	1.000028	0.999972	25 ".....	1.002868
3 ".....	1.000007	0.999993	30 ".....	1.004250
4 ".....	1.000000	1.000000	40 ".....	1.007700
5 ".....	1.000008	0.999992	50 ".....	1.011970
6 ".....	1.000031	0.999969	60 ".....	1.016940
7 ".....	1.000067	0.999933	70 ".....	1.022610
8 ".....	1.000118	0.999882	80 ".....	1.028910
9 ".....	1.000181	0.999819	90 ".....	1.035740
10 ".....	1.000261	0.999739	100 ".....	1.043230

Poisonous Effects of Different Metals.

BY CH. RICHTER.

In the following investigation the poisons were not injected subcutaneously, nor were they introduced directly into the veins, but small fishes, weighing about ten grammes each, were placed in poisonous water, from which very satisfactory results were obtained. The method is a very convenient one, and yields very accurate data. The rapidity of death depends upon the degree of concentration, and the limit of its poisonous effect was taken as the amount of poison contained in one liter of water in which it was possible for the fish to live for forty-eight hours.

The different metals were employed in the form of chlorates; the nitrates were found to be much more poisonous; while most of the sulphates were not sufficiently soluble, and hence could not be used for these experiments.

No. of Experiments.	Metal.	Limit of Poisonous Effect.
20.....	Mercury.	0.00029
7.....	Copper.	0.0033
20.....	Zinc.	0.0084
10.....	Iron.	0.014
7.....	Cadmium.	0.017
6.....	Ammonium (NH ₄)?	0.064
7.....	Potassium.	0.10
10.....	Nickel.	0.125
9.....	Cobalt.	0.125
11.....	Lithium.	0.3
20.....	Manganese.	0.30
6.....	Barium.	0.78
4.....	Magnesium.	1.5
20.....	Strontium.	2.2
5.....	Calcium.	2.4
6.....	Sodium.	24.17

Thus it will be seen that, according to the previous table, potassium chloride is 250 times as poisonous as sodium chloride.—*Chem. Zeitung*, v. 876.

Why San Francisco Needs the Steam Buggy.

To the Editor of the Scientific American:

Your correspondent, W. C. K., under the heading, "Steam Buggies," in the SCIENTIFIC AMERICAN of November 26, calls attention to a subject of special interest to the inhabitants of large cities. Everybody is aware of the intolerable horse nuisance, caused by keeping carriages, wagons, etc., standing in the public streets. It is safe to say that at least half the death rate of cities is attributable to this nuisance.

Here in San Francisco the stench arising from neglected filthy streets is simply awful. And this is for the most part caused by horses. There are only three streets in this city that are kept in anything like a decent condition: these are Market, Kearny, and Montgomery streets.

Were the streets of an Eastern city allowed to remain in the same condition as those of San Francisco the population would soon be decimated by smallpox and other epidemics. But here, owing to a constant strong breeze blowing from the ocean, the noxious vapors are carried off as fast as they rise. To this alone is owing the freedom of this city from epidemics, as the members of the Board of Health—if such a body exists here—seem to take no interest in the matter. Between the horses and the Chinese, San Francisco is fast assuming the characteristics of an Asiatic city. The man who will invent a motor substitute for horses will be a benefactor to the human race.

SANITARIAN.

San Francisco, December, 1881.

Cold Storage.

The increasing use of cold storage for perishable food stuffs, which are apt to be scarce at certain seasons, is one of the characteristics of the time. Last summer, when fresh eggs were plentiful and cheap, a gentleman in Chenango Co., N. Y., stored in a mammoth cooler some five thousand barrels of eggs. Now they sell in this city as "fresh laid" eggs, at a large profit. As the eggs are removed the cooler is filled up with ducks and other fowl to be sold next spring.

RECENT INVENTIONS.

Messrs. John H. Houston and David H. Houston, of Cambridge, Wis., have patented an improved hurdle for fanning mills. The object of this invention is to insure a more thorough separation of the grain and the chaff in a fanning mill. Hurdles for fanning mills, as heretofore made, have been defective in the construction of the frames or slides of their sieves, which have been straight on their lower or inner edges, thereby not providing for a proper filling of the sieves at their sides and angles and permitting the light grain and chaff to drop through the hurdle among the clean grain. This is caused by the greater or more rapid movement of the grain in the middle than at the sides, whereby the grain passes down the sieve on a curved line or front. The present invention obviates this and causes the grain to pass down the sieve in a straight line, all the grain moving at the same rapidity and completely covering the sieve. This is effected by making the lower edges of the screen frames and feed slide concave. An upper sliding feed board thus constructed is arranged above the uppermost inclined sieve, also an inclined slide below the lower sieve, and whereby the grain is made to pass over the entire width of the sieve of the screenings box, thus more thoroughly cleaning the grain.

A very simple and efficient bag fastener, which is operative without the aid of locking devices, has been patented by Mr. John B. Batt, of Williamsville, N. Y. The device consists of an oblong metal loop or band, having one end expanded into a larger curve than the other, to serve as a handle and to facilitate the insertion within the band of the mouth of the bag. It is applied by drawing a portion of the mouth of the nearly filled bag into the loop and placing it against the edge of the smaller end of the latter, so that the hem of the bag rests upon the upper portion of the rim, and afterward gradually drawing the remaining portion of the mouth through the enlarged portion of the band till the entire mouth is equally distributed in gathered folds along and within the band, when the upper edge of the rim of the band will engage with the hem of the bag and prevent the mouth from slipping out. The device may be disengaged by employing force to withdraw a small portion of the hem at the mouth end of the bag.

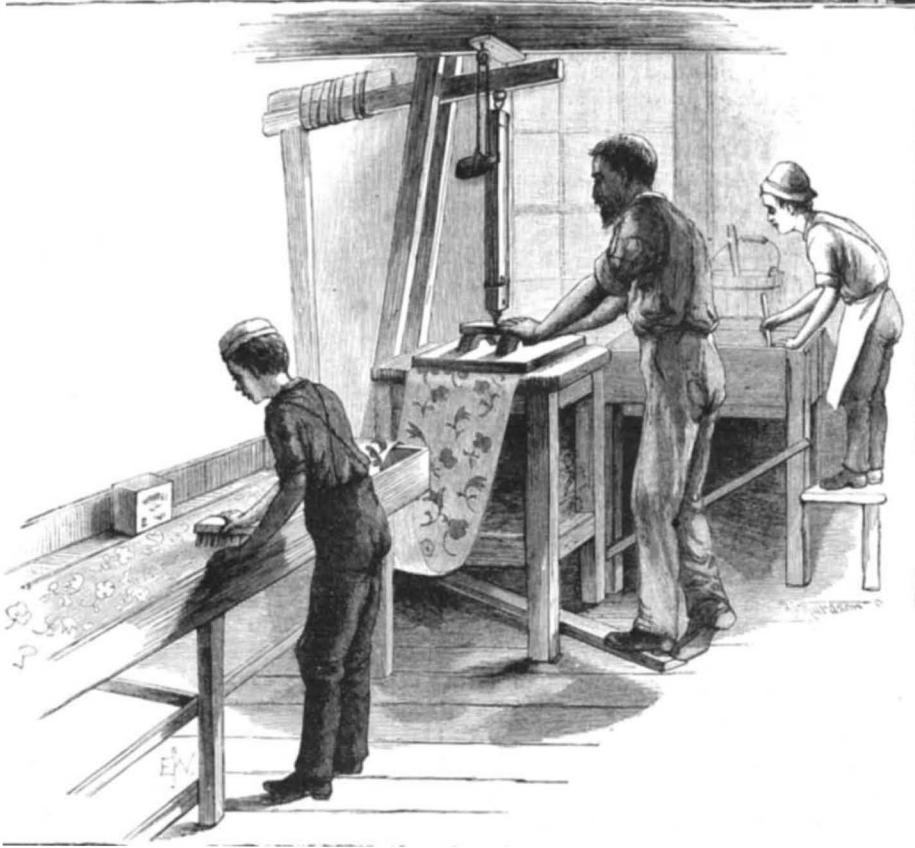
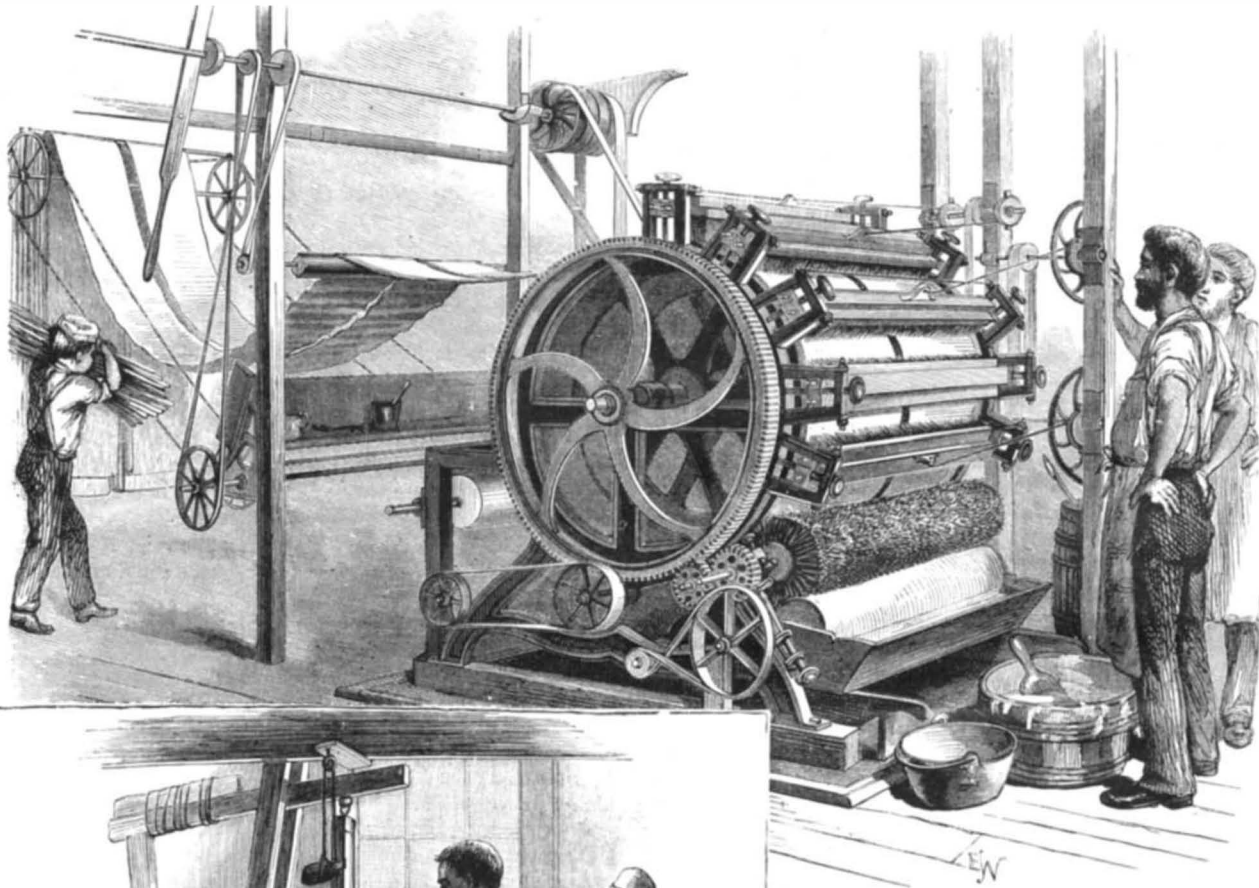
An improvement in cotton gins, which provides for the delivery of the cotton in a clean condition and for the easy running of the gin, has been patented by Mr. Joseph Kopfler, of Amite City, La. This invention consists in a combination, with the brush cylinder, of an open concave composed of a series of curved bars arranged transversely in the frame of the gin, the planes of said bars being set at an angle

and inclined rearwardly with their ends highest, to cause the cotton to drift toward the middle of the machine. The cotton is carried over the rearwardly inclined bars of the open concave, each inclined bar forming an air eddy in the blast generated by the revolution of the brush cylinder immediately behind the bar, and carrying off the dirt. The invention also comprises a combination of reversely beveled friction pulleys for imparting motion from the saw shaft to the brush shaft of the machine, the frictional contact being maintained between said pulleys by a spring arranged within a socket bearing at the end of the brush shaft and adjustable by an outside screw to vary its tension.

A simple improvement in sewing machine needles, by which the needle can be threaded very easily and quickly even by those having imperfect eyesight, has been patented by Mr. Amos F. Gerald, of Fairfield, Me. The needle is formed with a slit extending from a little below the eye, along one side of the latter, and upward to a point above the

part of the needle that works through the goods, where it passes out at the side of the needle, thus forming an inclined splint, which has its upper end set outwardly. A sleeve inclined at the inside of its lower end is fitted over the needle to receive within it the upper end of the splint. This sleeve, which has its motion in direction of the length of the needle, controlled by a pin and slot, is formed with opposite notches in its lower edge, so that to thread the needle it is only necessary to draw the thread across the splint and press it upward against the lower edge of the sleeve to slightly raise the latter, and so that the thread will enter the notches and pass over the point of the splint, after which it is drawn downward through the slit until it enters the eye of the needle.

Ordinary flowerpots or crocks are open to the objection that they do not prevent the surplus of water poured into them from dripping upon the flower shelf or floor, and produce dampness by water collecting under their saucers. They also are subject to rapid destruction by rust. These objections are remedied in the flower crock recently patented



BRONZING BY HAND.

THE MANUFACTURE OF FINE WALL PAPERS.

by Mrs. Amelia D. Polsgrove, of Catawissa, Pa. In this improvement the flower crock or pot is provided with a drip-tube at its bottom arranged to project down within a cup which is formed with a screw-collar that fits within a correspondingly threaded collar on the tube. Said crock is also preferably made or provided with a base arranged to sit within the saucer of the crock and to inclose and conceal from view the cup and its connections. It is likewise proposed to fit within the crock a removable metal lining terminating below in a tube which enters the drip-tube of the crock. This construction not only effectually removes the objections above cited, but admits of the ready transplanting or interchanging of plants from one crock to another by removing the metal linings containing the plants.

A safety device, in the shape of an automatic brake for elevators, etc., has been patented by Mr. Joseph H. Baird, of Oakville, Conn. The invention is especially applicable to elevators and hoisting machines, and its object is to pre-

vent the rapid descent of the elevator in the event of the slipping or breaking of the driving belt. The invention consists of two pulleys, one fixed on the driving shaft of the elevator, and the other on a parallel counter shaft or stud, and a wedge held loosely in a socket with its point inserted between the pulleys and in contact with their faces, whereby a constant friction is created between said pulleys and wedge during the descent of the elevator. On the upward movement of the car the wedge is released from the pressure of the pulleys. The device is a simple one and not liable to get out of order.

THE MANUFACTURE OF FINE WALL PAPERS.

DADO, SCREEN, AND FRIEZE.

In our issue of November 26 we gave engravings illustrating a portion of the extensive manufactory of Messrs. Frederick Beck & Co., Seventh avenue, corner of 2 th street, New York city. We now give some particulars in regard to hand-made papers.

In the extensive warerooms of the factory are found almost endless varieties of pattern and color. Here are papers almost as thick as board, imitating stamped leather. They make a very elegant finish for a dining-room or library. Some of them cost \$12 a roll—eight yards to the roll. But they are very durable. Some of these papers reproduce the effects of the old Venetian or Dutch leathers. Their effect, with their quaint antique patterns, especially when used as a dado in an apartment finished with dark woods, is extremely rich. The same may be said of a similar class of papers which produce the effect of oxidized metals. They can be introduced in decorations to ad-

LAYING THE GROUND.

mirable advantage. Here are papers shining with gold, and with most graceful patterns. Combined with a rich border, and skirted by a dado, there can be nothing more fitting for the drawing-room. Very charming effects can thus be produced at a very moderate cost. These papers of delicate tint, with suggestions rather than masses of color, and with sprays rather than blocks of gold, are suited to the bed-chamber, giving a sense of airiness and beauty rather than of magnificence. Some exquisite papers for this purpose are the "mica" papers, made only in the establishment we are visiting. The paper is "grounded" with a preparation of the best Japanese mica, and then the pattern is printed upon it, the glitter of the mica, which never tarnishes, adding to the attractiveness of the whole. The effectiveness of these papers is great and the cost moderate. Here is a real novelty. It is a genuine velvet, but so attached to a paper backing that it can be put upon the wall with the facility of the most ordinary wall hanging. These genuine velvets, embossed in rich figures, will furnish hanging suited for a palace. The ordinary "velvet" papers, so-called, are handsome; but these are not imitations—they are the genuine article. The process of their manufacture is a secret, but any one who wants his walls hung with real velvet can now obtain the article he needs, and the cost will not be disproportionate to the effect.

Here are found papers for the finest and most costly mansion, and papers for the little nest of a cottage; papers embossed, and stamped, and flocked, and gilded, and plain; papers with the sheen of steel, or with a surface of velvet fit for the robe of beauty; papers with French patterns, with Japanese patterns, with American patterns, papers with flowers or birds that carefully simulate nature, and papers with conventional designs; papers suited to all the different apartments of a house; papers for ceilings, for screens; papers—beautiful ones, too—for twenty-five cents a roll, or even for less, and papers, as before mentioned, for twelve dollars.

The white paper comes into the factory from the paper mill in large rolls. It varies in weight according to the particular use to be made of it; much heavier stock is required, for example, for "leather" paper than for the ordinary wall hangings. The first step in the process of printing is what is called "grounding." This is applying a tint over the whole surface of the paper, and is done by the machine

represented in the engraving. The color is applied evenly over the surface by a series of brushes, and then the paper is caught up in loops and carried by an endless chain over steam pipes, thus becoming dry as it slowly makes its journey of about four hundred feet. It is then reeled up and is ready for the printing. These grounding machines can carry two widths of paper simultaneously, so that the process is a rapid one. The "mica papers," to which reference has been made, are grounded in the same way as those in plain colors.

The next step is the printing. Our former article described the manner in which this is done by machinery. The annexed engravings show the operation of printing by hand. This is done in working off specimens, that effects may be determined and patterns fixed upon. It is done also in the production of special patterns, made to order, or in cases where the quantity to be printed would not warrant the expense of preparing the rollers for the machine. It is done also in those cases where the pattern is, as it were, built up by layer after layer of "flock," resulting in very rich effects. The process is clearly represented in the engraving. The pattern is cut upon a block of the width of the paper. This hangs upon a sort of crane, as shown in the illustration. The block is applied to a color sheet, and then is swung over and gently pressed upon the paper, the exact position being indicated by certain marks on the margin. The paper is moved along, there is a new application of color to the block and of the block to the paper, and so the work goes on. Of course but one color is printed at an impression. The same process must be repeated for each color, and therefore the work is slow compared with the machine printing. But the results are very elegant. The finest papers, the richest borders, and the like, are hand printed.

Some of the "leather" papers which we noticed in the wareroom have raised figures upon them. These papers, which are very thick and heavy, are stamped in a machine similar to other machines for the same general purpose. Some of the most gracefully elegant papers are embossed.

After the printing and gilding they are run through a simple machine, the essential parts of which are two rollers, an upper one of steel, engraved with the pattern desired—ribs, wavy lines, or reticulations of any kind—and a lower one of hard manila paper. With many patterns this embossing adds very materially to the effect. In some of the papers the gold or bronze, or other metal, is applied by hand. The portion to be bronzed is printed in varnish, as shown in the illustration, then it is liberally dusted over with the metal powder. When the superfluous powder is brushed off, the masses of gold, or silver, or bronze shine out, with the result of enhancing the beauty and effectiveness of the whole.

A Phosphor-Bronze Steamer.

A private trial trip of a steam launch called the Phosphor-Bronze, the property of the Phosphor-Bronze Company, Limited, London, lately took place in the Thames, off Westminster. This small vessel is built entirely of phosphor-bronze, and her length is only 35 feet, her beam being about 6 feet, and she attained a speed of 12½ miles per hour, which, considering her size, is a remarkable performance.

The chief object of the company in having so small a craft built was to test the rigidity of the phosphor-bronze sheet and angle pieces used in her construction, prior to having boats built on a large scale. The results have been beyond the company's expectation as regards rigidity and absence of vibration. As we understand, says *Engineering*, that the cost of phosphor-bronze boats will not much exceed those made of steel, and as the metal is not subject to corrosion like iron or steel, and also retains its value, we expect to hear soon of a further use of phosphor-bronze for steam launches, torpedo boats, etc.

Water in Steam.

Herr Stoupler, of Lucerne, Switzerland, by adding fluor-escine to the water of a boiler which by calorimetric tests enabled him to detect the presence of one half of one per

cent of water carried mechanically out of the boiler by the steam, found that from 2.3 to 4 per cent was actually thus present in the steam.

The deep green color of the water in the boiler was retained in it for weeks, and yet no trace of coloring could be detected in the water condensed in the steam cylinder, a proof that the water which gathers there is entirely due to condensation caused by the expansion of



HAND PRINTING.

steam, and that very little water is actually mechanically carried away by the steam from boilers.

Testing a New Magazine Gun.

The duplex field magazine gun was tried at Governor's Island the other day in the presence of General Hancock and a number of prominent officers and citizens.

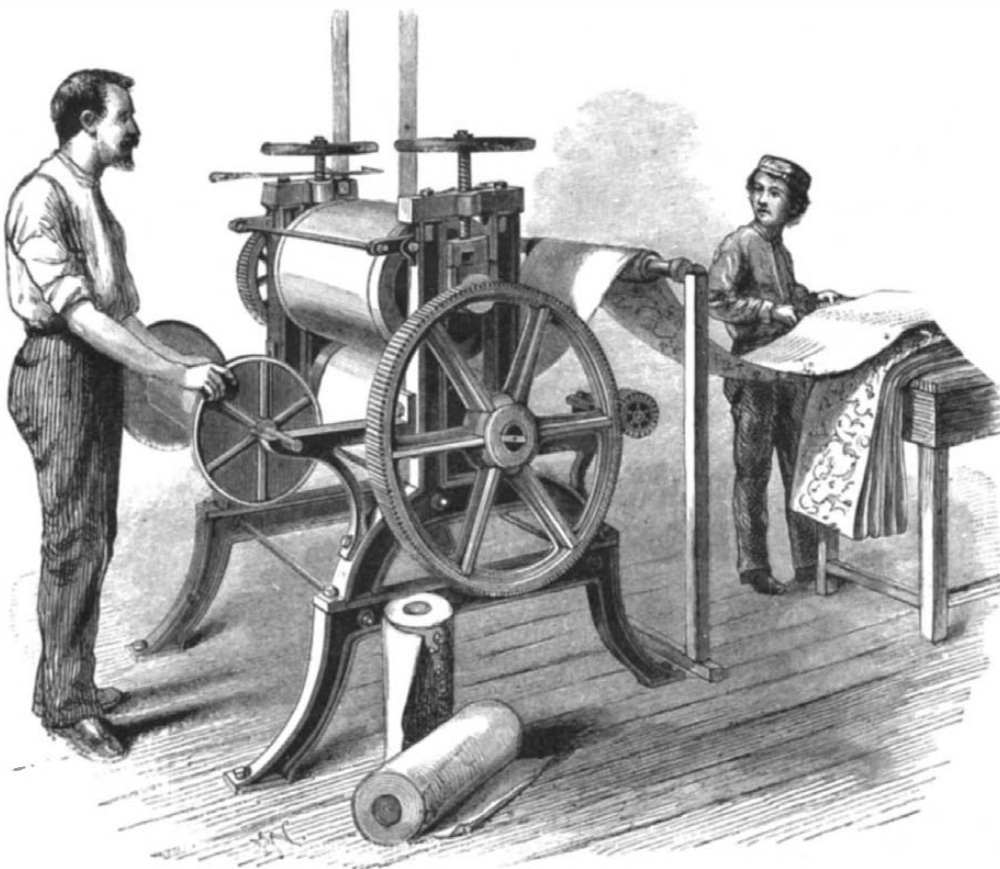
The gun consists of two breech-loading rifle barrels, placed

trace carriers, by which the trace carrier is free from all projecting parts for the reins to catch upon, and whereby also it can be readily attached and detached by detaching the back strap from the loop or frame, has been patented by Mr. Robert D. Whittemore, of Chippewa Falls, Wis. The object of the invention is to facilitate and cheapen the manufacture of harness and provide a convenient means for carrying the traces. The invention consists in constructing a combined

harness loop and trace carrier with a loop or frame having outer and inner bars upon the front, rear, and side parts to receive the harness straps, projecting pins upon its inner bars to hold the harness straps in place, and a rod having hooks formed upon its ends and a projection upon its middle part, whereby the cockeyes of the traces can be received and held, and are not liable to become accidentally detached, the cockeyes as they pass over the hooks causing the pressure of the back strap against the projection on the rod to force the ends of the hooks down against the loop or frame and to hold them there.

Mr. Michael Angelo McGuire, of Cincinnati, Ohio, has patented an improved trunk and valise frame. The object of this invention is to provide a frame for trunks, valises, satchels, etc., which is light and durable, and insures a good fit of the body and lid of the trunk or valise on each other. The frame of the body, and also the frame of the lid of the trunk or valise, is made of metal, shutting one down upon the other when the lid is closed, and each provided with a projecting rib on its inner surface. The leather, the edges of which rest against the ribs, is riveted to the inner sides of the frames and to inner metallic binding strips. The construction is a very serviceable one.

Mr. Benjamin O. Branch, of Friar's Point, Miss., has patented an improved broiler, which is simple, cheap, and efficient. The object of this invention is to provide an improved device for broiling meats, etc., in front of a fire, so that the articles broiled shall not be flavored by the smoke from the fire. The invention consists of a disk having straight pins projecting from its face for holding the meat to be cooked, said disk being pivoted so as to revolve vertically on an upright standard whose lower end is secured in a pan which is designed to



EMBOSSING.

side by side in a brass case filled with water to keep them cool. The gun is operated by two men, one to feed and the other to discharge the cartridges, which is done by turning a crank. During the test 200 ordinary United States cartridges, 45 caliber, were first fired in 25 seconds. Then 100 were fired in 11½ seconds, and at the third fire the barrels were emptied of 500 cartridges in 68 seconds. The gun rotates on a swivel, and can be raised or depressed at any angle,

catch the gravy; and it consists, further, in having a funnel supported above the disk for the purpose of delivering the butter, etc., for basting the meat during the process of cooking.

Mr. James M. Brooks, of Columbus, Tex., has patented an improvement in seed planters in which the reciprocating seed-dropping slide in the bottom of the hopper has arranged over it a brush which serves to prevent said slide from carrying out of the hopper any more seed than is necessary or proper, and which brush is held in place by two catches secured to the hopper and arranged to grasp the head of the brush. One of these catches is stationary, but the other is made yielding or elastic, so that it can be sprung back to allow the brush to be put in and taken out when required.

An improvement in running gear for wagons, which operates very effectually to distribute shock to the gear and to reduce jerking of the shaft or pole connections, when traveling over ruts or rough roads, has been patented by Messrs. John M. Wadlington and Daniel Grace, of St. Joseph, Mo. This improvement refers more particularly to that class of wagons in which both forward and hind axles are pivoted at their centers and connected by cross rods or chains, and it consists in providing a wagon having said pivoted axles and connecting cross rods, with hind hounds extending forward for some distance from the rear axle to which they are attached, said hounds carrying a cross stop rod, which acts, in combination with the reach, to limit the movement of the axles and to prevent any rising of the rear hounds from the reach.

An improved wash boiler has been patented by Mr. Augustus E. Carson, of Livingston, Iowa. This boiler is divided horizontally by a partition arranged at a short distance above its bottom, into a lower steam generating chamber, and an upper water and clothes-holding space. A pipe situated outside of the boiler connects the lower compartment with the upper part of the clothes-holding space above, and at its entry within said space is bent downward to deliver the steam and water from the compartment below down on the clothes. The water is kept circulating in this direction by a knee pipe connecting the bottom portion of the upper chamber with the interior of the lower one, at the opposite end of the boiler to that on which the before-named pipe is arranged. This knee pipe is situated within the boiler, and is fitted with a valve to prevent back circulation; also with a perforated guard to exclude the clothes from entering it. The clothes are held down in the boiler by a weighted perforated plate. A wash boiler thus constructed becomes an automatic steam washer, that rapidly and thoroughly cleanses the clothes.

Mr. Constantine L. Brady, of St. Louis, Mo., has patented an improved smoke flue, which is intended to take the place of the brick chimneys in frame houses and to be built in the walls of brick houses, or it may be inserted in the chimneys or smoke flues of houses already built. Said flue is made of sheet or cast iron, and is preferably square in cross section. Its lower portion is bent and presents an open end, which is inside the house a short distance above the floor, and may be closed by a sliding door. This lower portion forms a soot chamber, and said flue is provided at different points in its height with suitable stove pipe connections. Such improved flue is practically self-cleaning, and the soot as it collects in the chamber below may readily be removed.

An improved attachment for raising and lowering carriage or buggy tops, which may be operated with facility by the occupant of the vehicle from the seat thereof, has been patented by Messrs. Emanuel Fleck and John Boyd, of La Grange, Ind. The attachment comprises a hand lever pivoted to the end of the seat or railing, and provided with a pivoted locking lever having at its lower end an eccentric, which rests against the edge of a semicircular plate attached to the end of the seat or railing. To this hand lever a jointed lever is pivoted, which has its one end attached to a rod connecting the jointed braces of the buggy top. When the hand lever is turned toward the back of the seat the jointed braces will be folded and the carriage top lowered.

An improved car coupler, which is self-coupling, has been patented by Mr. Joel Ren, of Parrottsville, Tenn. The invention consists of a horizontal pincher-like pair of clamps pivoted above the draw-head of a car on a suitable support, with the long legs of the clamp extending forward and carrying a sliding ring, and the jaws or short legs directly above the coupling pin aperture in the draw-head in position for grasping the coupling pin; and, further, of a horn or a rod bent at right angles, fixed in and projecting from the end of an opposite car, whereby, when the cars approach each other, the clamp may be opened to release the coupling pin, that the latter may drop into the draw-head and hold the coupling link.

In adjustable dental chairs in ordinary use the crank arm or web requires to be frequently turned, and if left on the crank shaft it is constantly interfering with the movements of the operator in passing around the chair, and consequently the crank must be removed, to be replaced again for making any change in the adjustment of the chair. This frequent removal and replacement occasions much loss of time and inconvenience. This objection is overcome by an improved dental chair crank recently patented by Mr. C. Edmund Kells, Jr., of New Orleans, La., in which the crank arm or web is adapted to be rotated upon or around a pin which projects from the boss of the crank, and is capable of being set and held in any desired position in relation to the crank shaft without removing the crank, and whereby it may be turned entirely out of the way of the operator.

The Ventilation of Long Tunnels.

Herr Wilhelm Pressel has circulated a lithographed paper on this subject among his friends and colleagues; and as it is a question of daily increasing importance, we reproduce his most important suggestions. He begins by pointing out that the direction and intensity of the current of air in a tunnel are the product of numerous factors, that is, the length and dimensions of the tunnel, difference in level of the two mouths, average temperature in the tunnel, temperature of the external air at the mouths, pressure and moisture of the same, direction and strength of the prevailing wind. The effect of the latter group of factors may be either to intensify or to neutralize the natural action of ventilation set up by a difference between the level of the two mouths. The interior of a tunnel situated in a high mountain district, and passing under a vast mass of rock, will always be warmer than the outside air, especially at night, when in the Alps the temperature always falls. The warm internal air will, therefore, ascend the slope, and issue at whichever mouth is highest, and the cool air be drawn in from without to supply its place. Evidently this natural ventilation will be stronger in proportion to the difference of level of the two mouths. But the increase of this difference means increased steepness in the tunnel, and consequently increased production of smoke, and an intensifying of the evil to be cured. Moreover, as was before said, an unfavorable combination of external circumstances may destroy all the benefit to be derived from a steep gradient, and leave only the ill effects. This is the case at the Mont Cenis, where the difference is so great as 140 meters (nearly 460 feet), but where the natural current is from these causes extremely weak, and often fails to produce any through draught at all, the smoke merely shifting backward and forward, than which nothing can be worse. Nor has the mechanical ventilation succeeded in supplying the deficiencies of the natural. Herr Pressel states that the loss of power in the air-compressing machines is so great that, instead of sweeping out the tunnel, they barely succeed in sending their current sufficiently far into the interior to keep the refuge chambers for the employes clear of smoke; and the apparatus more lately erected for pumping out the vitiated air is very ineffectual. He therefore concludes that natural means are insufficient for the ventilation of long tunnels, and that mechanical means have failed, and proposes instead a system not hitherto tried. It is obvious that a current is caused by varying specific densities of air at various places, the heavier air being drawn along (popularly speaking) to take the place out of which the lighter has arisen. If then a distinct difference can be established and maintained between the specific gravities of the air at the two ends of the tunnel, a steady current can be relied upon. This may be done by condensing the air at one end or rarefying it at the other, or doing both together. The second plan has often been adopted. Shafts have been sunk into the tunnel at each end, and the air in one has been kept heated by fires, so that there was a continual indraught of outside air through the other. The objections to this method for long Alpine tunnels are, first, the expense of the apparatus and fuel when used on such a large scale; and, secondly, the radiation of heat from the walls of the tunnel itself, when this is pierced through an immense mass of rock, which makes it necessary that the air brought in should be not only pure but cold. The author proposes therefore to adopt the reverse process, and cool the air in one of the shafts by means of falling water. Railways always approach Alpine tunnels along high valleys, which invariably contain mountain streams of very low temperature. The means of refrigeration are therefore at hand. Herr Pressel considers that a stream of about one hundred gallons per second falling through the shaft would cool the air sufficiently and establish the current, for which he believes that a difference of temperature of ten degrees Cent. between the two shafts would be all that would be necessary. The upper openings of the shaft should be protected by revolving iron shields from the disturbing effects of wind on the ventilation. The mouths of the tunnel should be closed to allow this system to work properly, but need not be absolutely shut. Arrangements should be made for closing the shafts, and either wholly or partially shutting off the water supply, and there should be a special system of telegraphic signals for the purpose, so as to keep the whole system under control and enable it to be worked according to the varying conditions of the atmosphere. In very cold weather the supply shaft should be closed altogether, and the corresponding mouth of the tunnel opened, when the cold air will flow in of its own accord.—*Engineering.*

Automatic Freight Car Brakes.

After each war of passenger and freight rates between competing lines is over, and new figures are agreed upon, we notice that there is always a shrinkage in price from the previous rates which ruled before the war commenced. The question is naturally sprung: How are roads enabled to stand a continued reduction in rates? They pay no less for labor of any class nor for supplies of any kind. They have the same, or perhaps increased fixed charges to meet, and the same dividends to earn or to promise. How then can they make both ends meet, and submit to these successive cuts in prices? We answer that one very important reason is because of increased facilities every year arising from improvements in rolling stock, motive power, and roadway. Improved platforms and couplers, air and vacuum brakes, electric signals, paper wheels, safety switches, etc., permit increased speed with greater safety to their passenger trains,

while heavier steel rails, better ballasted road beds, lessened gradients, and more powerful locomotives reduce the cost per ton per mile of moving freight trains. This latter cost will be still further very materially lessened as soon as a thoroughly practicable, independent, self-acting, automatic freight train brake shall have come into general use. Not only will the cost of moving of freight be lessened, but the immense losses by wrecks be greatly reduced by such an appliance. But it must be one that shall meet the requirements of railway freight management, namely, simplicity, durability, and cheapness, not only of first cost, but of cost of maintenance and repair.

What railway men want to-day is an automatic device in the form of a brake for freight trains, which shall produce the greatest results with the fewest number of pieces, which by reason of its simplicity shall require the minimum amount of care and attention, which shall be in all respects automatic and requiring no other connection between cars than the ordinary link and pin to make it effective, and at all times operative.

The more complicated and intricate the appliance, of course the greater the first cost and cost of maintenance. An automatic freight car brake which gives the engineer the control of his train when moving forward only, if simple, cheap, and durable, will always take precedence over a more extended and comprehensive device that would enable him to control it in moving backward also, for no train will ever be run backward at a speed which the engineer cannot control with his engine. It is the enormous loss of property, which is to-day the result of collisions, both head and rear, and the numerous, now unavoidable accidents incident to suddenly coming into danger while moving forward, with no means to check the heavy train going at even a moderate rate of speed except the unreliable appliances now in use, that railway managers are most anxious to save and avoid. They do not fear the accidents which may result from moving backward. This is the problem to be solved. How near are we to its solution? Every morning paper which we take up, with its record of loss of property and life, tells how badly such an improvement is needed.

Every railway manager is anxious to make his present freight equipment earn a greater income by shortening up the schedule of his freight trains, provided he could do it with any show for safety. Who has made any substantial, well authenticated developments in this direction? We have heard a great deal about trial trains, experimental stops, etc., with this or that device, but who can show results which have been obtained by constant service, even of a reasonable number of months upon a reasonable number of cars? Don't all speak at once!—*Railway Register.*

No Organic Matter in Meteors.

A Louisville (Ky.) paper reports an interview with Prof. J. Lawrence Smith, of that city, in the course of which Mr. Smith gave reasons for discrediting the discovery of organic substances in meteors, as claimed by Prof. Hahn, of Berlin. Mr. Smith said

"Although I have probably examined more microscopic plates of fragments of meteorites than any other person, still I have never discovered anything like organic remains in any of them. Besides, the well known chemical composition of these bodies is averse to the existence of any such remains as spoken of by Prof. Hahn. Were these remains present we should discern carbonate of lime on their interior. The two or three that have any carbonate of lime were discovered and analyzed by myself, and in these cases the carbonate of lime was an accidental constituent of incrustation deposited on the surface after their fall. In the microscopic examination of these polished plates of meteorites the two predominating minerals, enstatite and bronzite, will, by their fissures and forms, sometimes remind one of vegetable and other organic forms, but the merest tyro of an observer will trace here nothing but a rare resemblance. And, furthermore, the very ingenious nature of these minerals precludes the possibility of organic remains even in terrestrial minerals of similar kind. Not knowing of any eminent German geologist named Prof. Hahn, I thought it but reasonable and logical that I should inquire something about him from my friend Prof. Hawes, now in the employ of the Smithsonian Institution, and the best lithological microscopist in this country, and who recently returned to this country after ten years' study with Prof. Rosenbaum and others into the microscopic character of rock. In answer to my inquiries Prof. Hawes wrote me this letter:

"I read that paper of Prof. Hahn's. He is a kind of half-insane man, whose imagination has run wild with him. These forms which he so accurately describes and figures have long been known to exist in meteorites, and have been frequently described by mineralogists and microscopists. They are mainly composed of enstatite or bronzite in radial forms, and fractured in such a peculiar manner as to give them the appearance of structure. Some of the American meteorites which I have examined show these forms in great beauty, but Prof. Hahn is the only man who has seen anything organic in them, and his paper has excited nothing but ridicule. It reminds one of the long and laborious research of a German professor who found a whole flora and fauna which he named with double Latin names, and which he found in his microscopic examination of basalt."

"It is very clear to my mind," continued the Professor, "that these cranky observations, viewed with the spectacles of the imagination of Prof. Hahn, have obtained more publicity than they merit."

NEW INVENTIONS.

An improvement in apparatus for preserving timber, by removing the sap and other volatile elements and supplying their place by antiseptic agents, without impairing the organic structure of the wood or changing its chemical character, has been patented by Mr. Joseph W. Putnam, of New Orleans, La. This invention relates to a vacuum apparatus, by which the wood is first subjected to a steam bath, the steam then condensed to produce a vacuum, and a comparatively high temperature maintained in the treating chamber during the production and continuance of the vacuum, and lastly, oleaginous and preservative material is admitted, under pressure, to supply the vacuum and permeate the pores of the wood. In this improved apparatus the treating chamber, and the storage tank located at a lower point, have combined with them a suction and force pump for the oil, and suction and discharge pipes, together with a supplementary oil tank, so that the oil is first passed by said pipes, one of which is circuitous, from the main tank to the treating chamber, by atmospheric pressure, and subsequently is forced in by the pump, and the latter afterward diverted to supply the supplementary tank, from which a more powerful force pump draws oil and ejects it into the treating chamber. This improved apparatus perfectly performs the work for which it was designed.

Mr. John M. Walden, of Fort Valley, Ga., has patented a very ingenious and improved cotton chopper. The object of this invention is to facilitate the chopping of cotton plants to a stand. In this machine two side bodies are connected with a central main body. Three or more knives are arranged in the forward ends of the central body to cut the crust of the soil and prevent it from being broken away by the chopping hoe. There are also plates projecting below the sides of said body which enter the soil and separate the plants to be chopped from the plants to be left for a stand, to prevent the latter from being torn away by the soil when operated upon by the chopping hoes. The side bodies of the machine are similarly provided with knives and side-plates. These side bodies are connected at their middle portions with the central body by hinged bars, and are further connected longitudinally with the front and rear portions of the main body and handles of the machine by bent rods. These several connections are adjustable to provide for the side bodies being set at a greater or less distance from the main body, according as more or less plants are required to be left for a stand, and so that the side bodies can be raised and supported above the ground. The hoes project below the surfaces of the several bodies far enough to enter the ground to the desired depth, and the side parts of the under side of the said bodies beneath and at the rear end parts of the hoes are concave to allow the plants and soil to escape from the said hoes freely, and so that the plants left standing will be supplied with sufficient soil without being covered by said soil.

Mr. John V. Capek, of Brooklyn, E. D., N. Y., has patented an improved dynamo-electric machine. The invention consists in a dynamo electric machine having the field magnets formed of removable U-shaped iron cores fitting in plate iron casings, in the ends of which the concave magnet heads surrounding the armature, and connected by non-magnetic plates, are inserted, and which casings are surrounded by several layers of wires, the ends of each layer being connected with a plate, uniting the two coils in such a manner that all or any number of layers can be included in the circuit—that is to say, the wire or line of the exciting current can be so connected that more or less layers of wire are excited. The invention further consists in an armature formed of a series of U magnets attached to circular soft iron disks, and provided with segmental plates integral therewith or riveted thereto, and projecting from the middle of the outer surfaces of the magnets, where they are united, on each side of which central segmental plates the coils are wound, these coils being wound around sheet iron casings, which are slipped on the magnets. The invention further consists in brush holders formed of two forked segmental arms united at one end and mounted loosely on pintles, between which pairs of arms the brushes are clamped between two plates provided with pins passing between the forked arms, and secured by nuts, these arms being provided at the outer end with a transverse rod fitting in a fork on the commutator, whereby the pressure of the brushes can be regulated. The invention further consists in a spring plate in the ends of the brush holding clamp plates, and set screws for drawing them together and separating them, whereby the length of the part of the brushes resting on the commutator can be regulated. The invention also includes various improvements in the construction of details which, taken in connection with the features of invention above stated, assist in producing a dynamo-electric machine that is simple in construction, capable of being easily repaired or adjusted, and is very advantageous in its operation.

An improved press for baling hay, moss, cotton, etc., and which provides in a very efficient manner for compacting the bales, for tying them and for removing them from the baling chamber, has been patented by Messrs. Andrew Wickey and Albert A. Gehrt, of Quincy, Ill. In this invention the chamber in which the follower moves is distinct from but in line and connects with the bale chamber, which is of larger transverse dimensions than the follower chamber, whereby the follower has the advantage of pressing the material to be baled from a smaller into a larger space, and the shoulders formed at the junction of the two chambers serve to hold the material as the follower is repeatedly

drawn back to admit new charges. The bale is thus built up gradually, and is more compactly formed than where a large quantity of material is pressed by a single movement of the follower. To carry out this method of working, the follower has its successive pressing actions given it by a cogged segment, which is operated from either end by an oscillating sweep, and meshes with a double-gear rack in pivoted connection with the follower, a spring applied to the follower serving to suddenly draw the latter back every time the rack passes its dead center on the segment. The press, which is horizontally arranged, is also provided with a pivoted and sliding reversible end piece to facilitate removal of the bale, and with longitudinally bisected tie tubes applied to the heads of said end piece and head of the follower to provide for the cording of the bales.

Mr. Homer H. Hunt, of Muscatine, Iowa, has patented an improved holder for bows for musical instruments. The object of the invention is to facilitate holding the bow of a stringed instrument in the position to insure neatness of execution and a fine and clear tone. The invention consists in attaching a thumb plate or bow holder to the bow or making it integral therewith. Said bow holder, which can be attached to the bow of any kind of stringed instrument, such as the violin, violoncello, etc., is formed with an under concave recess for the thumb of the player, the hairs of the bow touching the thumb nail. It relieves the player of all strain on his hand, and protects the hairs of the bow from being soiled or broken.

An improved fastening for neckties, which is simple and capable of ready application, and which serves to securely fasten together the shirt, collar, and tie, has been patented by Messrs. Emmet C. Standiford and John T. Todd, of Chrisman, Ill. In this fastening, which is designed to be used in conjunction with any collar button having a hinged or detachable outer head, a spring clasp having two leaves hinged together is applied to the tie, by securing the outer leaf to the back face of the bow over the inner end of the strap of the tie. The collar button is inserted in the button-holes of the shirt and collar, with the hinged or detachable head outward and turned so as to lie in the plane of the shank of the button. Said head is then passed through a slot in the inner leaf of the clasp, and the strap of the tie passed around the neck of the wearer, and a hole in the outer end of the strap passed over the outer head of the collar button, which latter is then turned so that the heads of said button are parallel with each other, and the spring clasp closed.

An improvement in nut locks has been patented by Mr. Francis R. Hewitt, of Evington, Va. This invention relates to that description of nut locks in which a nut is provided with a spring and pin in its bearing surface, and so that the pin is made to engage with recesses in the washer for holding the nut in position. A leading object of the invention is to construct a nut lock which shall be adapted for use in combination with fish plates having elongated perforations for the bolts, to allow for expansion and contraction of the rails. The invention consists in a nut lock provided with a ratchet-faced washer, which has two opposite rectangular lugs struck up from its central portion on the edge of its central aperture. These lugs are inserted within the elongated sides of the perforation in the fish plate and prevent the washer from turning when the nut is screwed down. The invention also comprises a square-headed pin to engage with the ratchet-faced washer and keep the nut from turning.

A gong-bell of improved construction has been patented by Mr. George B. Owen, of Winsted, Conn. The object of this invention is to facilitate the attachment of gong bells to clock cases and other supports and give them a louder, clearer, and more musical tone. The gong is made in the form of a spirally-coiled wire, the coils being at such a distance apart that they will not touch each other when the said gong is struck by the bell hammer. The end of the gong is fastened to the central exterior portion of a sounder, which is made in the form of a circular plate with an inwardly projecting flange around its edge. A standard, screwing into an interior central hub of this sounder, connects the latter with the foot or base of the bell, which may be fastened to the back of a clock case or other support. Such standard is bent in its middle part into an arc of about three-quarters of a circle, and has its end parts bent inward to the central part of a circle, and then bent in opposite directions at right angles with the plane of the said circle, whereby the gong can be brought close to the foot or base that supports it without having its vibrations checked or its tone deadened.

A simple but useful improvement in cuff or sleeve buttons and studs, also applicable to studs for use in collar-bands, wrist-bands, etc., has been patented by Mr. Shubael Cottle, of New York city. This invention is an improvement in ornamental cuff or sleeve buttons and studs whose backs or shoes are constructed with a radial open slot to facilitate attachment and detachment of the same. In this improvement the shank is made hollow and provided with a vertical notch in its upper edge, or otherwise equivalently constructed, and the back or shoe has a central hole and radial slot coinciding with the notch. By this construction, in applying the button, one edge of the buttonhole is drawn into the center of the back, and thus crosses the end of the shank diametrically, instead of coming in contact with the side of the same and being pressed and turned outward. Thus the opposite edges of the buttonhole not being crowded so far apart, the button may be attached with greater rapidity and with less injury to the cuff and less rumpling or soiling of the latter.

Our Foreign Commerce.

The annual report of the chief of the Bureau of Statistics for the past fiscal year is packed with information. It shows the foreign commerce of the United States to have been for the year \$1,675,024,318, and larger than in any previous year in the history of the country. The value of exports of merchandise amounted to \$902,377,346, exceeded the value of exports during the preceding year by \$66,738,688, and was considerably larger than in any previous year. The value of imports was \$642,664,628, and was greater than that of any preceding year except that ending June 30, 1880. During the last six years the value of exports of merchandise has exceeded imports by \$1,180,668,105. The excess of the value of exports over imports of merchandise during the last fiscal year was \$259,712,718. The imports of specie exceeded the exports by \$91,168,650. The value of exports of merchandise was \$883,925,947, exceeding that of such exports the preceding year by \$59,979,594, and were larger than in any previous year. The specie value of the exports of domestic merchandise from the United States increased from \$428,398,908 during the year ended June 30, 1871, to \$883,925,947 during the year ended June 30, 1881—an increase of \$455,527,039. This increase was due mainly to the increased exports of breadstuffs, provisions, and tallow, cotton and manufactures thereof, live animals, leather and manufactures of leather, and wood and manufactures thereof. The increased value of the exports of these commodities during the fiscal year 1881, as compared with the fiscal year 1871, amounted to the sum of \$374,059,476, and constituted 82.12 per cent of the increased exports of domestic merchandise, exhibited as follows:

Commodities.	Value of Exports during the year ended June 30.		Increase.
	1871.	1881.	
Bread and breadstuffs...	\$79,381,187	\$270,332,519	\$190,951,332
Provisions and tallow...	41,870,254	158,328,896	116,458,642
Cotton and manufactures of.....	221,885,245	261,267,133	39,381,888
Animals living.....	1,019,604	16,412,398	15,392,794
Leather and manufactures of.....	1,397,395	8,088,445	6,691,050
Wood and manufactures of.....	12,916,542	18,600,312	5,683,770
Total increase..			\$374,059,476

A Quicksand Section.

Underneath the surface of the ground, and directly overlying the rocky formation of the "Portage group" of rocks, contiguous to the falls of the upper Genesee River, in the towns of Genesee Falls, in Wyoming County, N. Y., and Portage, in Livingston County, is a stratum of quicksand of the most treacherous character, jeopardizing the construction of any public works that may be built thereon. The celebrated "slide section" of the Genesee Valley Canal, opposite the Middle Falls of the Genesee, has passed into history as the most expensive piece of earthwork ever maintained, not only in this State, but the United States. This section one mile in length, has cost more money than any twenty miles of the same canal between Rochester and Orleans. To maintain navigation upon this particular piece of work not only cost fabulous sums of money, but baffled the scientific knowledge of the engineering corps of the State, and to-day, but for the abandonment of this thoroughfare as one of the waterways of the commonwealth, the problem would still be a vexed question in the brains of the State officials.

To-day, upon the opposite bank of the river, but little to the westward, the New York, Lake Erie and Western Railroad have, in order to lessen a 40-ft. grade between Portage Bridge and the village of Castile, put in a loop line, which leaves the old road bed directly after crossing the bridge and passes over a deep ravine with an embankment about 80 feet in height, where it makes a sharp detour through a hill of quicksand, with a cutting of about 40 feet. The embankment at this point, which is made from the surplus material in the cutting, is about 600 feet in length. At the bottom of the ravine is a culvert, built upon pile foundations extending down to the rock. The superincumbent weight of earth upon this treacherous mass of natural earth has caused the whole to sink, while the lower material is making preparations to move down the ravine. Already, large forest trees have been carried downward toward the river bank, and fears are entertained that, as the soil becomes permeated with moisture, the whole embankment will slide out of position. The bed of the present track has moved far enough to take out the alignment of the curve, and the track repairers, who have raised the bank three times within as many months, have substituted a short tangent, to accommodate the running trains. The culvert in the new road bed has become to some extent demoralized, and information is now wanted how to hold the track to its original survey. When the new loop line shall have been brought into use, the vigilant care of the railroad officials, no doubt, will prove equal to the emergency, and before traffic is carried over this new line, measures both vigorous and remedial will be instituted.—*Buffalo Express.*

Success of the Elevated Railways, New York.

The travel over the elevated steam street railways of New York city for the month of October was the heaviest yet recorded, aggregating 7,121,961 passengers, as against 5,881,474 for the corresponding month of 1880, an increase of 1,240,487, representing just about the entire population of the city.

AGRICULTURAL INVENTIONS.

In distributing attachments for plows for sowing seeds or fertilizers in the furrow formed by the plow, and in which a stationary hopper, a movable lower spout, and a subjacent shaking wheel have been arranged in rear of the plow standard, it has been a serious objection that said attachments were not adapted to distribute with the same regularity when traveling over hilly and horizontal surfaces. This objection has been removed in the improvement patented by Mr. Timothy C. Norwood, of Honca Path, S. C. In this improvement the hopper, the spout, and the agitating wheel are all connected by two and the same side bars, which, in their turn, are connected by links to the plow standard, whereby the hopper, spout, and wheel move together in parallel position behind the plow standard, and consequently maintain the same and proper relation to each other, under all varying conditions of the surface of the ground.

An improvement in seed planters has been patented by Mr. Charles P. Hanson, of Edwardsburg, Mich. The object of this invention is to provide an improved means of raising the openers of a planter from the ground and adjusting them to work at any desired depth. For these purposes the tongue of the planter is pivoted at its rear end so as to project above the main frame, and a slide bar extending back of the tongue is adapted to be thrown in contact with said end of the tongue by an adjusting lever operated by hand and provided with attachments for holding it in any desired position. By these means the tongue and frame may be set at any required angle of inclination with each other, and the openers, which are attached to the frame, be rapidly and easily adjusted or elevated.

An improvement in devices for separating grain from cockle and other small seeds, and for separating grain into grades, has been patented by Messrs. Martin B. Parker and Myron T. Smith, of Blue Earth City, Minn. In this device the grain is separated and graded during its passage down an inclined screen, and final delivery of the larger plump kernels over the lower end of the latter. As the grain passes down the screen, it is kept in contact therewith and prevented from bounding away from the screen by a series of flaps or aprons of rubber or other flexible material, arranged transversely over the screen. These aprons also serve to retard the descent of the grain, so that it may be properly separated and graded. The screen is prevented from sagging, and is kept up to the straight line of the lower edges of these aprons by longitudinal ribs attached to the frame and arranged under the screen cloth. This separator is a decided improvement upon other separators in use for like purposes.

IMPROVED LIFE RAFT.

The engraving shows an improved life raft recently patented by Mr. Thomas Hall, of Newton, Mass. It is designed to be carried on ships and steamboats, and consists of a double float or raft made of cork or other buoyant material, and of such shape that they may be fitted to the outside of the ordinary ship's boat.



TRANSVERSE SECTION OF LIFE RAFT.

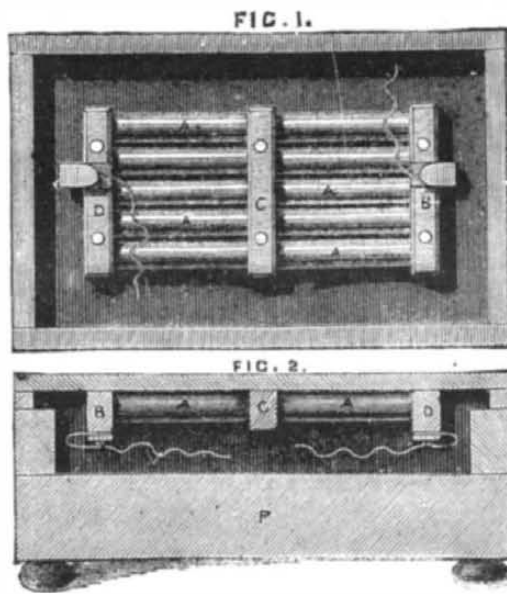
These rafts or floats are made in two parts, one being placed on each side of the boat, to which they are secured by suitable fixtures and lashings, as represented in the engraving.

When the parts of the raft are united they form a cradle or holder in which the boat rests, and the curved ends of the rafts are nearly in contact with each other at the bow and stern of the boat. While it is preferable to make the raft of such materials as can most readily be made to conform to the shape of the boat, straight cylinders or caissons may be used.

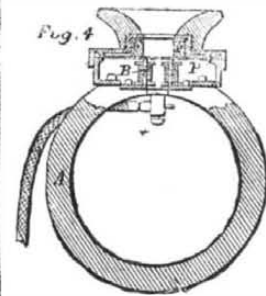
On board a ship or steamboat the raft and its included boat is carried on deck or hung from the davits in the usual manner, and when launched it takes the water without danger of upsetting. The boat may be filled with people, and the life lines will support a large number of those who are in the water, both being used simply for floating; or the lashings may be cut and the floats detached from the boat, which can then be rowed, with its passengers, to any desired point, and return to take off those who are clinging to the floats and the life lines.

THE TELEPHONE AT THE PARIS OPERA.

One of the most popular attractions at the Paris Electrical Exhibition is the nightly demonstration of the marvelous powers of the Ader telephone, by its transmission of the singing on the stage and the music in the orchestra of the Grand Opera at Paris, to a suite of four rooms reserved for the purpose in one of the galleries of the Palais de l'Industrie. This demonstration is given nightly between eight and eleven



o'clock, and the enormous number of people who crowd the entrance to the building before the doors are open to the evening visitors rapidly resolve themselves into patient queues as soon as they can obtain access to the gallery adjoining the telephone rooms. There they patiently await their time for admission, and the privilege of hearing for a few minutes whatever may be going on at the opera—solo, chorus, instrumental music, or possibly all three, until the allotted time has expired, and the listeners have to give way for a fresh installment from the outside. In this way eighty telephones are constantly at work at the same time, at short intervals the communication being shifted to another set of eighty similar instruments in two other rooms. It may be



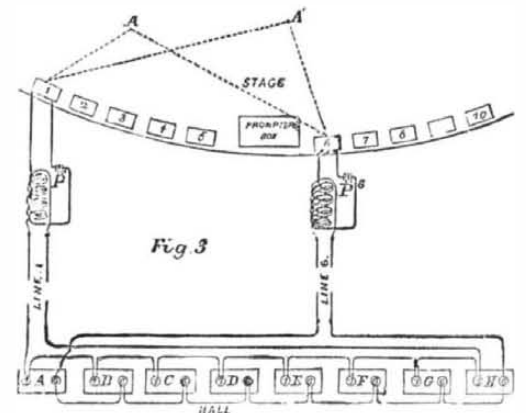
remarked in passing that this distant audience of the performance at the opera enjoy their allotted moments of actual transmission and that interludes do not count. Certainly nothing has ever been done before so effectually to popularize science, and to render the masses familiar with the effect, however ignorant they may be of the cause, of this marvelous invention, the first feeble voice of which was heard in the Centennial Exhibition of 1876. Our contemporary, *L'Electricien*, publishes this week an excellent description of the installation at the opera and in the Exhibition, and from this we gather our information and illustrations on the subject.

The transmitters are microphones on the Ader system, placed in front of the opera stage, close to the footlights and behind them. Figs. 1 and 2 are a plan and longitudinal section of one of these transmitters. Each consists of ten small carbon pencils, A A, arranged in two series of five each, and supported by three cross pieces, B C D, fixed to a small pine board, which receives the vibration and serves as a cover to the instrument. This board rests, as shown, in a massive block of lead, P, which in its turn is supported on four blocks of soft rubber. This arrangement is found to prevent any vibrations of the stage from being transmitted to the microphones, and the only movements taken up by the instrument are the sonorous vibrations of the air. The microphone is in connection with a Leclanché battery, and the

wire of a small induction coil without any condenser. The line, laid in double wire, is connected on the one hand with the induction coil, and on the other with a series of telephone receivers placed in the rooms at the Palais de l'Industrie. There are eight receivers thus coupled to each transmitter. The undulatory induction currents developed in the fine wire of the induction coil by the variation in intensity of the current traversing the induction wire, react on the receiver. There are ten such installations as we have just described on the stage of the opera, each with its own battery and induction coil, and double line to the Exhibition. As the batteries become rapidly polarized, two sets are provided for each transmitter, and the batteries are shifted every fifteen minutes by a commutator. Fig. 3 is a diagram showing the arrangement, the transmitters being numbered one to ten; the batteries are shown at P, the induction coil at B, and the receivers in connection are marked A to H. Only two complete circuits are shown to avoid confusion.

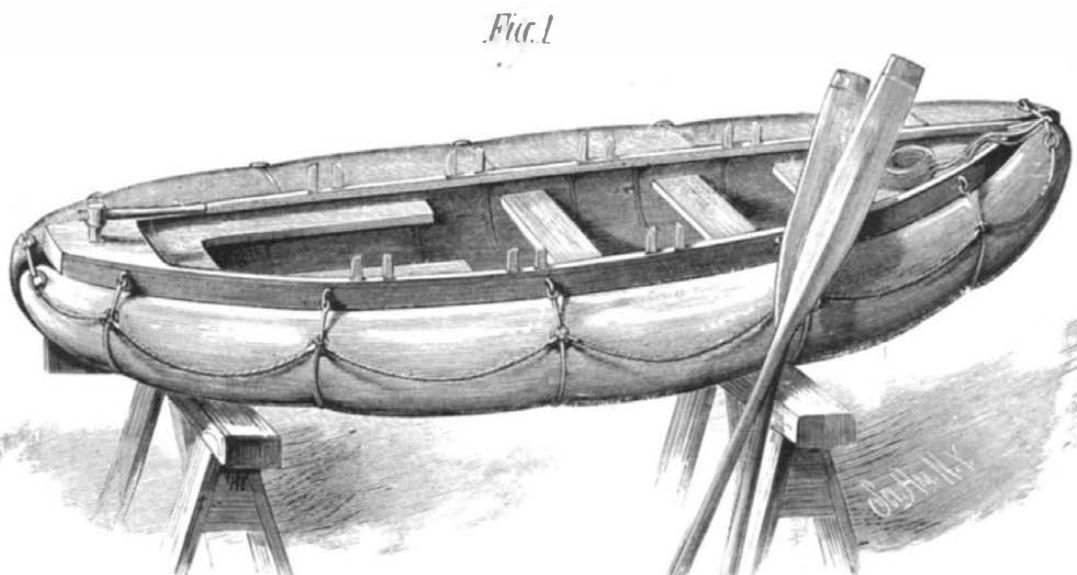
The Ader receiving telephone, shown in Fig. 4, is well known; it is a magneto-electric instrument, the magnet of which is formed into a ring so as to serve as a handle (see A, Fig. 4). The two cores, B B, are attached to the poles, and have wires coiled round them; a soft iron ring, F F, is placed over the poles, and in front of the diaphragm. The object of this ring is to serve as a supplementary excitor, and its object is to give to the lines of magnetic force a direction perpendicular instead of divergent to the diaphragm; by this arrangement the variations produced in the magnet by the induction currents of the coils have a maximum effect on the diaphragm; it is to this arrangement that the clearness of definition of the Ader telephone is due.

M. Hospitaller, in the article from which we are drawing our information, refers to a peculiar property of the Ader telephone which we cannot do better than deal with in his own words: "We will now consider the new acoustic effect which Mr. Ader has discovered, and applied for the first time in the telephonic transmission at the Electrical Exhibition. Every one who has been fortunate enough to hear the telephones at the Palais de l'Industrie has remarked that, in listening with both ears at the two telephones, the sound takes a special character of relief and localization which a single receiver cannot produce. It is a common experience that, in listening at a telephone, it is practically impossible to have even a vague idea of the distance at which the person at the other end of the line appears to be. To some listeners this distance seems to be only a few yards, to others the voice apparently proceeds out of a great depth of the earth. In this case there is nothing of the kind. As soon as the experiment commences the singers place themselves, in the mind of the listener, at a fixed distance, some to the right and others to the left. It is easy to follow their movements, and to indicate exactly, each time that they change their position, the imaginary distance at which they appear to be. This phenomenon is very curious, it approximates to the theory



of binauricular audition, and has never been applied, we believe, before to produce this remarkable illusion to which may almost be given the name of auditive perspective. Having explained this phenomenon, we may consider its cause, which is a very simple one. In order to realize it, we may recall the stereoscope, which allows us to see objects in

their natural relief. A similar effect is produced to the ear, and may be explained by referring to Fig. 3. Each person is placed in front of a transmitter with two telephones, which receive the impression from two distinct transmitters, placed a certain distance apart. These transmitters are grouped in pairs, 1 and 6, 2 and 7, 3 and 8, 4 and 9, and 5 and 10. Fig. 3 shows the complete arrangement for group 1 and 6. This group supplies sixteen telephones adapted for eight listeners, but the transmitter 1 serves the eight telephones on the left, and the transmitter 6 the eight telephones on the right of the eight listeners, A, B, C, to H. When the singer is at the point A, the transmitter 1 is more strongly influenced than the transmitter 6; the left ear is,



HALL'S LIFE RAFT.

therefore, more deeply impressed than the right ear, and the singer appears to be on the left to the eight listeners of the group. When the singer is at A, the transmitter 6 is more affected than the transmitter 1, and the singer appears to the right of the audience; these aural impressions change with the relative positions of the singers, and their movements can in this way be followed."

The use of the double conducting wire has been necessary to obviate the effect of induction, and in this respect it has been entirely successful, although of course it increases the cost of installation.

It may be interesting to note that experiments have been made to connect the Théâtre Français with the Exhibition, but up to the present time these have not been successful, chiefly owing to the fact that the footlights create a powerful upward current and interfere with the vibrations to the transmitters. At the opera the footlights are closed at the top, and are burnt with a powerful down draught.—*Engineering.*

MISCELLANEOUS INVENTIONS.

An improved hermetically sealed paper package, admirably adapted for aromatic substances, such as spices, coffee, tea, also baking and yeast powders, and other materials injuriously affected by air or moisture, has been patented by Mr. Henry Clay Crocker, of Milwaukee, Wis. This invention covers both a process and the article produced by the process. The mode of procedure is as follows: A package is made of any desired kind of paper and is filled with the material it is intended to contain, and then sealed in the ordinary manner. The package is next steeped in a bath of paraffine, which effectually makes all the joints of the package air and water tight, and closes its pores. Such package is then inclosed by an exterior wrapper, which may be an ornamental one. Only clean paper, it will be observed, is next to the contents, and the paper being pasted before the paraffine is applied, a stable package is produced without bringing the contents in direct contact with the paraffine.

An improvement in siphons, which provides for their being charged or started automatically at a given moment, has been patented by Mr. James J. Powers, of Brooklyn, N. Y. The invention consists in providing a tank siphon with an automatic valve at its outer end, whereby on the water or other liquid reaching a given level in the tank, the weight of the liquid in the outer arm of the siphon will open said valve and the contents of the tank be discharged, the pressure of the liquid keeping the valve open as long as the flow continues, but the valve closing when the discharge ceases. To effect this action of the valve, it may be carried by a lever provided with an adjustable counterbalancing weight.

A very useful improvement in formers for making pulp pails has been patented by Mr. John W. Bartlett, of Grand Rapids, Mich. This improvement relates to conical formers upon which paper pulp pails are made. The object of the invention is to permit formation of the crease for receiving the bottom and the chine at the same time the pail is formed, and to permit removal of the pail from the cone without injury. The invention consists in an expansible head composed of adjustable segmental plates, which are provided with flanges that form the crease and chine of the pail, such expansible head being combined with a conical former, whereby the head may be expanded while the pail is being formed, and withdrawn to permit removal of the completed pail, without marring the crease or the chine.

An improved machine for fluting hair, moss, and other substances for upholstery, has been patented by Mr. James Taylor, of New York city. In this machine the material to be operated upon is dampened to make it flexible, and is spread upon a traveling feed apron, with its fibers longitudinal with the said apron. It is carried by the apron beneath a feed roller and up to and over a hollow heated fluted cylinder, and is pressed into the flutes of said cylinder by an endless chain of small rollers, arranged to fit the flutes for about one-third of the surface of the cylinder, whereby the fiber is fluted or corrugated and dried at one operation, and is delivered at the opposite side of the cylinder to that at which it was entered.

Mr. William A. Allen, of Jersey City, N. J., has patented an improvement in machines for sawing kindling wood. This invention is an improvement upon a former machine patented by the same party. In it the wood to be sawed is fed on to a slotted table and carried by hands attached to a series of traveling endless chains to a set of parallel circular saws which divide the wood as required. Arranged over the saws is a plate, sufficiently raised to receive the upper parts of the saws beneath it, and of a width equal to about

the diameter of the saws, so that the stick of wood to be sawed may pass beneath the forward edge of said plate before coming in contact with the saws, whereby the stick will be inclosed between said plate and the hands when first struck by the saws, and will thus be prevented from jumping out of place. Furthermore, to the forward part of the lower side of this plate are attached springs, which pass back between the saws, incline downward to the table, and terminate a little beyond the rear edge of the plate, so that the stick of wood will be securely held until it has been severed by the saws and carried past them. These attachments greatly improve the machine.

An improved continuous furnace for treating ores has been patented by Mr. Amedee G. Sebillot, of Denver, Col. This improved furnace is designed to be used for treating ores, pyrites, and other minerals, and is to be used for roasting ores and minerals and converting them into sulphates, oxides, etc. The invention consists in a tunnel-shaped furnace with heat flues on the top and sides, and with rails on the bottom, on which rail cars rest, fitting closely in the furnace and containing the ore or the ore and acid, the fumes and vapors produced passing through a side aperture into a flue which conducts them into a suitable condenser. The car

the convex head of the stopper, that has a hole for the bore constructed to terminate in a shouldered recess in its base. Thus constructed, the stopper is placed upon a shouldered pin which fits said hole and recess, and is secured at its lower end by a screw to the block. Said pin in revolving packs and smooths and thus finishes the inner surface of the bore of the stopper, and the recess in the block packs and smooths and so finishes the convex head of the stopper. A lever formed with a socket to fit over an extended portion of this pin, and provided with a knife, is used to cut the rabbet in the base of the stopper. These several devices perform their work accurately.

EBONY CABINET.

The engraving represents an ebony cabinet of great beauty made by Herr Türpe, of Dresden. It is an example of the highest order of art manufacture. The bass-reliefs are of pear wood, and the sculptured figures are the work of a master hand.

The Formation of Coal.

All attempts to explain satisfactorily the formation of coal have thus far proved unsuccessful, though it is generally understood that it is the product of the decomposition of vegetable matter. Just how that decomposition has been brought about chemically is a matter which chemists have not as yet been able to solve. The principal difficulty has been that it has been impossible to obtain a clear insight into the chemical constitution of coal. It has been thought hitherto, and this is still the popular belief, that coal is in the main pure carbon, mixed with varying quantities of bituminous substances. It has been generally believed that, as the product of the distillation of coal is principally carbon, it would be safe to conclude that free carbon actually does exist in coal. The fact that sugar, starch, etc., under similar circumstances, leaves a residuum consisting of carbon has never been considered a proof that that element existed in these bodies in a free state. It is well known that coals which may have the same percentage of carbon, hydrogen, and oxygen do not by any means, in coking, yield the same products of distillation, and we have a complete analogy for this in the behavior of cellulose and starch when subjected to distillation. Evidence points to the conclusion that coal is a mixture of many and complex compounds; and the difficulty, amounting almost to an impossibility, of separating these compounds has much to do in rendering a chemical solution of the questions involved in the formation of coal a very arduous task.

The production of coal by artificial means is met by great obstacles, among which the absence of all knowledge concerning the conditions under which that process actually took place is the principal one. The question whether the vegetable matter to which our coal veins owe their origin was amassed by drifting or was carbonized *in situ*, has been much debated, and there has been much discussion on the point whether it was obtained from water or from land plants. Dr. Muck, of Bochum, in a recent work to which we shall refer at greater length in the future, takes up the theory that algae have mainly contributed to the formation of coal. It is urged that the remains of marine plants are rarely found in coal veins, and that shells, etc., are not often met with. Dr. Muck calls attention to the fact that marine plants decompose easily and completely, losing their form entirely; and that the disappearance of the calcareous remains of mollusks is readily explained by the formation of large quantities of carbonic acid gas during the process of carbonization. In accepting the marine origin of coal it is not necessary to resort to the assumption of immense pressure and high temperatures to explain decomposition and the total destruction of the structure of the original substance. Dr. Muck combats Fremy's bog theory at



EBONY CABINET MADE BY TURPE, OF DRESDEN.

length. His views are well supported by recent investigations made by Herr P. F. Reinsch, who has examined 1,200 sections of coal, coming to the conclusion that mineral substance has not been formed by the alteration of accumulated land plants. Herr Reinsch claims to have discovered that coal consists of microscopical organic forms of a low order of protoplasm; and though he carefully examined the cells and other remains of plants of a higher order he computed that they have contributed only a fraction of the matter of the coal veins, however numerous they may be in some instances.

Mr. William Driscoll, of Taunton, Mass., has patented an improvement in mechanism for finishing stoppers for steel ladles. The improvement comprises a block which is designed to be secured to a potter's wheel or other revolving device, and which is formed with a concave recess to receive

length. His views are well supported by recent investigations made by Herr P. F. Reinsch, who has examined 1,200 sections of coal, coming to the conclusion that mineral substance has not been formed by the alteration of accumulated land plants. Herr Reinsch claims to have discovered that coal consists of microscopical organic forms of a low order of protoplasm; and though he carefully examined the cells and other remains of plants of a higher order he computed that they have contributed only a fraction of the matter of the coal veins, however numerous they may be in some instances.

DREDGING IN BARBADOS.—It will be seen by reference to an advertisement in this paper, that the Colonial Government, Barbados, ask for proposals for an extensive amount of dredging in the harbor of that island. Over five acres are to be dredged.

Business and Personal.

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

AUGUSTA, GA., Nov. 9, 1881.

H. W. Johns Manufacturing Company, New York.
GENT.: We have used your patent Asbestos Roofing on our buildings for six years, and find them to-day apparently good for as many years more. On the roof of our burner-room the Roofing has been constantly subjected to the fumes of burning sulphur, and has given us every satisfaction. Tin subjected to the same usage became worthless in less than a month.

C. B. F. LOWE, Supt. and Chemist.

The Constant Current Cure.—A rational, well tried cure for chronic diseases. Send for pamphlet to Constant Current Cure Co., 207 Main St., Buffalo, N. Y.

John A. Brashear, Manufacturer of Silvered Glass Reflecting Telescopes and Specula, No. 3 Holt St., Pittsburgh, South Side, Pa.

Combination Roll and Rubber Co., 27 Barclay St., N. Y. Wringer Rolls and Moulded Goods Specialties.

Send for Pamphlet of Compilation of Tests of Turbine Water Wheels. Barber, Keiser & Co., Allentown, Pa.

Metallic Letters and Figures to put on Foundry Patterns, all sizes. H. W. Knight, Seneca Falls, N. Y.

List of Machinists in United States and Canada, just compiled; price, \$10. A. C. Farley & Co., Philadelphia.

Lightning Screw Plates and Labor-saving Tools, p. 380.

For Sale.—1 Engine Lathe, Fitchburg, 7½ ft. x 15 in.; price, \$250. 1 Iron Planer, planes 7½ ft. x 34 in. x 30 in.; price, \$50. Address Concord Axle Co., Fisherville, N. H. Presses & Dies (fruit cans) Ayar Mach. Wks., Salem, N. J.

Latest Improved Diamond Drills. Send for circular to M. C. Bullock, 80 to 88 Market St., Chicago, Ill.

Telegraphic, Electrical, and Telephone Supplies, Telegraph Instruments, Electric Bells, Batteries, Magnets, Wires, Carbons, Zincs, and Electrical Materials of every description. Illustrated catalogue and price list, 72 pages, free to any address. J. H. Bunnell & Co., 112 Liberty St., N. Y.

Wood-Working Machinery of Improved Design and Workmanship. Cordesman, Egan & Co., Cincinnati, O. Clark & Heald Machine Co. See adv., p. 413.

Abbe Bolt Forging Machines and Palmer Power Hammers a specialty. S. C. Forsaith & Co., Manchester, N. H.

"How to Keep Boilers Clean," and other valuable information for steam users and engineers. Book of sixty-four pages, published by Jas. F. Hotchkiss, 84 John St., New York, mailed free to any address.

Cope & Maxwell Mfg Co.'s Pump adv., page 398.

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

Saw Mill Machinery. Stearns Mfg. Co. See p. 397.

Common Sense Dry Kiln. Adapted to drying all of material where kiln, etc., drying houses are used. See p. 398. Supplee Steam Engine. See adv. p. 397.

Punching Presses & Shears for Metal-workers, Power Drill Presses, all sizes. Power and Foot Lathes. Low Prices. Peerless Punch & Shear Co., 115 S. Liberty St., N. Y. Diamond Engineer, J. Dickinson, 64 Nassau St., N. Y.

Pure Oak Leather Belting. C. W. Army & Son, Manufacturers, Philadelphia. Correspondence solicited.

The Best constructed low priced Engines are built by E. E. Roberts, 107 Liberty St., New York. Communicate. For Mill Mach'y & Mill Furnish'g, see illus. adv. p. 396.

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

Peck's Patent Drop Press. See adv., page 398.

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

Malleable and Gray Iron Castings, all descriptions, by Erie Malleable Iron Company, limited, Erie, Pa.

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

Electric Lights.—Thomson Houston System of the Arc type. Estimates given and contracts made. 31 Arch, Phil. 4 to 40 H. P. Steam Engines. See adv. p. 382.

Corrugated Wrought Iron for Tires on Tractor Engines, etc. Sole mfrs., H. Lloyd, Son & Co., Pittsburg, Pa.

Best Oak Tanned Leather Belting. Wm. F. Forreugh, Jr., & Bros., 381 Jefferson St., Philadelphia, Pa.

Rollstone Mac. Co.'s Wood Working Mach'y ad. p. 382.

Presses, Dies, Tools for working Sheet Metals, etc. Fruit and other Can Tools. E. W. Biess, Brooklyn, N. Y.

Improved Skinner Portable Engines. Erie, Pa.

Learn Telegraphy. Outfit complete, \$4.50. Catalogue free. J. H. Bunnell & Co., 112 Liberty St., N. Y.

List 27.—Description of 3,000 new and second-hand Machines, now ready for distribution. Send stamp for same. S. C. Forsaith & Co., Manchester, N. H., and N. Y. city.

Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Also manufacturers of Solomon's Parallel Vise, Taylor, Stiles & Co., Riegelsville, N. J.

For Machinists' Tools, see Whitcomb's adv., p. 366.

50,000 Sawyers wanted. Your full address for Emerson's Hand Book of Saws (free). Over 100 illustrations and pages of valuable information. How to straighten saws, etc. Emerson, Smith & Co., Beaver Falls, Pa. Telegraph, Telephone, Elec. Light Supplies. See p. 413.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 413.

Peerless Colors for Mortar. French, Richards & Co., 40 Callowhill St., Philadelphia, Pa.

Gear Wheels for Models (list free); Experimental Work, etc. D. Gilbert & Son, 212 Chester St., Phila., Pa. Gould & Eberhardt's Machinists' Tools. See adv., p. 413. Elevators, Freight and Passenger, Shafting, Pulleys and Hangers. J. S. Graves & Son, Rochester, N. Y.

Engines, 10 to 50 H. P., \$250 to \$500. See adv., p. 413.

Pure Grain Nickel, Rolled and Cast Anodes, Nickel Salts. Greene, Tweed & Co., 118 Chambers St., New York. Safety Boilers. See Harrison Boiler Works adv., p. 412. The Medart Pat. Wrought Rim Pulley. See adv., p. 412.

For Heavy Punches, etc., see illustrated advertisement of Hilles & Jones, on page 413.

Pays well on small investment.—Stereopticons, Magic Lanterns, and Views illustrating every subject for public exhibitions. Lanterns for colleges, Sunday schools, and home amusement. 116 page illustrated catalogue free. McAllister, Manufacturing Optician, 49 Nassau St., N. Y. Barrel, Key, Hoghead, Stave Mach'y. See adv. p. 413.

Fine Taps and Dies in Cases for Jewelers, Dentists, Amateurs. The Pratt & Whitney Co., Hartford, Conn.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 425, Pottsville, Pa. See p. 413.

For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, Send for catalogue to Rowley & Hermance, Williamsport, Pa.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 413.

The Porter-Allen High Speed Steam Engine. Southwork Foundry & Mach. Co., 430 Washington Av., Phila. P.

The New Lace Cutter saves cost on each side. Leather cut. Sample by mail, 50 cts. Greene, Tweed & Co., N. Y.

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher, Schumm & Co., Philadelphia, Pa. Send for circular.

Ore Breaker, Crusher, and Pulverizer. Smaller sizes run by horse power. See p. 413. Totten & Co., Pittsburgh.

Portable Power Drills. See Stow Shaft adv., p. 413.



HINTS TO CORRESPONDENTS.

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.

When you 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 SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) J. A. C. asks how he can temper and put an edge on a piece of sheet steel five inches long half an inch wide, and one-sixty-fourth of an inch in thickness. A. Steel in this form is best hardened in oil. It may be tempered by blazing off. It may be brought to an edge on a wet grindstone.

(2) A. B. N. asks how much of which kind, and what number of insulated copper wire, to use in making a sounder-magnet, 1½ inches long by ¼ inch core—to be one, and sometimes two instruments on a short line, probably from one room of the house to another. A. Use eight or ten layers of silk covered insulated copper wire, No. 22.

(3) J. E. K. asks: Can you inform me how to get rid of roaches? Our building is infested with them. We have tried a great many drugs, but with no effect. We are manufacturers of paper bags, and the paste breeds them. A. Use plenty of finely powdered borax and dalmatian insect powder. Put a small quantity of borax in the paste.

(4) J. S. B. writes: Please explain the manner in which the air brake operates in checking a railroad train. A. In the vacuum brake the exhaustion of the air from behind the piston allows the external air to drive the piston inward, carrying with it the brake levers, thus applying the brakes. In the air brake the air pressure created at the locomotive acts on a piston connected with the brake.

(5) M. M. H. wants to know how to make a good quality of court plaster. A. Soak isinglass in a little warm water for seventy-four hours, then evaporate nearly all the water by gentle heat, dissolve the residue in a little proof spirits of wine, and strain the whole through a piece of open linen. The strained mass should be a stiff jelly when cool. Now stretch a piece of silk or sarsenet on a wooden frame, and fix it tight with tacks or packthread. Melt the jelly, and apply it to the silk thinly and evenly, with a badger hair brush. A second coating must be applied when the first has dried. When both are dry, apply over the whole surface two or three coatings of balsam of Peru. Plaster thus made is said to be very pliable and never breaks.

(6) R. J. B. asks how white lead is made. A. The molten lead is poured through an iron sieve into a tank filled with water, whereby it is converted into threads of one-sixth of an inch in thickness, which are now placed in vats, each of which holds about 1,000 threads. Vinegar is now poured over the lead, and immediately drawn off again. Under the influence of the air and the vinegar adhering to the metal, the latter is oxidized. The vinegar is now poured into the vat and again drawn off, when it carries away the acetate formed on the surface of the metal in solution. After this process has been repeated a number of times, the vinegar has been transformed into a concentrated solution of basic acetate of lead, from which the carbonate

may be prepared by the introduction of a current of heated carbonic acid gas. The supernatant liquid is mixed with another quantity of vinegar, used again for the same process.

(7) A. A. U. writes: I have or had a slip of selenite on a glass slide to show various colors with the polarizer. The glass slip got broken, and I carefully heated the slip and transferred it to another piece of glass. It looks just as it did before, but does not work. It looks no different from a piece of glass. A. It has probably been injured by the heat, and cannot be repaired.

(8) C. A. V. writes: Having been a reader of your paper for more than twenty years, and knowing that it is justly held in high favor by many others in this city, I know that an opinion expressed in your columns would have due weight and consideration with your subscribers here. Can you give us an article in relation to smoke consuming? Or, if not consistent with your practices to do that, will you give replies to the following questions in your Answers to Correspondents: Does a mixture of steam and air introduced into the fire box of a boiler furnace have an injurious effect on the boilers? If it does, in what way and to what extent. I have heard it stated that when steam is injected into a boiler furnace a chemical combination takes place between the steam and the coal, forming a gas or vapor which corrodes the adjacent iron. Is this the case, and if so, what is the action? What is your opinion in regard to using a steam jet, or a combined steam and air jet, for the purpose? A. When steam is brought into contact with highly heated pure coal in an engine fire box, carbonic oxide, carbonic acid, hydrogen, vapor of water, and nitrogen are the chief products. If air is injected above the fuel less carbonic oxide and hydrogen pass off unconsumed. Ordinary coal, however, nearly always contains more or less sulphur, and the sulphurous oxide formed in burning may be changed by contact with the steam to hydrosulphuric and sulphuric acids, both of which injure iron, especially when mixed with much aqueous vapor. The latter portions of a boiler are, however, not so apt to be corroded by these as the portions furthest from the fire. A steam jet in the fire box may, therefore, prove injurious to the boiler in some cases. Steam and air, or air alone, introduced at the proper time and in proper proportions, is effective.

(9) J. M. K. asks: Is it possible to freeze pure alcohol or pure whisky? A. Alcohol could doubtless be solidified, but it would require a temperature lower than any yet attained by artificial means.

(10) W. N. W. writes: Will you kindly tell me how to clean or whiten the white medallions on blue Wedgwood ware? A. As the colors are burnt in it is not possible to bleach or remove them, save by mechanical means, such as the sand blast or scratch brush.

(11) D. H. A. writes: 1. I wish to coat small castings with some material that would be permanent and resist the action of hot water. Is there any material as good as galvanized iron, that would be cheaper than said material? A. Zinc is probably the cheapest coating. 2. Please describe the process of galvanizing. A. Cleanse the castings by pickling them in water to which has been added about ten per cent of sulphuric acid, and scouring with sand. After rinsing pass them through a strong slightly acid aqueous solution of zinc chloride, and then put into a bath of melted zinc (contained in a shallow iron pot over a furnace) until properly coated with zinc. The bath of zinc should be covered with a layer of salammoniac to keep its surface free from zinc oxide. 3. Would there be any objection to having a churn made wholly of tin? A. Yes; wood is to be preferred.

(12) W. G. A. B. asks: Can you tell me how to make the moulds of glue and molasses, such as Rodgers uses for making his statuettes? A. The flexible moulds referred to are prepared as follows: Glue, 8 lb.; molasses (New Orleans), 7 lb. Soak the glue overnight in a small quantity of cold water, then melt it by heat over a salt water bath, stir until froth begins to rise, then add and stir in briskly the molasses, previously heated. Continue to heat and stir the mixture for about half an hour; then pour.

(13) L. McN. asks: How can I obtain large crystals of boron? I obtained small crystals by heating together 80 grains of boracic acid and 100 grains of aluminum. Would keeping the crucible in the fire longer and cooling more slowly develop larger crystals? A. The largest crystals of boron are prepared as follows: 1,500 grains of anhydrous boracic acid are closely powdered and mixed with 900 grains of metallic sodium cut into small pieces. This mixture is introduced into a cast iron crucible previously heated to bright redness; 700 to 800 grains of solid, but previously fused sodium chloride is placed on the top of the mixture, and the crucible is covered. As soon as the reaction is over, the still liquid mass is thoroughly stirred with an iron rod and poured, while red hot, in a slender stream into a large and deep vessel containing water acidulated with hydrochloric acid. The undissolved pulverulent boron is then collected on a filter and washed with acidulated water until the boracic acid is got rid of, the washing being continued until the boron begins to run through the filter. It must be dried upon a porous slab without the application of heat. In order to convert this amorphous into crystalline boron it is mixed into a thick paste with water and packed tightly into a crucible with a piece of aluminum weighing about 90 grains in the center. The cover having been luted on the crucible is inclosed in a second one, the interval between the two being filled with recently ignited charcoal. The outer crucible is next closed with a luted cover and the whole exposed for about two hours to an intense white heat. The temperature is then allowed to fall slowly, and when cold the contents of the inner crucible are digested with dilute hydrochloric acid, which dissolves out the aluminum, leaving the boron in large clear yellowish or brownish octahedral crystals mixed with copper colored scales of boron and aluminum.

(14) J. D. H. asks: What is the action of alcoholic tinctures on blue litmus paper which it turns red? Pure alcohol has no effect on it. What is the cause of this? A. The tinctures (the extracts) you have been experimenting with are doubtless slightly acid.

(15) L. McN. writes: Can you give the proper proportion of ingredients to make a good clear glass? I have tried, upon recommendation 60 grains silica, 20 grains lime, and 28 grains clay, but instead of a glass I obtained a white stone. A. Fine hard glass is made from the following materials: Fine white sand (silica), 29 lb.; best calcined soda, 18 lb.; quicklime, 3½ lb.; niter, 1 lb.; broken scrap glass (same quality), about 17 lb. A heap bottle glass is prepared from common sand, 100 lb.; soda (common), 30; wood ashes, 40; potter's clay, 100; broken glass, 100.

(16) J. J. B. writes: Please state manner of producing a white paste alive with animalcules just visible to naked eye. How long will it take to produce such? Several friends and myself were shown a paste similar to the above. A discussion arose as to the manner and time of its production. A. Mix wheat flour in to thin paste with a little yeast and cabbage water, and let it stand in a warm place until it becomes quite putrid. Mix this with water (or a little common vinegar) and examine. The time required to prepare such a paste under favorable conditions need not exceed three days.

(17) E. B. asks: Will you give me a recipe for making a bronze or varnish such as is used on steam radiators to give them a bright gold color? A. Give the iron a good coating of common gold size, reduced with oil of turpentine so as to work freely from the brush. When this coating has nearly dried lay on the bronze powder (obtainable in the market) so that every part is covered. After standing for an hour or so go over the work with a soft cloth, removing all excess of the powder and developing the luster of the coating by gentle friction.

(18) H. B. L. asks: Will you please inform me how to finish wooden panels for oil paintings in the natural color of the woods and for black? A. You will find directions for such painting in "The Painter, Gilder, and Varnisher's Assistant." Address the book-dealers who advertise in this paper.

(19) W. R. S. writes: I have a separate sink in my yard into which the deposit of my water-closet empties. It was dug sixteen years ago, and has a light sandy bottom. For fourteen years no sign of its filling was apparent; suddenly it began filling, and in the past two years has had to be taken out three times. Had the kitchen refuse run into it, I could have easily accounted for the trouble in the grease forming a coating on the bottom preventing the fluid portion from filtering through the sand, but such is not the case. Some persons have told me that there is a substance which, if emptied into the sink, will evaporate all the fluid and leave only the solid. Can you tell me what means will dispose of this fluid? A. This is a common difficulty, due chiefly to the gradual clogging up of the soil in the immediate vicinity. A new cesspool or connection with a sewer trap are the only remedies we know of.

(20) J. P. asks: 1. Will rubber (elastic) bands serve for making rubber cement? A. No; pure (unvulcanized) rubber is required. 2. About what is the per cent of chlorine gas contained in ordinary chloride of lime? A. It is very variable in the commercial substance it varies from 12 to 30 per cent. When pure, dry, freshly prepared bleaching powder may contain 38½ per cent of the gas. 3. What quantity of commercial sulphuric acid is necessary to set free the chlorine gas in ordinary chloride of lime? A. As one sample may contain much more of the gas than another it is impossible to give close figures. The pure, dry, freshly saturated substance would require about 1½ times its weight of the acid for its complete decomposition. 4. What is the proportion of glycerine to glue for printer's rollers? A. If the glycerine is concentrated use about equal parts of both.

(21) E. T. G. asks for the best and most practical method of bluing tire bolts and stove bolts. A. Run your bolts through an inclined iron cylinder revolving over a fire. The speed of the cylinder must be regulated with reference to its temperature.

(22) E. R. writes: If "W. F. E.," No. 31, of December 17, will paint his stove with paint made of powdered black lead and linseed oil, and polish in the ordinary way when dry, he will have a sample stove that may be left out in all kinds of weather without injury to the polish.

(23) R. V. J. writes: 1. I have a can nine inches high and six inches in diameter, made of heavy galvanized iron, with a brass faucet in, all joints soldered secure. I wish to exhaust about one-third of the air it contains by means of the air pump, but it fills again in a short time. Have had it resoldered several times, and a different faucet put in, but with the same effect. Can it be made air tight, and by what means? A. Yes; fill the vessel with water under pressure to discover the leaks, which mark and secure with solder, after relieving the pressure. A well packed faucet must be used. 2. Is there any coating that could be applied to canvas to make it air tight that would resist the pressure of the atmosphere? A. Give the cloth several coats of rather thick alcoholic shellac varnish, allowing each to dry before another is put on. 3. I have a box containing one hundred and twenty-five cubic feet made of wood with sufficient strength to frame work inside to stand the force of atmospheric pressure. What is the cheapest material it could be covered with that will exclude air? I wish to exhaust air from the box and retain it for a length of time at about five pounds pressure within. A. You could use the varnished cloth above described, sheet metal, or lead foil.

(24) R. C. Co. ask: What will remove claret stains from white linen goods without injuring the fabric? A. See directions under "How to Remove Stains," in SUPPLEMENT, No. 158.

(25) W. J. McD. asks: 1. What will make thick petroleum lubricating oil, that is dark colored, lighter colored, or nearly transparent, without spoiling it for lubricating? A. See "Lubricants," page 41, current volume. 2. How is the white paraffine obtained from the thick waxy substance that comes out of the wells, and what is the process? A. Paraffine in an impure state is separated from the oil by refrigerating or "freezing" the fluid, and cold pressing. It is purified

by resolution in fresh oil and reprecipitated and separated by cold and pressure. 3. How can pure paraffine be made to melt at a higher degree of heat without otherwise destroying its properties? A. Its melting point cannot be elevated without altering its properties in some degree.

(26) F. W., Jr., writes: I see in some newspapers notices of "ozone" for preserving fruits, meats, etc. Can you give your opinion as to its value, method of preparing, applying, expense, and any other information you may be willing to suggest in regard to preserving fruits? A. We have no knowledge of any practical process for preserving fruit, etc., wherein ozone is employed. The liquid preserving agents called ozone preservatives, etc., are commonly solutions in water of the sulphites of lime and soda potassa or ammonia. Aside from the cost of producing ozone this substance, though a disinfectant, is not a preservative agent in any sense.

(27) F. G. asks: What can be used to prevent store show windows from sweating when the gas is being lit in the evening? I have taken the gas out and put in a ventilator, still they sweat and are of no use in the evening when we want to make the most show. A. Apply to the glass evenly a slight film of pure glycerine, and you will not be troubled by the "sweating" complained of. Glycerine used in this way will also prevent the formation of frost on the glass in cold weather.

(28) J. W. C. asks: What liquid or liquids will penetrate rubber? A. Try pure bisulphide of carbon or benzole. In these rubber (if pure) first swells and then dissolves. If 15 per cent of absolute alcohol is mixed with these liquids the rubber does not go into solution. Vulcanized rubber swells up without dissolving in these liquids.

(29) A. L. Y. asks: Please give a good receipt for a cologne. A. Alcohol 95 per cent, 1 quart; oil of cedar, 9 drachms; oil of thyme, 2 drachms; oils of bergamot and lemon, 6 drachms; oil of Portugal, 4 drachms; oils of neroli, vervain, and rosemary, 2 drachms; oil of mint, 2 1/2 drachms; eau de melisse, 2 drachms; tincture of musk, 24 drops. Mix, and after standing twenty-four hour filter till clear.

(30) J. N. asks: Will you please let me know in your Notes and Queries column how to make a dip for brass wire, to be used in bird cages? One that will prevent the wire from corroding or getting dirty. A. Seed lac, dragon's blood, annatto, and gamboge, of each, 4 oz.; saffron, 1 oz.; wine spirit, ten pints. Triturate together and digest for several days, with occasional stirring. Then strain for use.

(31) Q. L. asks: Can caoutchouc which has been dissolved in carbon-bisulphide and then mixed with the right proportion of sulphur, be vulcanized to make ebontite? A. As we understand you, yes—the process is covered by several patents. 2. In vulcanizing rubber, is it necessary that steam heat be used, or will dry heat do as well? A. Dry heat will do, but steam can be used to better advantage.

(32) E. A. E. asks: How is water gas made; is it used for lighting, or only for heating; will it condense by conveying it in pipes under ground 1,000 feet; who are manufacturers of it? A. Water gas, so called, is made by passing dry steam through a column of highly heated coal contained in an air-tight furnace. A gas rich in hydrogen and carbonic oxide, mixed with carbonic acid, results. The latter impurity, together with others derived from the coal, are purified by washing in water and passing over quick-lime. For illuminating purposes it requires to be mixed with another gas—derived from petroleum—very rich in hydro-carbons. When properly prepared, very little of it condenses under ordinary conditions of temperature and pressure. See our advertising columns for addresses of those interested in this process.

(33) F. D. H. writes: A pulley 8 inches diameter is driven by belt from a pulley 36 inches diameter, making 230 revolutions. Against this belt presses a pulley 6 inches diameter. How many revolutions does the 6 inch pulley make, and what is the rule for finding the same? A. The speed of the belt is the same as that of the periphery of the driving wheel, and the relative speeds of the driving and driven wheel is as their diameters. E. g. 6 : 36 :: 230 : 1380. The speed of the 6 inch pulley is 1380 revolutions per minute.

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

M. C.—It is powdered slate or argillaceous rock containing iron sulphide—and possible traces of precious metals—an assay would be necessary to ascertain what value (if any, it has as an ore.

NEW BOOKS AND PUBLICATIONS.

THE ST. NICHOLAS MAGAZINE. NEW YORK: Published by the Century Co.

It is impossible to speak in too high terms of eulogy of St. Nicholas. It is confessedly unapproached and unapproachable in its peculiar field. It is a marvel of perfection, both as regards its literary excellence, its artistic merit, and its singular adaptability to the requirements of an eager and alert generation of young readers.

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[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

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

November 29, 1881,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired and remit to Munn & Co., 37 Park Row, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

Table listing inventions with patent numbers, including items like Air blast, Album clasp, Albin, Albin, Alloy, Amalgamator, Annunciator case, Auger, Ax handle attachment, Axle box cover, Axle, Bag holder, Bales of fibrous material, Ball, Battery, Bed lounge lock, Bit stock, Bolt, Bolt threading dies, Book, Boot and shoe attachment, Boots and shoes, Boring holes, Bottle stopper, Bottles and jars, Boxes, Brake, Button, Button or stud, Button, separable, Camera, Can, Can filling machine, Candle sheath, Cane mill, Car brake, Car, Cattle, Car pusher, Car, sleeping, Car, stock, Carriages, reversible handle for children's, Zimmermann (r), Cart, breaking, Cart, manure dumping, Case, See Annunciator case, Blotting case, Caster, M. B. Schenck, Castings, core for forming screw threads on, G. Cowing, Chest, Cigar lighter, electric, Clasp, Clevis for elevators, suspension, Clothes drier, A. H. Stephens, Clutch for pulleys and hoisting engines, friction, H. E. Armitage, Coffee, aging and improving the quality of, C. S. Philips, Coffee, aging and maturing, C. S. Philips, Coffins into graves, device for lowering, W. Keisling, Cold, apparatus for producing, G. F. Meyer, Colors for ornamenting fabrics, preparing, W. H. R. Toye, Colors, manufacture of rosaniline, J. Holliday, Colter, rolling, D. W. Hughes, Comb, A. Taylor, Congelation of water, etc., facilitating the, Guthrie, Coop or crate, O. Collins, Cork fastener, bottle, J. Walker, Cornstalk cutter, A. Cherry, Cotton picker, W. Lee, Coupling, See Hose coupling, Cracker chest, D. W. Mills, Crane, traveling, J. Walker, Crib, folding, Wilbur & Hungerford, Crimping iron cabinet, M. A. Kaler, Crucible furnace, G. Nimmo, Crushing and mixing granular and pulverulent material, machine for, P. H. Bracher, Cuff box, I. P. Turner, Cuff holder, E. A. Robbins, Cuff or collar fastening, M. Loomis, Cultivator, wheel, F. O. Williams, Curtain fixture, W. A. Bowyer, Curtain roller, spring, B. I. Hicks, Cutter, See Cornstalk cutter, Meat cutter, Plow cutter, Stalk cutter, Dental plate, J. G. Yemen, Disintegrating mill, L. J. Bennett, Divided ring or link, H. T. Booraem, Door hanger, S. Ide, Drier, See Clothes drier, Fruit drier, Drying rack, adjustable, J. R. Moore, Ear piercing instrument, F. X. Xavery, Egg box, J. L. Stevens, Egg tester, W. S. Sanderson, Electrical switch board, T. W. Lane, Electro-magnetic device, E. Thomson, Elevator buckets, double seamer for, F. H. C. Mey, Elevator buckets, forming the bodies of, F. H. C. Mey, Embroidering and sewing machine, E. Cornely, Enameled ware, etc., E. C. Quinby,

Table listing inventions with patent numbers, including items like End gate, wagon, Engine, See Traction engine, Fabric, See Textile fabric, Fabrics, ornamenting, W. H. R. Toye, Faucet, F. C. Lillis, Fence, barbed, T. H. Dodge, Fence wire, barbed, P. P. Hill, Fence wire stretcher, J. F. Landers, File cutting machine, J. H. Schaal, Firearm, breech-loading, F. Beesley, Fishing reel, J. Palmer, Fishing rod, T. H. Chubb, Forging rear forks of bicycles, die for, H. T. Russell, Fruit drier, A. W. Walker, Fruit press, D. H. Whittemore, Fuel, artificial, Walker & Brot, Furnace, See Crucible furnace, Glasshouse furnace, Furnace for burning solid fuel, C. Gearing, Furniture polisher, J. Swenson, Furs and articles thereof, making skinless, Koch, Jr. & Burgmiller, Galvanic battery, L. D. McIntosh, Gas lighter, electric, W. R. Nutting, Gate, See End gate, Glasshouse furnace, J. J. Gill (r), Glove for husking corn, W. E. Hall, Glucose, manufacture of, Weber & Scovell, Gold saving apparatus, N. H. Falk, Grain binder, J. F. Gordon, Grain meter, R. Forward, Grinding mill, J. Higginbottom, Handle, See Saw handle, Umbrella, parasol, or cane handle, Hanger, See Door hanger, Shaft hanger, Harrow, T. Haxton, Harrow, spring tooth, G. L. Gilkey, Harvester, J. P. Manny, Hats, machine for beating napped, G. Yule, Hay gatherer or loader, E. Bamberger, Headlight, locomotive, J. M. Kelly, Heating water over lamps or gas, device for, C. S. Tallmadge, Holder, See Bag holder, Cuff holder, Rein holder, Spool holder, Hook, See Snap hook, Horse detacher, R. W. Clendening, Horseshoe weight attachment, J. Harney, Hose coupling, L. Ford, Hot water and steam boiler, Livingstone & Wright, Illuminating apparatus, C. M. Lungren, Indicator, See Station indicator, Inkstand, C. De Roberts, Jack, See Lifting jack, Knife, fork, and spoon, combined, F. Praunegger, Knitting machine cam lock, A. B. Dodge, Lamp, G. Bohner, Lamp, electric, L. K. Böhm, Lamp, electric, E. M. Fox, Lamp, electric, J. H. Irwin, Latch, gate, F. N. Martin, Level, spirit, G. Egart, Level, spirit, F. Kraenel, Lifter, See Stove, etc., lifter, Lifting and weighing device, A. Arnot, Lifting jack, J. C. Beard, Light, See Headlight, Lock, See Bed lounge lock, Knitting machine cam lock, Lumber trimming machine, W. B. Swartwout, Maize, treating, L. Chiozza (r), Meat cutter, G. P. Treulieb (r), Mechanical movement, J. M. Griest, Mechanical movement, Porter & White, Medical compound, W. H. Eaves, Meter, See Grain meter, Milk and cream, apparatus for preserving, F. M. Slutz, Mill, See Cane mill, Disintegrating mill, Grinding mill, Mirror, E. G. Gollner, Mirrors, device for suspending, A. Iske, Moulding machine, gear, J. Walker, Mortar for laying bricks, etc., Arrouquier & Barret, Mortising machine, chair leg and arm, F. F. Parker, Motor, See Pump motor, Sewing machine motor, Motor, I. L. Landis, Nippers, police, J. B. Craig, Nut and bolt lock, W. C. Kownover, Nut making machine, W. E. Ward, Ore concentrator, S. Kendall, Ore concentrator, centrifugal, A. D. Clarke, Ore separator and pulverizer, A. McKellar, Oven illuminator, A. Gampe, Pail, chamber, F. Heyl, Pantaloons and overalls, L. S. Bortree, Parasol lining and the method of applying the same, L. L. Gans, Parer, corer, and slicer, apple, B. D. Tabor, Picker, See Cotton picker, Plow, J. Lane, Plow cutter, M. W. Farber, Plow, listing, J. Lane, Plow, planting, J. Lane, Plow sulky planting, Black & Pates, Pocket for reversible garments, M. Goldberger, Power machine, manual, F. Rourk (r), Preservation, hermetically sealed receptacle for food, W. W. Stewart, Press, See Fruit press, Printer's lead and slug rack, C. De Vos, Printing films, adjustable frame for, B. Day, Printing machine, J. E. Hinds, Printing machine registering device, T. M. Vielle-mard, Printing plate, C. H. Hansen, Printing plates, preparing matrices for producing, C. H. Hansen, Pulverizer, dirt, J. H. Burd, Pump, W. F. Johnson, Pump, M. Walker, Pump, double-acting, H. Santrock, Pump motor, O. M. Tomlinson, Pump regulator, steam, H. Kessler, Rack, See Drying rack, Railway, elevated, S. Dodson, Railway trains, signaling, etc., apparatus for electrically stopping, W. C. Shaffer, Reel, See Fishing reel, Refrigerating preserving package, O. P. Johnson, Refrigerator, A. W. Zimmerman, Refrigerator can or barrel, C. A. Sheridan, Regulator, See Pump regulator, Rein holder, elastic check, L. M. Devore, Ring, See Divided ring, Rod, See Fishing rod, Roller, See Curtain roller, Rosaniline, sulphated compound of, H. Caro, Safe, fireproof, T. Brett,

Table listing inventions with patent numbers, including items like Saw blades by sand blast, apparatus for polishing, E. C. Atkins, Saw guide, band, H. A. Kimball, Saw handle, A. J. Doane, Saw tempering apparatus, E. C. Atkins, Sawing machine, D. Berry, Sawing machine, drag, G. B. Durkee, Seams of sheet metal cans, machine for making the, F. M. Leavitt, Separator, See Ore separator, Sewing machine, T. Carey, Sewing machine corder, E. D. Fellows, Sewing machine embroidery attachment, R. M. Rose, Sewing machine motor, R. Whitehill, Jr. (r), Shaft hanger and box, A. Loebner, Sheet metal, machine for squaring, E. Jordan, Sheet metal pipes, machine for threading, W. W. Crane, Sheet metal, press for working, E. Jordan, Skate, H. Dobson, Skate, roller, H. M. Yates, Sleigh, T. F. Westervelt, Snap hook, W. S. Truitt, Snow, heating apparatus for melting, C. Delafield, Snow plow, W. W. Osborne, Soldering machine, can, H. R. Robbins, Soldering side seams of cans, machine for, E. Norton, Sower and fertilizer distributor, seed, H. P. Tenant, Spark arrester, C. H. Waters, Spike, J. B. Barnes, Spinning and reeling silk, machine for, J. E. Tynan, Spool holder, I. Dimock, Spring, See Vehicle spring, Watch case spring, Stalk cutter, W. S. Boliver, Stand, See Telephone stand, Starch, machine for reducing, R. W. Graves, Station indicator, Hackney & Hudson, Steam boiler, S. L. Hill, Steam cone lensing apparatus, J. Charlesworth, Steam engine reversing gear, A. J. Hoag (r), Steering apparatus, steam, G. H. Reynolds, Stereotype locking device, E. P. Brown, Stocking, elastic, D. D. M. Master, Stockings, manufacture of, L. S. Cox, Stopper, See Bottle stopper, Storage tank for petroleum, F. H. Benton, Stove base, J. K. McLaughlin, Stove cover, M. G. Carleton, Stove, heating, J. R. Graves, Stove, hot blast, F. W. Gordon, Stove, etc., lifter, T. S. Lindsay, Stove, oil, A. Krause, Stove or range, cooking, L. L. Culver, Stove polish, F. A. Page, Sugar and sirup, manufacturing, Weber & Scovell, Sugar, process of and apparatus for mixing glucose with cane, S. M. Lillie, Swimming apparatus, W. K. Kidder, Switch and signal apparatus, C. H. Jackson, Tablet, blotter, R. B. Holmes, Tanning hides, W. Harris, Target ball, J. Powell, Telegraph, automatic, R. K. Boyle, Telegraph, chemical, G. A. Hines, Telegraph instrument, W. A. Shaw, Telegraphic relay, O. Lugo, Telegraphic transmitter, S. V. Essick, Telephone receiver, H. E. Waite, Telephone, speaking, F. Blake, Telephone stand, J. A. Seely, Telephone transmitter, H. Hunnings, Telephone transmitter, H. E. Waite, Telephonic relay and repeater, C. A. Randall, Textile fabric from bamboo, cane, etc., Robbins & Southmayd, Thrasher and separator, combined, H. Hardgrove, Thrashing and separating machine, grain, Huber & Strobel, Thrashing machine, J. I. Case et al., Tie for supporting header joists, B. F. Ellis, Tire upsetter, F. K. Collier, Torpedo boats, gas expansion chamber for, G. E. Haight, Torpedo flow controller for oil wells, W. Greter, Torpedoes, apparatus for placing railway, W. M. & W. A. White, Toy, automatic, J. Doyle, Traction engine, R. B. Chritton, Truss, J. B. Mayer, Truss, hexrial, W. Nelson, Tumbler, forge, A. W. Morgan, Umbrella, parasol, or cane handle, G. W. Hughes, Valve gear, steam engine, L. Ransom, Valve, slide, W. B. Turman, Vehicle spring, G. B. Hamlin, Vehicle, two-wheeled, S. W. Metcalf, Velocipede, W. A. Whiting, Verges and pendulum rods, device for making, A. E. Hotchkiss, Washing machine pounder, J. D. Carr, Watch case spring and holder, R. F. Burke, Watch, stem winding, J. W. Hurd, Watches, method of and apparatus for demagnetizing, H. S. Maxim, Wave power, machine for utilizing, I. L. Roberts, Whip, Mullen & Noble, Jr., Whistle, call, C. S. Leet, Wire finishing apparatus, H. Roberts, Wood ornaments, composition for artificial, O. O. Karsch, Wood working machine, R. H. Andrews,

DESIGNS.

Table listing designs with numbers, including items like Carpet, T. J. Stearns, Oil cloth, C. T. & V. E. Meyer, Saucepan handle, L. & W. H. Berger, Window cleaner handle, E. P. Hall,

TRADE MARKS.

Table listing trade marks with numbers, including items like Cigars, H. Feltnan, Cotton piece goods, Naumkeag Steam Cotton Company, Cracker or biscuit, soda, E. J. Larrabee & Co., Dentifrice, E. Steinhauser, Fish and salt mackerel, cod, J. Pew & Son, Gin, Adams, Taylor & Co., House furnishing japanned toilet ware, Hollander & Bradshaw, Lead white, Vogeler, Son & Co., Liniment, H. D. Kendall, Medicine, cough, C. A. Lewis, Oranges, Wessels & Co., Perfumes, H. S. Evans, Pharmaceutical preparations, certain, J. Wyeth & Brother, Saws, crosscut, E. C. Atkins, Vermifuge, W. G. White,

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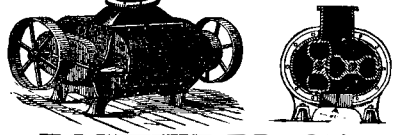
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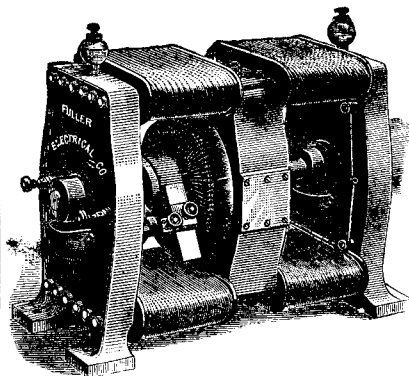
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