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#### THE MANUFACTURE OF WINDOW GLASS WITH NATURAL GAS.

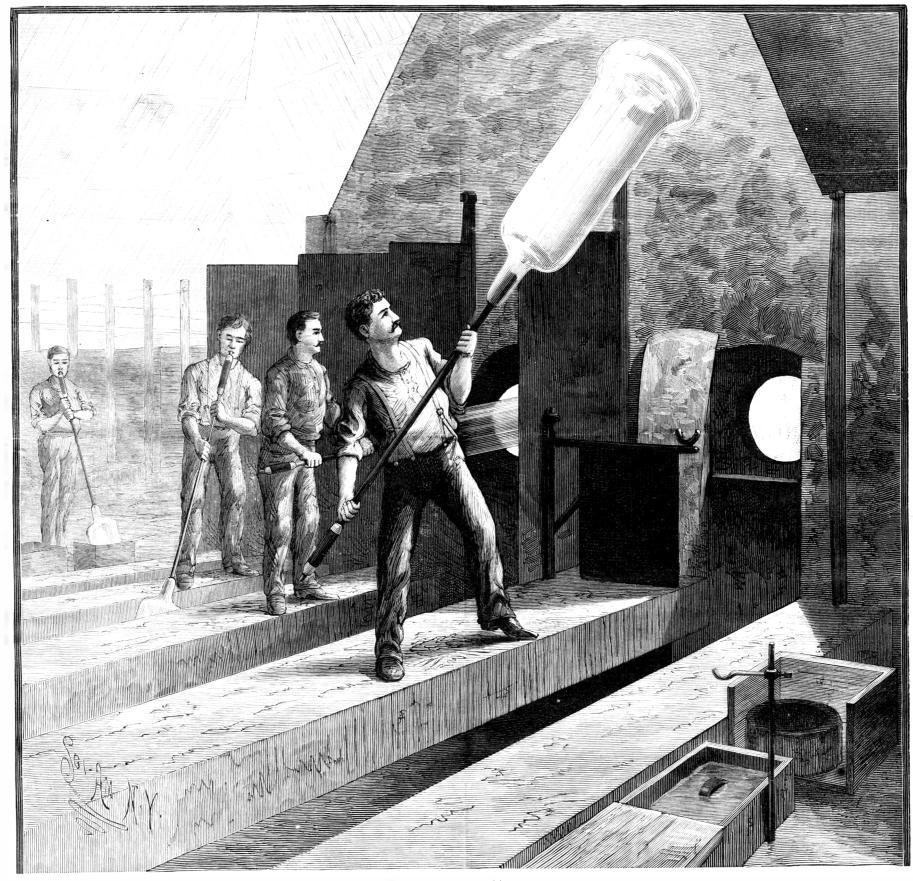
There is probably no industry among the many that have been benefited by the utilization of natural gas in which the results have been so deed as in the manufacture of glass. For a number of years past, American glass has been undoubtedly inferior to the product of European factories, and has consequently occupied but a secondary position in the estimation of American builders and architects. The foreign manufacturers, and particularly those of France and Belgium, have hitherto manifested a superior dexterity in the handling of their materials. They seem to have held the secret of either neutralizing the effect of impurities in their fuel, or of burning it in such a manner | feeted, in a measure, by the more complete mechanical as to get the minimum disadvantage from their pres- appliances now at our command, but the most potent

ence. This has been due partly to greater experience in the industry and partly to a better construction of furnaces. In some of the more perfect plants, crude fuel has been abandoned and manufactured gas used instead, thus giving them in advance the advantages of natural gas, with the important exception, however, of its cheapness and almost total freedom from sulphur. These circumstances made imported glass synonymous with best quality.

That these conditions have now so far changed that our own glassmakers can compete with the best foreign producers, and can even honestly claim certain points of superiority for the home product, is a subject for hearty congratulation. The improvement has been ef-

influence must be ascribed to the use of natural gas. In the manufacture of window glass, the results have been particularly gratifying, many important buildings being now fitted with American glass which but a few years ago would have demanded the imported. The metamorphosis of the crude material into a clear and brilliant pane of glass involves so many interesting points that we have illustrated the process, choosing the works of Messrs. S. McKee & Co., at Pittsburg, as a typical establishment.

The manufacture of sheet glass depends for is success upon the closest attention to details, and its history is therefore one of delicate manipulations. It is a very easy matter simply to make glass, for it is nothing more than a double silicate of soda or potash and an (Continued on page 183.)



THE MANUFACTURE OF WINDOW GLASS WITH NATURAL GAS.-BLOWING.

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#### TOO MUCH IDLE CAPITAL.

There are in the city of New York forty-five national banks with a capital aggregating forty-five million four hundred and fifty thousand dollars. The statement made by these institutions on the first of March showed that there was due to their depositors two hundred and nine million seventy-one dollars. Add to this enormous sum the millions in the vaults of the banks organized under our State laws, and with private bankers, as well as the great sums held by our Trust and Insurance companies, and it is evident that there is a great deal too much unemployed capital lying idle in this city.

If this large sum and the surplus funds in our other monetary institutions throughout the country could be put into circulation, it would give an impetus to all kinds of business, and bring about that condition of prosperity for which the public have been looking for the past few years, and are now realizing only in part.

#### PROPOSED AMERICAN EXHIBITION IN 1889.

It was in the year 1789 that the Constitutional Government of the United States was established, with Washington as its Chief Executive. The inauguration of the first President was celebrated in the city of New York. As this ceremony ushered in what will probably always be regarded as the greatest century vouchsafed to the nation, it has seemed highly fitting that its centennial should be commemorated by suitable observances in the same city which saw the birth of the new republic. It has therefore been proposed by the General Assembly of the State of Tennessee that such a celebration should be held in 1889 in the city of New York, and that it should take the form of a great National and International Exhibition of Science, Art, Industry, Manufactures, and the Agricultural, Mineral, and other resources of the United States, since this would seem to be the most fitting memorial of the intellectual and material progress made by a young people under a century of popular government.

The joint resolution passed by the Tennessee Legislature provides that such an exhibition shall be recommended; that its importance be commended to the President, with the request that he bring it to the attention of Congress, that the people of Tennessee be urged to assist the movement, and take steps to prepare a suitable State exhibit; and finally, that the Governor be requested to forward a copy of the resolution to the President and to the Governors of the several States and Territories. The occasion is one of such great historical importance, and the celebration proposed seems so eminently suitable, that we trust the movement started by the patriotism of Tennessee will receive the undivided support of her sister States and Territories, of the National Government, and of the President. Three years have already passed since this proposition was first brought forward. Three years remain in which to act. The history of former exhibitions shows that this time is not so long that any of it can be wasted. This should be particularly borne in mind when the importance of the occasion, as well as the competition offered by other exhibitions already organized, both demand that the attractions shall be greater than ever before if the celebration is to be such a success as will satisfy the national pride.

#### Fluid Extract of Camellia.

Within the space of a few months, Dr. E. R. Squibb has called the attention of the medical profession to the fluid extract of camellia, or tea, which has been thus proposed to take the place of guarana and coca. He states that the testimony in regard to the effect of tea, coffee, Paraguay tea, and kola nuts is all of a similar character to that given with regard to coca. Each of these substances appears to have come into use independently in widely separated countries, in order to produce the same effects, namely, to refresh, renew, or sustain the physical and mental organism; and it is a curious surprise to find that after they had been in use for a very lengthened period, and although each came from a different order of plants, the same active principle, namely, caffeine, could be extracted, in different proportions, from all of them.

It is even more curious to find that for centuries past a plant called coca, yielding a different principle, has been in use for a similar purpose, the effects of which, says Dr. Squibb, differ but little from caffeine, "simply producing a similar physiological effect in much smaller doses."

Comparing the power of these drugs in their tendency to counteract sleep, or promote wakefulness, the author found that three grains of caffeine were equal to three fluid drachms of the extract of coca, and to seventy minims of the fluid extract of camellia. These seventy minims of the latter extract equal seventy grains of tea, and this yields a little over two grains of caffeine. These are Dr. Squibb's figures.

Latterly, Dr. J. B. Andrews has reported on a long series of experiments with fluid extract of camellia and hydrobromate of hyoscine in the treatment of insane patients. With the first of these drugs he noticed a

remarkakle uniformity of action, the pulse being decreased from ten to twenty-four beats under the influence of various doses, while the force and tension were invariably increased. The full influence of the remedy was experienced in half an hour to one hour after administration. After remaining stationary for about half an hour, the pulse began to increase in frequency, and regained its normal condition in the course of another half hour, the effect of the drug disappearing in about three hours after taking it. It was used clinically in a number of cases, as a heart tonic, with favorable results

#### New Use for Cold Air Machines.

Most persons have heard of the process for facilitating the drilling of artesian wells through strata of quicksand by freezing the quicksand with liquids brought to a very low temperature, and circulated through pipes introduced through the well tubing. La Revue Industrielle gives an account of an ingenious modification of this process, put in practice by a Swedish contractor for his own benefit, which deserves to be kept in mind for future occasions. The contractor had undertaken to drive a tunnel through a hill, on which stood a number of large houses. As the excavation went on, it was discovered that the surface of the hill was underlaid in many places with masses of gravel mixed with sand, and saturated with water, which ran out immediately into any excavation made in it. The escape of any considerable quantity of this material from under a building would infallibly ruin the building; and the foundation was so soft that the tunnel could not be lined with sufficient rapidity to prevent serious escapes. To underpin the houses from the level of the tunnel would have been a costly undertaking, and the contractor was obliged to have recourse to his wits for a solution of the problem. Fortunately, these did not fail him. It occurred to him that, if the wet gravel could be frozen, it might be worked as well as a hard material; and he considered whether it might not be possible to throw a stream of cold air upon it from one of the cooling machines now so often used. Inspired with this idea, he crossed the sea to England, and bought a Lightfoot ice machine, which he brought back with him and set up in the tunnel. The result surpassed his expectations. Before the cold blast the quicksand became a rock, which could be cut and worked easily and safely, and within a few weeks he passed under two five-story houses without experiencing any trouble.—Amer. Architect.

#### Fatal Effects of Alcohol.

According to Dr. Richardson, alcohol cuts down by disease, in England and Wales alone, 1,000 persons a week. What, adds the Doctor, if any other cause of mortality did the same? What if 1,000 persons per week died, in the same area, from the bite of the rabid dog or the snake, by the swallowing of arsenic, opium, or prussic acid? What if some thousand persons a week were known to be killed by the secret devices of the slow poisoner, who, under the guise of friendship, went about and instilled into his victims some subtile drop which led to the shortening of their life and to the production of lingering organic fatal disease? What, indeed, then would be the cry and the action? Why, all through the ranks of the great profession of medicine there would be a tumult of labor and toil, such as never before was seen, to remove the calamity. Men would be ambitious to be first to discover by experiment, by experience, the cause of so fearful an evil, and to remove it instantly; while he who won the victory over the calamity would be extolled as illustrious, and, crowned with honor, become a household word from among the children of Esculapius. Yet here one single cause making this deadly havoc, a cause well known and easily removable, in spite of its evils and in face of its easy removal, is permitted to remain in sight with a majority of the army of medicine looking on in apathy, pitying us "poor foolish fanatics" who are exercising our limited powers to uproot it, and some, with the rest of the world, so sharing the calamity as to become copartners in the destruction which follows from the participation.

#### Frozen Fishes.

On Nov. 18 a fishmonger of Paris, M. Heydendare, received from Gonda (the center of fisheries in the region about Rotterdam) a large consignment of fishes packed and preserved in ice. They could not have been caught later than the 16th, and were probably caught on the 15th. On unpacking, a jack was seen to move its gills slightly, and the idea occurred to wash it with fresh water, and immerse it in a vessel. In a few hours the fish was in its normal state, and very lively. M. Heydendare sent it to the Trocadero Aquarium, where it is to be seen now; it is a fine animal, about 2 ft. 4 in. long. Here, then, is a case of a fish out of water more than 48 hours (probably 3 days), packed with little care, along with dead fish and pieces of ide—traveling thus 280 miles, and coming to life again. The lowering of temperature was doubtless very favorable to maintenance of the vital functions.

#### PHOTOGRAPHIC NOTES.

Photographing by the Aid of Magnesium Light .-Mr. Goodwin, before the Glasgow and West of Scotland Amateur Photographic Association, recently explained a simple way of burning magnesium powder for taking photographs at night, which we find reported in the Brit. Jour. of Photo. A long camera stand is turned upside down, and the legs tied firmly together, a horizontal arm of wood about eight inches long is lashed as near the top as possible, and at the end of this is supported a small tin funnel, beneath which is a ring of cotton wick wet with alcohol. When in bench or chair, and, everything being ready for the exposure, the wick is lighted, and the magnesium powder, mixed with two parts of fine sand, is poured into tirely ceased operations, and is supposed to be permathe funnel; a magnificent sheet of flame results, and the negatives obtained were very soft, the light having been thoroughly diffused. A thimbleful of magnesium powder with twice the amount of sand is sufficient for an exposure.

Photographing Colored Pictures.—Many experiments have been recently made in this branch of photography, more especially in Germany, which it is probable will shortly result in the formulation of a valuable process for accurately copying colored pictures, such as paintings, chromos, etc., in the true relation of the respective tints.

One class of experimenters believe that it is necessary to mix some dye like eosine or azaline with the emulsion, in order to secure the best results; others show that an ordinary commercial dry plate may be utilized by immersing in a bath of azaline. The film thus becoming impregnated with dye is as sensitive as if the latter was contained in the original emulsion. In either case it is suggested that a pale yellow screen of may yet have an important bearing on the overwhen daylight is employed, in order to counteract the effect of the blue rays. Dr. H. W. Vogel, one of the early experimenters, says recently in the Photographishe Correspondenz, translated in the British Jour. of Photography, that he tried photographing on plates sensitized with azaline by lamplight, as follows:

I had two gas burners (Argand) at hand, which I placed right and left at a distance of about eight inches from one of my colored tables.

The direct light from the flame was screened from the lens by sheets of tin.

The lenses were of the stereoscopic class, with four inches back focus, without stops.

The first experiment showed at once that azaline plates with this illumination had a sensitiveness far beyond what I had expected.

Two minutes' exposure proved to be much too long. I reduced the exposure to one and a half minutes, and finally to fifteen seconds; even with this short exposure the plates appeared to be overexposed, and the negatives were so vigorous that they took a long time to print.

An exact comparison with daylight showed that through a dark yellow glass screen at one o'clock in the afternoon of Dec. 7, in clear weather, six seconds was necessary to give a well exposed picture of the color table; so that in fact it is possible to obtain by lamplight, without a yellow screen, an image with true color relation, with an exposure only two and a half times as great as that with daylight and a yellow screen.

The photograph by lamplight had almost exactly the same relation to the colors as that by daylight. For photographing colored bodies by artificial light a new way is thus, by means of azaline plates, opened.

Further, the interesting fact is established by these experiments, that an azaline plate is more sensitive by lamplight than an ordinary dry plate with the same emulsion.

#### Quicksilver Production and Trade, 1885.

Mr. J. B. Randol, of San Francisco, gives the follow ing information:

California is the only State in America where cinnabaris mined in paying quantities, and where the production of quicksilver from that ore is worthy of notice.

The year 1885, like the three years preceding, has been unsatisfactory in production and price.

produced, the price ranged from \$27.90 to \$30.75 a confirmation in the fact that the arrow extends only flask; in 1884, 31,913 flasks produced sold for from \$26 to \$35; and last year the product, 32,073 flasks, realized \$28.50 to \$32. With this large decrease in production-nearly one-half since 1881-there has been no corresponding rise in price, which, united, have caused the quicksilver industry to be almost entirely unprofitable; for, with deeper mining, the expenses have largely increased, and the ores have also become scarcer and poorer.

In this condition of affairs, all the mines would be compelled to cease operations were it not for the ad by the island of the Cité, the third pier had sunk, and valorem duty of 10 per cent placed on the quicksil- the pressure of the arches toward the subsidence had ver produced by cheap labor at the rich mines of Almaden, Spain, and Idria, Austria, owned and worked by the governments of those countries.

It is not known that any of the ten quicksilver police. A large crowd soon collected, and could see samples for trial.

year; but it is quite certain that none was paid, and the prospects for the future in that direction are quite unfavorable. To make this industry fairly remunerative, it is necessary for the government to foster it by a duty of not less than ten cents a pound, and even that would leave the strength for survival one of great uncertainty and difficulty.

The total production for 1885 was 32,073 flasks. The New Almaden mine is credited with 21,400, or 1,400 flasks more than it made in 1884; all the other mines, ten in number, had an aggregate of 10,673 flasks, use, the stand is further raised by being placed on a which was 1,240 flasks less than they together produced in 1884.

> The Gaudalupe mine made only 35 flasks, then ennently closed. The Sulphur Bank mine made a last dving effort to continue a producer; but it is believed its superficial deposits will soon be exhausted, and then one more will be added to the list of closed mines, in which category may also soon be included the Redington, Great Eastern, Ætna, New Idria.

> The exports by sea from San Francisco were 15,730 flasks, an increase of 829 over the previous year. Ten thousand flasks were sent out of the State by railroad to Arizona, Utah, Idaho, Montana, and Mexico, and it is estimated that about 10,000 flasks were consumed in California and Nevada, leaving the San Francisco market bare of stock at the end of the

The low price of silver has shut out quicksilver as an article of export to China, and it has also seriously cut down the profits on shipments to Mexico.

Perhaps the exhaustion of the American quicksilver mines, quite sure to come before the year 1900, glass be affixed at the rear of the lens in the camera, supply of silver now agitating the financial and political world; for with the sources of quicksilver controlled, as they then would be, solely by the gov ernments of Spain and Austria, it would be in their power to limit the production, and to greatly increase the price, even to a point above where it would be a loss for the silver mines to mine any but the richest ores. Thus the output of silver could be diminished from all mines except the few having smelting ores.

#### A Peculiar Illumination.

A brilliant phenomenon has been noticed at Beaver Falls and other places in Western Pennsylvania, where natural gas blow-off pipes send out their large volumes of flame into the frosty night air, which has aroused particular interest both from its beauty and the absence of any fully satisfactory explanation.

At those works which receive their supply of natural gas directly from a well, and are running only during the daytime, the gas is permitted to escape into the atmosphere at night, and to avoid the roaring sound is usually ignited as it issues from the top of the blow-off. These gigantic torches light up the country for miles around, the effect being particularly noticeable in cloudy weather, when the glare is reflected. It has been observed that in certain conditions of the atmosphere a vertical, feathery, and very brilliant arrow of fire extends above the flame almost to the zenith. Its greatest brilliance is perhaps at its highest point, where it is described as being quite as bright as a rod of iron at a white heat. The natural pulsations of the gas, as it rushes from the blow-off, affect the outpouring flame, and give the luminous arrow a leaping, flashing motion which adds greatly to its beauty. The observers agree in stating-and the fact is significant—that the conditions necessary for the appearance of the phenomenon depend upon the presence of a frosty atmosphere and an appreciable haziness, or else it is visible either during or immediately preceding a light, fleecy fall of snow, the temperature being somewhat below the freezing

Bearing these facts in mind, it is not difficult to explain the arrow. The minute crystalline faces of the suspended snow or ice particles catch the light from the burning torch, and reflect the rays in precisely the same manner as the ocean, or other expanse of water, on a moonlight night, gives us a long, silvery path of In 1881, when 60,851 flasks of 76½ pounds each were reflected moonbeams. This explanation finds further to the upper limits of the haze, and when the lower atmosphere is clear, begins at some distance above the flame.

#### Accident to the Pont Neuf.

On the morning of December 17, about six o'clock, a serious accident was found to have occurred at the Pont Neuf, the oldest and best known of the Paris bridges. On that part of the structure crossing the narrower of the streams into which the Seine is divided torn up the pavement of the footpaths and the causeway. An alarm was given by persons who were crossing the bridge, and traffic was at once stopped by the

mines worked in California earned a dividend last the outer stones of the bridge break off in large masses and fall into the river. Barriers were erected at both ends of the bridge, and the gas pipes crossing it were cut off and rendered secure.

It was found that the part of the bridge which had been injured had subsided 65 centimeters. That part of the bridge which crossed the wide stream is secure, but the other part will have to be entirely rebuilt. The city engineers state that the work will be long and tedious, and that while it is going on it will be necessary to erect a temporary bridge connecting the Quai des Orfevres and the Quai des Grands Augustins. The common proverb, "Solide comme le Pont Neuf," has thus been falsified.—London Times.

#### How a Wise Man Built His House.

Many of our readers will find their own experience reflected in the following paragraph taken from the last number of the Central Law Journal, where it is used to illustrate another subject. A gentleman wished to build for himself a nice mansion, and, of course, was exceedingly anxious to have the approbation of his friends and neighbors. So he asked the advice of all. The first said, "Here is a nice site, and I should build such a style of house." The second said, "I don't like that site nor the style of house." The third came along, and was utterly amazed at the selection of the site made by the others, and of their total want of taste in architecture. He said, "Leave off all that; here is the most charming spot for a house, and here is the most exquisite plan for a house." And so it went on until the gentleman became disgusted with his advisers, and went and selected his own site and adopted his own style of architecture, and builded a house to suit himself. By a multitude of counselors there is wisdom, but the house builder's experience in seeking the advice of his neighbors found it different, and was probably wise in rejecting all their suggestions, and following the plans his own judgment dictated. The moral here conveved does not end with locating of a house site or the erection of the building. It will be generally found best to follow one's own impressions and taste rather than to defer to others.

#### The Universal Telemeter.

Some interesting experiments were recently carried out on the Thames Embankment with the universal telemeter, a new surveying instrument, the invention of the Abbe Luigi Cerebotani, Professor of Astronomy and Mathematics at the University of Verona. The instrument consists mainly of two glasses capable of accurate adjustment, the one acting as the base line, the other, the side of an angle. The direction of the glasses is gauged by a graded rule, by means of which the distance between the two glasses of observation and the point to be measured is registered, rendering the finding of the required length of line a matter of easy calculation. The stand on which the telemeter is fixed is provided with a drawing board, on which the objects measured can be dotted as the measurements are obtained, thus gradually forming a plan of the country surveyed. The whole is exceedingly simple, and can be worked by any one not possessing special knowledge. The telemeter has already been tested by Herr Foerster, of the Berlin Observatory, and one is now in use by the German War Office. The instrument seems well adapted to ordinary surveying, although it might possibly be urged that its utility may be somewhat handicapped by the shortness of its base line.

#### The Cost of Wheat Production.

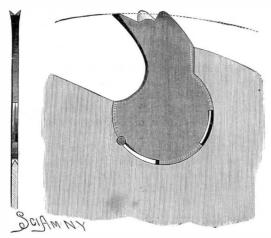
The phenomenally low prices for wheat which have prevailed during the past year have directed attention to the details of the cost of producing that grain, and in various States of the wheat section the statistical experts are making calculations to settle the question whether, at the prevailing prices, the culture of wheat can be profitably continued. One of the most interesting reports yet published on this point has been made by the Michigan Secretary of State concerning the cost of producing and marketing the wheat, oats, and corn crops of 1885 in that State.

The average yield per acre is given at 21 98 bushels of wheat, 40.55 bushels of oats, and 70.87 bushels of ears of corn. The yield thus indicated applied to the cost per acre shows an average cost per bushel of 59.1 cents for wheat, 29 cents for oats, and 21.1 cents for ear corn. The average price of wheat on January 1, for the State, is placed at about 74 cents, oats 30 cents, and corn 24 cents per bushel of ears. In regard to wheat, the report observes that the "net profit on investment in the southern counties ia 38 per cent, and in the northern counties 35 per cent.

P. ORR & Sons, of Madras, write that, owing to the terrific rains in India, a good waterproof roofing is very necessary. The writers think the paper tile referred to in the Scientific American of Oct. 31 might be specially adapted to their climate and storms, and suggest that the manufacturers of the article send them

#### SAW TOOTH.

The saw plate is of the usual description. The re movable tooth consists of a circular plate in which is ter having a saw tooth point and the smooth cutting knife edges, which are formed on opposite sides of the cutter (as shown in the end view of the tooth) and plate), and are bent outward slightly away from each other to bring them into engagement with the wood. These knives project outward beyond the cutting point, so that they will cut deeper into the wood than the point; the point of every tooth removes the material cut by the knives on the tooth in front of it. This construction insures a clean cut, without making any dust. The periphery of the circular part of the tooth and the back of the cutter



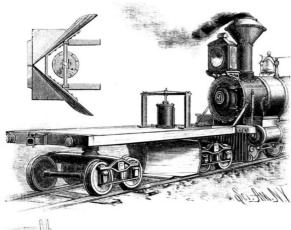
WILSON'S SAW TOOTH.

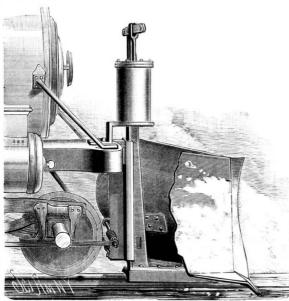
are provided with a V-shaped groove, which is adapted to receive a V-shaped tongue formed on the edge of the circular part of the blade; and portions of the edge of the tooth and of the plate are cut away to admit of placing the tooth in the circular notch before bringing the tongue and groove into engagement with each other. The tooth is held firmly in place by a rivet or screw, part of which enters both the tooth and plate. It will be seen that the tooth can be removed from the plate by turning it through a part only of a revolution. The backward movement of the cutter is limited by the shoulder formed on the plate and against which it rests.

This invention has been patented by Mr. C. J. Wilson, of 114 Clinch Street, Knoxville, Tenn.

#### IMPROVED SNOW PLOW.

The accompanying engravings represent a snow plow that can be attached either to the front of a locomotive or to the middle of a platform car. The body





ORMEROD & CROSKEY'S SNOW PLOW.

of the plow is composed mainly of a base portion and wings that meet at the center to form the front flange and is attached to the locomotive in such a manner that it may have both a vertical and lateral movement independent of the locomotive, so that it branch pipes which conduct the water into tanks or William H. Brown, of Dunedin, Fla.

will follow the track at curves and may be lifted cisterns. The bottom of each cistern is below lowfrom the track, and will not interfere with the sway or lurch of the engine. The raising and lowerformed a notch, at one side of which projects a cut- ing of the plow may be done by lever or steam power, but it is preferred to employ compressed air, and for this purpose a cylinder is attached to the frame of pipe is carried over an elevation, it is extended bethe plow, the piston being so connected that, when it low the low-water line at both ends of the bend, and is operated by admission of compressed air to or its exhaust from the cylinder, the plow will be raised and lowered accordingly.

The construction is such that in rounding curves the locomotive will throw the plow into the center of the track. The upper surface of the base portion of the plow is extended to form a lip, which is cut away to span the rails, so that the plow may be lowered to remove the snow from the center and sides of the track, somewhat below the upper surfaces of the rails. The snow and ice are removed from the surfaces of the rails themselves by sharp edges running in contact with them when the plow is lowered for work. For properly guiding the plow body along the track, wear plates and flanges that run in contact with the rails are secured to the lower plate of the base.

When considered desirable, the plow can be mounted in the center of a short car, as shown, in which case the combination uniting the plow and truck can be dispensed with. The body of the plow is attached to vertically movable plates, and is raised and lowered by a piston in a cylinder placed on top of the platform of

The inventors of this plow, Messrs. Thomas Ormerod and A. B. Croskey, of Leadville, Colorado, claim that by raising and lowering the body of the plow vertically in slides it does not clog up with snow or ice, thus being preferable to plows or flanges that are raised on

#### HANDLE FOR CANS.

The handle for fruit, meat, and paint cans here shown is folded closely against the side when the can is stored, but can be readily arranged as a handle



COLEMAN'S HANDLE FOR CANS.

when the contents of the can are to be removed. The rectangular frame of wire is curved to conform to the shape of the can, to which it is soldered at the middle of its ends, so that it will remain in contact with the can, and occupy very little room; when necessary, the wires can be bent outward to form the handle, as shown in the right hand view. To give the handle additional strength at the point of its attachment to the can, the iron can be bent inward at the middle of the upper and lower sides of the frame, as shown in the lower part of the engraving. After serving as a package, the can can be converted into a convenient household article.

This invention has been patented by F. W. Coleman, M.D., of Rodney, Miss.

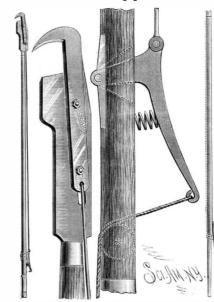
#### AUTOMATIC WATER WORKS.

New Orleans, La., is to provide

water works for automatically delivering water without the use of a motor or other power machinery. One end of the siphon pipe is dipped into the water in the river or bay to a point below the low-water mark, and the lower end of the pipe is passed into a cylindrical cup having a closed bottom on which a packing piece rests. This cup is formed with numerous apertures and with lugs through which passes a rod also passing through guide lugs on the pipe. The upper end of the rod is screw-threaded and passed through a nut held to the pipe. This cup serves as a strainer, and can also be used to close the end of the pipe when the apparatus is to be put out of operation. On the upper end of the pipe is a casing to which the main waterconducting pipe is connected. On

The main pipe is conducted underground in the desired direction, and to it are connected numerous

water mark, and the delivery pipe enters the cistern below the low-water mark, or, if it enters at the top, it must extend below the low-water line, as shown to the left in the upper engraving. When the a pipe extends from the highest point of the bend down below the water line, and then returns to the surface of the ground, where it is provided with a cock. The inner end of the main pipe is connected with a

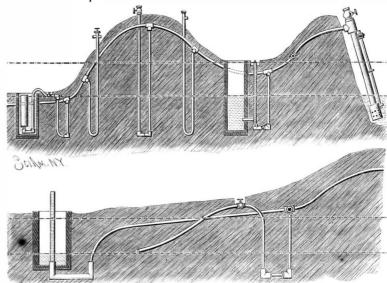


BROWN'S ACME THORN CLIPPER.

glass gauge-tube in a cistern. At the wells is a pipe extending to the surface of the ground and connected at its lower end with the delivering pipe. Extending through the vertical pipe is a rod carrying a valve at its lower end and a hand wheel at its upper end; this valve shuts off the supply to the well. When the pipe enters the top of the cistern, the outlet is provided with a float operating a valve, so that if the level of the water in the river should rise to such a height as to flood the country, the float would rise and close the valve, thereby shutting off the water. The pipes are first filled with water through a hose connected with the neck of the casing at the inlet. This starts the siphon, and the water runs into all the cisterns until the level is equal to that in the river.

#### PRUNING IMPLEMENT.

The chisel secured to the upper end of the pole is formed with a lower longitudinal slot and with an upper inclined one. A hook having a cutting edge at the bottom of its prong is arranged to slide on the side of the chisel, and is guided by screw bolts passed through the slots. Connected with the lower end of the hook is a rod whose lower end is connected with an angle lever, the shank of which is passed through a slot in the pole and pivoted to a clip. To the other end of the lever is attached a cord passing over a pulley in the pole, as shown. On the lower end of the rod is a ferrule to receive the upper end of an extension rod, near the lower end of which is a pulley over which the lower part of the cord passes, the end of the cord being secured to a lever pivoted on the extension rod, as shown in the right hand view. The cutting edge of the chisel being placed against the branch to be cut, the lower lever is swung from the rod, thereby moving, by means of the cord, the lower part of the upper lever toward the rod. The The object of this invention, which has been pat- hooks are thus pulled downward, but as it is guided ented by Mr. M. A. Laska, of 148 North Basin Street, by the inclined slot it is also moved slightly toward



LASKA'S AUTOMATIC WATER WORKS.

the casing is a cock, and above it is a neck for attach- the edge of the chisel, and a shearing cut is made. When the lower lever is released, a spring under the upper one presses the lower part outward and raises the hook. This invention has been patented by Mr.

#### TESTING BAYONETS AND CAVALRY SWORDS.

Previous to the year 1885, the long triangular Martini-Henry bayonet was tested by being sprung over a or a triagular bayonet which is either too soft or too bridge two inches high, as depicted in our sketch (No. | hard to be passed into the service.—London Graphic. The point of the bayonet was held in a shoe, the center of the blade rested on the bridge; the socket SCREW CUTTING AND SELF-ACTING SLIDING GAP LATHE. was then pressed down till it was level with the point. We give an illustration from Engineering of a screw and 4 ft. clear of the face plate in front. The bed is 20

The bayonet had to stand this test without receiving a permanent "set." This test was considered sufficient till the campaign in the Soudan showed the necessity for a more severe test. The bayonet now, instead of being sprung over a bridge, is bent down over a curved block of wood (Fig. 2), on all three sides, which tests every part of the blade from point to shoulder; if it stands this without receiving a "set," it is then struck two or three times on each face on a solid wood block (Fig. 3); this is with the object of testing the temper and quality of metal, and for detecting flaws. If the bayonet stands this test, it is finally subjected to the twisting test (Fig. 4). In this the socket is placed in a revolving disk with a weight of 80 pounds attached to it, the point being held stationary; the bayonet is twisted through an arc of a quarter of a circle, and on being released must recover its figure.

Cavalry Sword, Pattern 1885.—The tests for this sword are also extremely severe (Fig. 5). The blade

is first struck on back and edge on a solid oak block to cutting and self-acting sliding gap lathe, constructed to give smoothness and steadiness of cut, with little or detect flaws. The rigidity of the blade is then tested by by Messrs. John Lang & Sons, Johnstone, Eng. The placing it in a machine (Fig. 6), and bringing a weight | fast headstock is 6 ft. long and is in one casting to the pressure on it of 32 pounds; it must support this weight ground line, where it is securely bolted to the gap without deviating from the straight line. Its elasticity frame. The head is 6 ft. 6 in. wide at the base, and is

pressure of 40 pounds is applied, depressing the hilt six inches, as shown in the sketch. On the weight being released, the blade has to recover itself; the blade is then finally tested round a curved block of wood (Fig. 8), on both sides. After all these tests the blade should remain absolutely straight, without having received a permanent set. If it is set in the smallest degree, it is cast out. From

most, if not quite, impossible for either a cavalry sword

the above brief description, it will be seen that it is al- ed inside as well as outside, so as to be properly balanced. The largest step of the cone is 3 ft. 6 in. in diameter, and the smallest step is 22 in. in diameter. The face plate is 9 ft. in diameter, with an internal wheel cast on the back. The gap frame is of massive proportions, and is arranged to swing 15 ft. in diameter

> ft. long, 4 ft. broad, and 20 in. deep, and is arranged to slide from 12 in. to 61/2 ft. from face plate. The leading screw is of steel, and is 41/2 in. in diameter; it is accurately cut to Whitworth standard thread. The motion for driving the leading screw for general work up to 10. ft. diameter is communicated through the shaft crossing the gap frame; but when the work is over 10 ft. in diameter, the motion is carried around the end of the gap frame by shafts with bevel gearing, the shaft crossing the gap being then withdrawn.

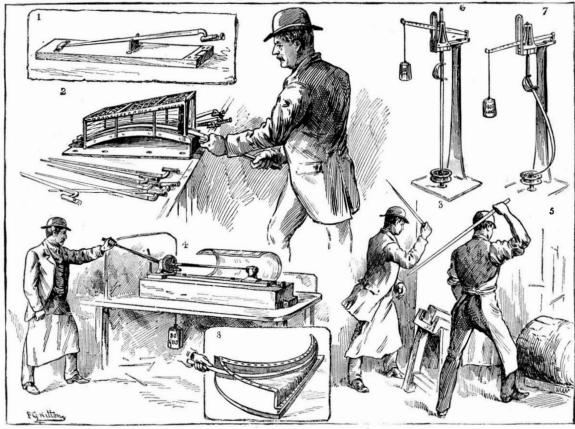
The shifting headstock is fixed in alignment with the running head by sliding in T-slots planed out of the bed, and having V-lips in which the headstock is fitted. Four bolts from these T-slots secure the headstock in position when turning.

All the gearing of the lathe is carefully designed and of ample strength for heavy duty; the arms wheels are all of the box pattern, and all teeth of the wheels, including the change gears, are machine cut from solid lanks, so as

no backlash, and the nearest possible approach to noiselessness of action.

The internal wheel on the back of the face plate, and the bevel feed motion, are cast from machine cut patterns, having a correct form of tooth. The gearing is proportioned so as to give an equal percentage of variation at each change of speed. A strong stool is supplied to cross the gap frame and carry the slide rest for use when turning large diameters.

structed for the Glenfield Company, Kilmarnock.



1. The "Bridge" Test (old style) for Triangular Bayonets.

2. The "Curve" Test (the method adopted during the past two years).

is next tested in the same machine (Fig. 7). A weight carefully designed to resist the various strains to which

3. The "Striking" Test for Bayonets. 4. The "Twisting" Test for Bayonets

5. The "Striking" Test for Cavalry Sword Blades.

6. The "Vertical Pressure" Test for Cavalry Swords. (A weight of

32 lb. must not deflect the blade.)

7. The "Vertical Pressure" Test. (A weight of 40 lb. must shortex the blade by six inches without breaking it.)

8. The "Curve" Test for Sword Blades.

it is subject.

TESTING BAYONETS AND CAVALRY SWORDS AT THE ROYAL SMALL ARMS FACTORY ENFIELD.

The spindle is of steel and has a front journal 10 in. in diame-This lathe, which weighs complete 45 tons, was conter by 15 in. long. The cones on the spindle The cost of smallpox to Tennessee during the past five years is estimated by the State Board of Health to and counter gear are turn-be \$141.619.91.

IMPROVED SCREW CUTTING AND AUTOMATIC SLIDING GAP LATHE,

#### Longevity of Butterflies.

A correspondent of the Times, referring to Sir John Lubbock's discovery of much greater longevity of ants than has hitherto been believed, thinks that the same may be true with regard to the butterfly, although the common notion is that the butterfly's life is a short and merry one. The correspondent, who writes from Bournemouth, then relates the following incident:

"On August 15 last a fine peacock butterfly flew into our house through the garden door, and was caught and put under a large bell glass. On the following day another came in, and was also put under the glass. They were supplied daily with fresh flowers and a few drops of new honey, which they evidently much enjoyed. No. 1 died during a suddenly cold night; No. 2 lived until yesterday, December 14. Whenever the sun shone upon their cage, which was placed on a table near a large window of plate glass, they opened their beautiful wings and flew about vigorously, occasignally resting on a flower to thrust their trunks deeply into its corolla, or standing over and suck up the drops of honey. The extraordinarily sensitive nervous system of these little beauties was indicated by the most rapid vibratile trembling of the wings directly the sunlight or the scent of fresh flowers reached them. When the sun was not out, they usually remained perfectly still, with their wings closed, especially selecting to hang on the under side of a leaf. They showed great intelligence in distinguishing the freshly gathered flowers and in deciding that honey was the right thing to eat, and I have seen one of them scramble with considerable difficulty across his cage through a tangle of leaves and stalks, determined to get to a particular leaf on which he wished to hang. After some unsuccessful attempts to reach it, he hooked it down with one foot, then held it with another, until he could get the rest of his legs upon it, having done which he appeared satisfied, shut up his wings, and hung himself upon it, topsy-turvy, to rest. If he failed to do what he wished with one leg, he immediately tried another, appearing to think that, having six at his disposal, it was foolish to waste much time on any one. But he only used his most anterior pair on very special occasions. How long each butterfly had lived before it was caught I do not know, but No. 2 lived in its glass cage 121 days."

#### Influence of Hot Drinks on Digestion.

Various opinions are held by the public, and we believe by medical men also, on the effect of hot drinks on the digestion of food. This matter has lately been investigated by Dr. V. E. Nyeshel, of St. Petersburg. The plan he adopted was to make use of twenty patients in the surgical wards of the Obukhoff Hospital, suffering from fracture of the fibula, contusion of the foot, and such like affections, and dividing them into two sets of ten each, to find out first, by a three days' experiment, the length of time an ordinary meal of soup, meat, potatoes, and black bread required for digestion. For this purpose the stomach tube was employed at periods varying from five to seven hours and a half after the meal, and the condition of the contents of the stomach examined. In all the cases complete breaking down appeared to have taken place in about six hours and a half. The exact time required by each individual for the digestion of the specified meal being noted, further observations were made on a subsequent day, the patients in the first group being given after the meal hot tea, at a temperature of from 40° to 75° C., the quantity taken varying from two to until a perfect bead of the reeight tumblerfuls. The contents of the stomach were quired size is formed. drawn off at the time when, as former experiments had shown, digestion would, under ordinary conditions, have been complete. The result was that, when not more than three tumblerfuls of hot tea had been swallowed, it was found that digestion had progressed just as well as without it, but a larger quantity of hot tea appeared distinctly to retard the digestive process. second group of patients were given a meal similar to what they had had before, but hot. On examining the contents of their stomachs, no be detected between the rate of digestion of hot and cold food. The author found that by painting the pharynx with a 5 per cent solution serted in the paper tube with the bead arranged cenquickly.—Lancet.

#### Extracting Teeth with the Pistol.

piece of eatgut securely to the tooth, to the opposite end of which he affixed a bullet. With this bullet and a full measure of powder, a pistol was charged, and when the trigger was pulled, the operation was performed effectually and speedily. Once a gentleman who had agreed to try the novelty, and had even allowed the apparatus to be adjusted, at the last moment exclaimed, "Stop, stop, I've changed my mind!" "But I haven't, and you're a fool and a coward for your pains," answered the Doctor, pulling the trigger. In another instant the tooth was extracted, much to the timid patient's delight and astonishment.

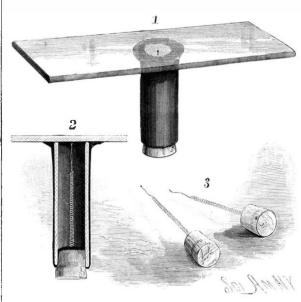
#### MICROSCOPIC OBSERVATION OF VIBRATING RODS.

BY GEO. M. HOPKINS.

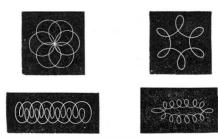
A metal rod fixed in a vise at one end, with a silvered glass bead attached to the other end, constitutes Sir charles Wheatstone's apparatus for the study of the transverse vibrations of rods.

By vibrating a rod arranged in this way Wheatstone vas enabled to obtain an almost infinite variety of symmetrical and beautiful luminous scrolls.

It is a simple matter to repeat Wheatstone's experi-



VIBRATING ROD MOUNTED FOR MICROSCOPIC OBSER VATION.



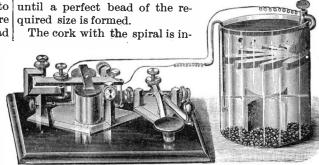
CURVES TRACED BY VIBRATING ROD.

ment with the apparatus alluded to, but it is not always convenient to do it.

A vibrating rod permanently mounted in a cell and arranged for observation with a microscope is shown in the annexed engraving; Fig. 1 representing the mount in perspective, Fig. 2 showing it in section, Fig. 3 showing the rods detached from the mount.

To an ordinary  $3 \times 1$  in. glass slip is connected a paper tube  $\frac{5}{16}$  in. internal diameter and  $1\frac{1}{4}$  in. long, well blackened on the inside.

The cement is applied carefully, so as to have the glass clean and clear within the tube. To a cork fitted to the open end of the tube is cemented a wire spiral formed of about 4 in. of No. 40 spring brass wire. The diameter of the spiral is  $\frac{3}{32}$  in. The end of the spiral next the glass slip terminates in a straight arm 1/4 in. long, upon the end of which there is a minute bead of black glass. A smooth bead is secured by first fusing borax on the end of the wire, then touching the borax while in a fused state with a thin thread of black glass, then breaking the thread a short distance from the end of the wire, and finally fusing it by gradually pushing it forward into the flame



of hydrochlorate of cocaine the tube passed easily and | trally with reference to the tube, and only a very short distance below the glass.

By placing the mount thus prepared under a 1 in. or 2 in. objective, and allowing light to fall on the bead Old Dr. Monsey extracted teeth by fastening a strong from one direction, it will be noticed that the black glass bead is rarely at rest, the bright pencil of light reflected from it continually describing curves of various forms. Stepping on the floor of the room in which the microscope is located is generally sufficient to set the spiral into active vibration.

Rapping on the table on which the microscope rests will cause the bead to describe intricate curves. By striking the side of the paper tube with more or

less force, different figures will be produced. Illuminating the bead from two points produces parallel curves.

While this mount is perhaps not strictly a micro-

scopic object, it may nevertheless be viewed to advantage by the microscope.

#### The Electric Light in the British Navy.

A trial has just been made at Portsmouth of an installation of the electric light which has been fitted on board the Imperieuse by Messrs. Siemens Brothers & Company, who are also about to provide similar installations on board the Warspite, Edinburgh, Collingwood, and Rodney. The lights on board the Imperieuse comprise 375 incandescent lamps of 20 candle power, which are disposed so as to illuminate all parts of the ship, including the engine rooms, stokeholes, and magazines; and also a couple of search arc lights, placed at the bows and at the stern, and which are each equal to the power of 25,000 candles. The currents are generated by three Siemens dynamos, on the combined and self-regulating principle, each of which is driven by one of Willen's compound two-cylinder engines, which is fixed to the same bed plate as the machine which it drives. The number of revolutions per minute is 400. The machines are interchangeable, and can be connected or thrown out of action by a simple switch arrangement. One of the machines supplies the search lights, and another is equal to maintaining 320 of the incandescent lamps aglow, which is considered as many as will be necessary as a rule to be alight at the same time. When the whole of the incandescent lamps are required to be lighted at the same time, two dynamos will be demanded for the several leads, otherwise one will be kept as a reserve against accidents. The arrangements have been superintended on behalf of the company, says the Naval and Military Gazette, by Mr. Collings, and the preliminary trial during the day and after dark proved very satisfactory.

#### Shying Horses.

This trick or vice is generally the effect of nervous timidity, resulting from an excitable temperament. It is aggravated by improper handling. To punish a horse for shving introduces a new cause of fear. The horse will be more alarmed and show more tokens of fear at the prospect of a whipping than at the imaginary object of danger in the road. Hence one bad habit is confirmed by the introduction of another. It is impossible to whip terror out of a horse or pound courage into one. Kindness and gentle persuasion are the best weapons to correct the pernicious habit of shying. The less fear exhibited by the driver, and the less notice taken of the shying by using harsh means, the sooner it will be given up. A careful, experienced' horseman can generally detect an object likely to cause a nervous horse to shy, and by word or touch will encourage him to pass it unnoticed. When this fails, give him time to look at the object of his fear; pat him and coax him up to it, then take him past it two or three times, till he takes no notice of it.

When defective sight is the cause of this bad habit it is incurable, and if the eyesight is failing, the horse for ordinary driving and riding will be perfectly useless. A mare we knew that had gone quietly in harness for two or three years, suddenly took to jumping the white stone crossings of an ordinary macadamized street, as if they were water brooks. In three months she was

#### THE DIAMOND LEARNER'S TELEGRAPH INSTRUMENT.

The leading feature of the instrument here shown consists in so forming the sounder, anvil, and key that

they have a diamond-shaped cross section, and in so making the base of the sounder and of the anvil that when set up the two form a diamond outline. The magnets of the sounder are inclosed in metallic cases, and the various metallic portions of the instrument can be made to present the appearance of either gold, bronze, or brass. The black baseboard is of wood.

This instrument—designed by the Novelty Electric Company, of 5th and Locust Streets, Philadelphia, Pa.—presents a unique and attractive appearance.

#### Toads as Bee Esters.

The toad may be useful in kitchen gardens as a slug and insect destroyer; the freer you can keep your apiary from his presence, the better. Toads will wait at the foot of a hive to seize any honey-laden bee that may happen to fall to the ground on its return from foraging, and one bee master, says a correspondent of the London Graphic, saw over a dozen little workers captured in the space of half an hour by an old fat fellow, who darted out his tongue with wonderful celerity immediately he saw a bee on the ground. The bees had been collecting pollen, and many of them, being heavily laden, were unable to reach the floor board of the hive.

#### A Guide to Rose Culture.

Beautiful Roses for All.—We have received the New Guide to Rose Culture, published by the Dingee & Conard Co., Rose Growers, West Grove, Pa. (see advertisement), and take pleasure in recommending it as one of the handsomest and best catalogues of the season.

#### Correspondence.

#### Poisonous Fish at Rotuma.

To the Editor of the Scientific American:

In the Jan. 2, 1886, number of your paper, I notice a letter from Mr. Robert S. Swanston, about poisonous fish in Rotuma or Rotuam. He states that "the fact was first noticed on the northwest side of the island, immediately after a hurricane," and that "the cause has gradually spread, moving east about," etc.

It is said by old fishermen that certain fish, sheepshead, for instance, will suck the moss, etc., from the copper-bound ships to an extent that the whole system will become impregnated with copper and the flesh become poisonous.

May it not be that a copper-bound vessel was wreck ed on the northwest side of the island during the gale of 1884, and that the time taken for the spreading of the poison was only the time taken for the fish to find their way from the other parts of the island to this CHAS. W. FORSTER. feeding ground?

Georgetown, S. C., March 1, 1886.

#### Light at the Bottom of the Sea.

To the Editor of the Scientific American:

After reading in your issue of January 30 the interesting article written by Ralph S. Tarr under the heading, "How the Ocean Bottom is Lighted," and believing it to be still an unsettled question whether there is light or total darkness at great depths, I have wondered if any of the deep sea explorers have tried photography. It could be easily arranged to lower photographic plates placed at different distances on the sounding or dredge line. If there is light, interesting impressions might be obtained. Certainly it would help to establish the fact of light or darkness. If this method has not been thought of the line of his lot only the thickness of the board, or tried, let your paper suggest it, and some salt water philosopher will try it. A sheet of sensitized paper inclosed in a bottle with an outer removable cover would be very simple, but perhaps not the best, as many more delicate methods could be devised. ] offer this simply as a suggestion. C. MURRAY.

#### Springfield, Ill., February 2, 1886.

Diminished Rainfall. To the Editor of the Scientific American:

Your recent editorial on the diminution of our average rainfall recalls statements made to me by the late Major Frank North, who had resided since childhood among the Pawnee Indians. They hold, it seems, a tradition that their ancestors came from the West, where they lived together in towns and cultivated the surrounding country. In time, however, they were compelled to leave their homes on account of a great drought, and migrated eastward. So great were their numbers that, in crossing the mountains, they wore deep trails in the rocky passes over which they journeved.

The Pawnees boast that at one time they possessed a civilization equal to that of the white man. Major North stated that the sages who preserved these traditions could give no idea of the time of the migration. but from their accounts it must have been a long time prior to the conquest of Mexico by Cortez. One is forced to believe that drought and famine have been more powerful in depopulating the regions of the Colorado and Rio Grande than the marauding Apache or IRVINE A. FORT.

North Platte, Neb., Feb. 15, 1886.

#### Crude Rock Oil for Keeping Steam Boilers Clean.

To the Editor of the Scientific American:

Crude rock oil, properly used, will keep a clean boiler. With any kind of water within reasonable fitness for use, it will keep it in excellent condition, and free from scale or moving sediment; but the crude rock oil will not do all this unless the proper amount of blowing off be done, for it will not compass the neglect of attendants. The proper way to use the crude oil is to send it into the boiler through the feed water, only once a day, and only in very small quantities. One-half an e per day will keep an ordinary tubular fifty horse power as clean as possible; and after a few et al. vs. Allis, decided by the Supreme Court of the river carrying trade, which keeps 44 barges and 50 months of regular use the shell will be found as smooth United States. as a piece of japanned work, provided it was not pitted at the start, and the tubes will be perfectly clean and smooth. The oil must be introduced into hot water, and for some reason it does its work better under pressure. If any "constant feeding" of the oil into a boiler takes place, the fire seams will commence to leak. for this has been tried; there seems to be a call they were before the entry of the company. Hence for only a small amount of the oil, and the small amount must not be exceeded.

Parties who have used this "crude oil" for four to six years have in some cases experimented with the sible to such owner for all losses of crops and other were, as above, say \$337,000, and wages (averaging amount, and in every case an excess of oil caused a leaking at the seams, while a small amount produced the most complete cleanliness and immunity from in the case of Payne vs. Morgan's Louisiana & Texas scale. In a large plant under the advisory charge of Railroad & Steamship Company, decided on the 5th the writer, the use of the "crude oil" has proved that January. it would loosen the scale rapidly; and in the case of an | Trade Mark in Signs.—In the case of Sanders vs. price. Quotations have been as high as \$9.

upright boiler, worked under one hunded pounds Jacob, decided lately by the St. Louis Court of Appressure, the scale became so rapidly freed from its hold on the tubes and firebox sides that a stop became necessary to clear out the leg of the boiler, and over five inches in depth of loosened scale was found in the water leg. In fourteen weeks another installment came out, and the coal consumed fell from 4,800 pounds to 3,200 pounds in the same time, the work done by the boiler being increased.

Some amusing instances might be related of putting in a "gallon of oil" at the cleaning of a boiler, on the supposition "it would last;" or of using tallow or sperm oil, or of some departure from the "crude rock oil," with a bare escape from serious consequences in two cases, and of "leaky boilers" in others.

"Crude rock oil" can be used in any boiler to advantage on the same principle as exemplified in the house wife's dinner pot—the oil or grease coats the surface of cast or wrough firon, and the pot becomes smoother than those not used for boiling greasy meats; but the steam boiler, under pressure and at a very much higher temperature, with a small amount of oil in motion through the circulation, becomes glazed, and being kept so by the minute particles of oil deposited, offers no chance for the scale to lay hold or to maintain a hold if one be acquired.

Many trials of crude oil in this way have been made in the New England States, especially in the large powers of cotton mills and manufacturing concerns, and its use is extending THOS. PRAY, JR.

#### Recent Decisions.

Liability of Cities.—In the case of the city of Henderson vs. Weisenberger et al., the Superior Court of Kentucky held that a city was not liable for injuries resulting from the falling of a billboard erected by the proprietor of a private lot and projecting over unless the city had notice that the board was not securely fastened.

Contract with Municipality.—A contract entered into with a municipality, which provides for a certain mode of payment by the city, cannot be changed by subsequent legislation so as to authorize a performance different from that prescribed in the contract, and payments made in conformity with such subsequent legislation will not bind the contractor unless assented to by him. So held by the California Supreme Court in the case of McGee vs. City of San Jose.

Insurance.—An agent was employed to secure certain insurance, which he did. Afterward the insurance company gave notice to the agent of the cancellation of the policy. The general term of the New York Supreme Court held (Von Wien vs. the Scottish Union & National Insurance Company) that the notice so given was not notice to the insured, and that a clause in the policy to the effect that the insurance broker should be deemed to be the agent of the insured in any transaction relating to the insurance did not affect the question.

Right of State to Prevent Armed Assemblages.-A State of the Union has the right to prevent the armed assemblage of its citizens and their parading as military companies when not organized as such under the laws of the State or of the United States. So held by the Supreme Court of the United States in the case of Presser vs. the State of Illinois. To deny this right, in the opinion of the court, would be to deny the right to disperse assemblages organized for sedition and treason, and the right to suppress armed mobs, bent on riot and rapine.

Sale of Goods.-When a vender sells goods of a specified quality, but not in existence or ascertained, and undertakes to ship them to a distant buyer, when made or ascertained, and delivers them to the carrier for the purchaser, the latter is not bound to accept them without examination. The mere delivery of the goods by the vender to the carrier does not necessarily bind the vendee to accept them. On their arrival he has the right to inspect them to ascertain whether they conform to the contract, and the right quality required by the contract. not of the

Right of Way.—A railroad company, in enforcing its right of way over the lands of others, and in conlands and fields which it crosses in the same condia railroad company which constructs an embankment on the lands of a planter, and thereby stops damages occasioned by such interruption of his drainage. So held by the Supreme Court of Louisiana

peals, it appeared that in 1871 the plaintiff opened an office for the practice of dentistry in St. Louis, under the title of the "New York Dental Rooms." He advertised under that name, and had it registered. In 1880 the defendant opened a dental establishment two doors from that of the plaintiff, using a sign in size and style similar to the one used by the plaintiff, and bearing the inscription "Newark Dental Rooms." The plaintiff brought suit to enjoin the defendant from using this sign, alleging that it was devised to deceive; his customers and deprive him of business. The court granted an injunction, holding that it was apparent that the defendant used the sign to deceive the public and to attract the customers of the plain-

Perils of the Sea.—The case of Pandorf et al. vs. Hamilton, decided lately by Lord Justice Lopes, of the English Court of Appeal, arose upon an action brought by the plaintiffs, as owners of a cargo of rice shipped on board the defendant's ship, for damage to the same by sea water. It was admitted that the damage in question was caused by sea water passing through a hole in a pipe supplying the bath room, which pipe had been gnawed by rats. It was also found that the defendant had taken proper precautions to keep down rats during the voyage, and that they had not been brought on board by the shippers while shipping the rice. The rice was shipped under a bill of lading which excepted "all and every dangers and accidents of the seas." Lord Justice Lopes held that as the immediate cause of damage was the action of sea water, which was itself one of the causes contemplated as an exception, and as the effective cause was the gnawing of the rats, which was as much beyond human control as if the pipe had burst from frost, the whole occurrence must be regarded as a peril of the sea for which the defendant was not liable as a shipowner. There being no negligence on the part of the defendant in not keeping down the rats, such an event, the Lord Justice said, should be taken to be an unavoidable accident, of the same kind as if a swordfish had bored a hole and so let in the sea water. -Bradstreet's.

#### Heat from Incandescent Lamps.

Herr Wilhelm Penkert, in the Zeitschrift fur Elektrotechnik, gives the following results of his experiments to find the quantity of heat emitted by different lamps, incandescent and other, in an hour:

Incandescent Lamps:	Units of Heat.
•	
Siemens and Halske	
Edison	
Swan	
Bernstein	153
Gas:	
Siemens regenerative burner	1,500
Argand	
Two hole burner	12.150
Petroleum:	•
Round burner	3.360
Small flat burner	
Solar Oil:	
Schuster and Bauer's lamp	3.360
Small flat burner	
Rape oil:	1,200
Carcel lamp	4 900
Reading lamp.	
Paraffine candles	
Spermaceti	
Wax	
Stearine	8,940
Tallow	9,700

With regard to the value of the Bernstein lamp, M. Penkert thinks that it is possibly too low, owing to the fact that in the measurements losses of heat were not absolutely guarded against. The construction of the lamp was such that it could not be entirely immersed in the water employed to determine the heat given

#### New York Bricks.

The forty-five brick yards at Haverstraw, N. Y., on the Hudson River, 32 miles above New York city, the largest brick making center in the country, with a capacity for making 340,000,000 bricks annually, furned to inspect implies the right to reject them if they are out 300,000,000 in 1885, against a like number in 1884. small vessels busy. Haverstraw bricks are of ordinary grade, but bring 25 to 50 cents per 1,000 more than other bricks of like quality, owing to the excellent structing its road, is bound to leave the adjoining sand and clay used. They brought an average of \$6 per 1,000 in New York last season, after paying \$1 river tion as regards the facilities of cultivation and as freight and \$1 to \$1.25 per 1,000 royalty to the concerns the utility of those lands to their owners as owners of the land where the yards are located. The works use in a season 42,000 cords of wood for heating kilns, at \$5 per cord; 12,000 tons of coal dust, at \$2 per ton; and 4,000 tons of coal, at \$4.25 per ton; up his ditches and other artificial drains, is respon- a total cost for fuel of \$251,000. The total royalties \$2.25 per day), say (six months), about \$776,000. Two hundred patent brick-pressing machines, costing \$1,000 each, are employed. The total gross receipts last year are given at \$1,800,000. This particular industry began fifty years ago. At that time \$3 per 1,000 was a fair

#### Discovery of a New Nebula by Photography.

MM. Paul and Prosper Henry have recently announced the discovery by means of photography of a new nebula in the Pleiades. It was first photographed on November 16 last, and, though it was again photographed on December 8 and 9, MM. Henry have as yet been unable to detect it by direct telescopic observation. The nebula is about 3' in extent and "tres-intense." It presents a well marked spiral contact with chimneys when the house was built. In form, and seems just to escape Maia. Its position is these cases sufficient heat reached the timbers to cause as follows: R. A. 3 h. 38 m. 57 s., Decl. 24° 1' N. The question is sometimes asked, Which is the most sensitive to light—the human eye or the photographic plate? This discovery seems to indicate the superior sensibility of the chemical plate.

#### DESIGN FOR A SUMMER GARDEN HOUSE.

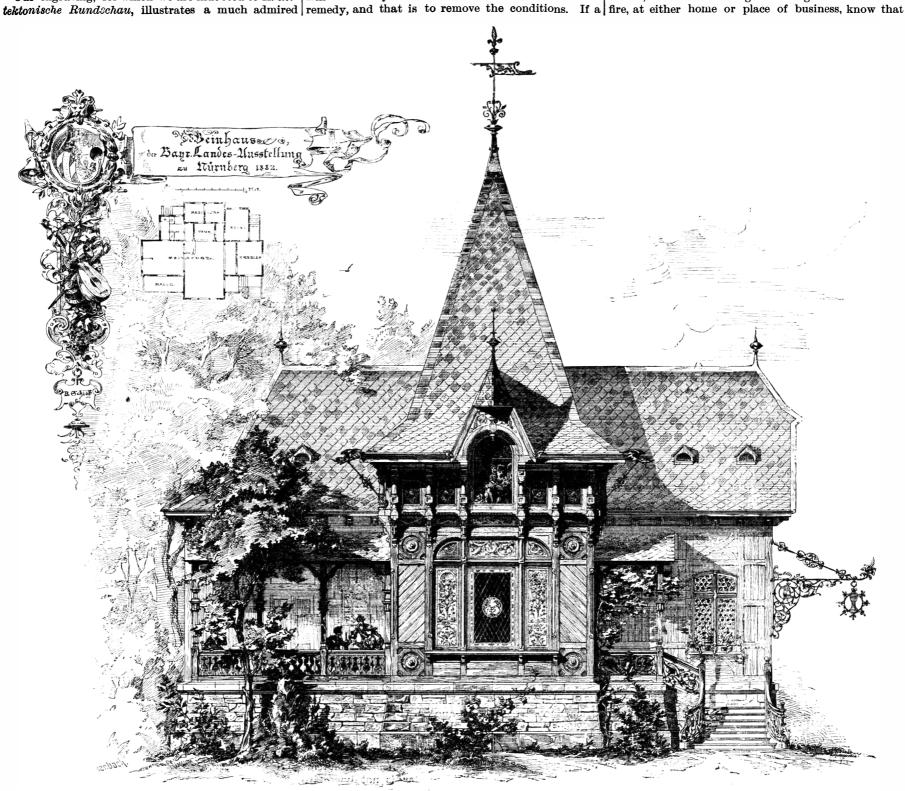
Our engraving, for which we are indebted to Archi-

as a notanger example of the complete carelessness possible in this direction, that the handsome residence of a neighbor got on fire three times within one month, and that on each occasion the narrowly escaped destruction was directly traceable to defective construction. In the first instance, fire was due to wood placed in connection with a steam boiler, and in the other two cases was caused by joists or beams brought in

There are many buildings in all parts of the country to-day where a little hotter fire than usual in furnace or grate will do just the same thing. Every householder should assure himself that no such danger menaces his own home or warehouse. Continued contact

were taken to avoid them. Now, however, they have been so well illustrated, together with the large possibilities of defectiveness in flues and chimneys, by a very complete list of catastrophes, that an intelligent builder-by which we mean not only the man who builds a house, but the man who has it built as well -must keep this experience in mind, and see that none of these fatal conditions is repeated in his own structure.

With twenty-seven recognized causes of fire, and any number besides, not classified, there are not a few otherwise careful persons who despair of the value of precautions, and trust the whole matter to fate and a heavy insurance. The wisdom of providing funds necessary for rebuilding is certainly commendable; but aside from any economic reasons why valuof wood with hot brickwork or heated currents of air ables should not be permitted to be thus quietly conwill eventually cause combustion. There is but one sumed, those who have gone through the ordeal of a



DESIGN FOR SUMMER HOUSE.-BY PROF. C. SCHICK, KARLSRUHE.

design for a summer refreshment house or casino, building is already erected, and these fire traps care- there are many things for the loss of which insurance by Professor C. Schick, of Karlsruhe.

#### The Origin of Fires.

In speaking of the origin of fires, Dr. Nichols states that present investigations show that the number of fires attributable to incendiarism is much less than is generally supposed. Spontaneous combustion is another cause which has heretofore been brought forward on a great many occasions, when the real trouble has been in defective or careless construction. While dwelling houses in the United States are burning at about the rate of one every hour, and mills, hotels, stores, and barns are vanishing in proportion, it is worth the consideration of every householder to know whether his own premises are inviting destruction from fire, or whether they are reasonably secure from the ruin brought by that element. In the fire tables of 1884, incendiarism is placed at the top of a list of some twentyseven causes. Next in this fatal list comes defective flues, but it is questionable whether they have been given the rank they deserve. Dr. Nichols mentions tion were so imperfectly known that no precautions

fully concealed, it is a difficult matter to get at the is but a poor compensation. source of danger and see that it is removed; but the difficulty is much less than that of starting anew when fire has carried off the household goods or destroyed the "plant" of a well established industry.

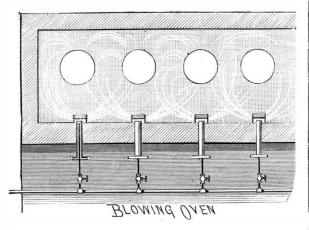
But while spontaneous combustion, being impersonal and therefore without the ability for defense, has had a great many sins laid to its door by builders whose volubility exceeded their carefulness, this peculiar process of slow oxidation has still a heavy account against it in the list of fire losses. In one instance, recalled by the same writer, a dwelling house caught fire by the spontaneous ignition of sawdust placed between kitchen floors as a sound deadener. The sawdust alone was safe enough, but when it became saturated with oil from the polishing of the floor above, new conditions prevailed. The sawdust heated rapidly from the absorption of oxygen by the oil. The temperature speedily rose to such a point that ignition occurred, and flame burst through into the room. For many years the conditions favorable to spontaneous combus-

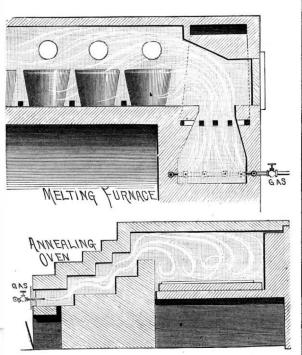
A curious phenomenon has been observed by M. Blondlot, and communicated to the French Academy of Sciences. A disk of platinum and a disk of copper. 0.03 meter in diameter, were fixed vertically in front of each other by help of two platinum stands. The disks were 3 or 4 millimeters apart, and both were placed inside a bell jar of porcelain, open below. The apparatus was then heated red hot for three hours, by means of a gas furnace, and although there was no electric current it was found that the face of the platinum disk was blackened with a deposit containing copper and platinum. In short, the copper had crossed from the copper plate to the platinum one. M. Blondlot, by repeating the experiment in different gas, found that the nitrogen of the air was the agent in this transport of matter. The nitrogen combines with the copper, and lodges on the platinum, either incorporating itself with the latter or decomposing in contact with it under the influence of its high temperature.

#### THE MANUFACTURE OF WINDOW GLASS WITH NATURAL GAS.

(Continued from first page.)

alkaline earth. The iron-master gets rid of the silica in his ores by making it into a fusible silicate of limean opaque glass. The assayer frees his metal from the accompanying gangue by adding suitable fluxes until





all the earthy matter is gathered into a fusible slag, and floats above the metal button as a molten glass. And even nature, when her interior caldron bubbles over in a volcano, shows that she, too, is a giant glassmaker. But to make good glass, clear, transparent, flared. Toward the mouthpiece, the pipe is surrounded colorless, to simulate the purest water of a mountain stream, this requires skill and patience.

operation. The first step is the manufacture of the crucible pots, and in this the glassmaker has a good opportunity to display these qualifications. The pots are made up of a mixture of about 2 parts raw fire clay, 2 parts burned clay, and 1 part ground pot shells, and require the greatest amount of care. The mixture is ground and thoroughly worked in a long trough, where it is turned once a day for a period of about four weeks. The workman kneads the plastic mass with his bare feet to make it tough and free from air. If the treatment is imperfect or careless, the entire subsequent work of the crucible will be unsatisfactory. The pots are formed entirely by hand, and in a room the temperature and humidity of which are kept as nearly constant as possible. They are all of one size, 33½ in. deep and 42½ in. across the top. The thickness varies from 31/2 inches at the base to 3 inches on top, while the bottom of the pot is about 4 inches. The bottom having been first formed, the sides are gradually built up from day to day, the entire process requiring about six weeks. The capacity of the pots is from fourteen to sixteen hundred pounds of melten glass. When quite dry, they are placed in small heating furnaces, where the temperature is gradually raised to that of the melting furnace, and when this point is reached they are quickly transferred, and are then ready to receive the raw mate-

rials. At the McKee works there are three

melting furnaces, having a total capacity of 26 pots. the gatherer dips his pipe into the molten bath, each pots and the other two, 8 each. Round openings in each side of the furnace permit free access to each pot. natural gas. This is admitted at each end of the furnace, and is mixed with air which has been heated by passing through chambers in the fire-brick arch. A well is built under each furnace to collect the molten glass, should a pot break, and thus prevent loss of material or stoppage of the furnaces. The raw material, or "batch," introduced into the pot consists of: sand, 100 parts, lime, 30 parts; alkali, 40 parts; and a small manufacturers make their alkali all sulphate of soda, while others employ a mixture of sulphate and carbonate, in the proportions shown by their experience to be the best.

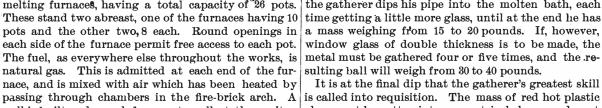
These are thoroughly ground and mixed together. One-third of the full charge is placed in the pots, and

after an interval of four hours a similar amount is With the last added. charge, introduced still four hours later, about two pounds of arsenious acid are added. This acts as a bleaching agent, and by converting the iron present into a higher oxide, removes the color to a large extent. At some establishments peroxide of manganese is used for this purpose, but a slight excess will give a pinkish color, and it also has the further disadvantage of making the transparency of the glass less durable. When the contents of the pots are quite liquid, and have settled down to a constant level, enough broken glass is added to fill the pots

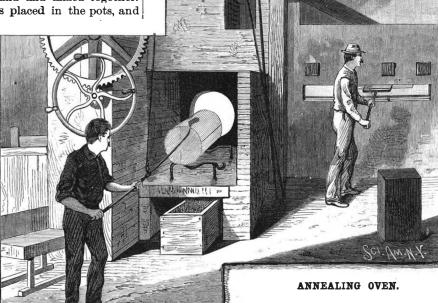
entire melting occupies about 16 hours. During the into a spiral and worked to the end of the mass. The latter part of this, time, the heat is somewhat reduced | ball of glass, red hot, and, if properly gathered, without in order to make the glass less liquid, and prepare it for gathering.

When the fusing period is completed, the surface of the molten "metal" must be freed from all impurities by skimming. For this purpose a fire-clay ring, introduced when the pot is first put into the furnace, floats upon the surface of the bath, and the gatherer, by removing all the scum from the interior of this ring, always has a clear surface from which to draw.

The gathering is done with a wrought iron pipe, about five feet long, the end of which is decidedly with a wooden handle. The first dip brings out but a small lump of glass. By careful turning of the pipe, These two qualities are demanded in all stages of the this is gotten into symmetrical oval form. Three times ling the temperature of the glass while being blown.



glass must be gotten into symmetrical shape, and must be thoroughly homogeneous before it can be handed over to the blower. The pipe is therefore placed on a convenient fulcrum, the end carrying the ball of glass being in the furnace, and by depressing the handle and but varying amount of pulverized charcoal. Some revolving the pipe the last glass added is made to completely overlap the former ball. The entire mass is



LAYING IN.

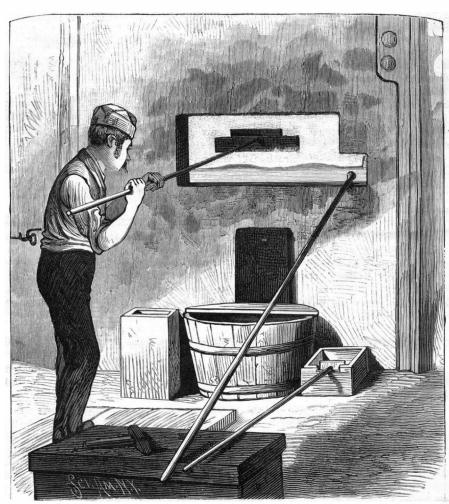
brought to a uniform temperature but little short of liquidity, and by a further revolution of the pipe the

completely. This is known as the "capping." The fold of glass formed by these manipulations is turned flaw or blemish, is now taken to a wooden mould, shown at the right in our illustration of the blowing furnace, and by dexterous turnings is formed into a pear-shaped ball. The wood is kept from burning by being continually moistened with water, which, in contact with the red hot glass, assumes a speroidal condition, and looks like so many globules of mercury. The gatherer's duty is now ended, and he hands pipe and glass over to the blower.

Formerly, the melting and blowing furnaces were combined in one, but it has been found more economical to have them separate. The blowing furnace has the same side openings as the melting furnace, and simply provides an intensely hot chamber for control-

> The first act of the blower is to grasp the pipe, and with the ball of glass still resting in the mould, blow through the mouthpiece until a large bubble of air is formed in the mass of glass. Then, with alternate blowing and manipulating, he increases the bubble until the mass takes the shape of a large carboy, such as one uses for transporting acids.

The blower now transfers his operations to the platform in front of the blowing furnace, where long openings permit him to swing his pipe and globe of glass in a pit beneath. Blowing and swinging and reheating, he extends the bubble at the pipe's end, until, in place of the ungainly carboy, with its disproportionately thick bottom, he has a beautifully symmetrical figure. the shape of an tube. But during these operations it happens from time to time that the glass flows a little too freely, and the sides of the tube are in danger of becoming too thin. So the blower must occasionally throw his tube into the air and let the glass settle back upon itself. As the tube by this time is about 5ft. long and from 15 to 18 inches in diameter, one can readily fancy that this apparently playful toss requires great skill and a large amount of muscle. In our illustration we have shown an even larger cylinder, one that when finished will furnish a pane 66 by 54 inches. The foremost figure of the group, who has thrown his heavy and bulky cylinder into the air with seemingly so little effort, is



THE MANUFACTURE OF WINDOW GLASS WITH NATURAL GAS .- FLATTENING.

burden, for, in addition to its extra size, it is also dou-

When the tube is formed to the satisfaction of the blower, he permits it to become comparatively cool, thrusts the end into the furnace, blows into his pipe and quickly covers the opening with his hand. A slight report is speedily heard. The confined air, expanding with the heat, has blown a small hole in the end of the tube. Resting his pipe on a suitable support, he gradually turns it around, while the hole grows larger and larger, until he no longer has a test tube, but a complete cylinder. Quickly he withdraws his pipe from the furnace, and allows the cylinder to depend into the pit below until the plastic edge passes to cherry red, and it can be taken away without danger of getting out of shape.

The blower has now finished his part, and he stands before you dripping with perspiration and apparently exhausted. But it takes him only a moment to recover his breath. Already another pipe is in his hand, and he is repeating his heavy labor.

A string of red hot glass adroitly drawn around the cylinder end causes an even crack to separate the neck and attached blowpipe from the cylinder proper. Then a hot iron is passed along the interior surface from end to end, and makes a longitudinal crack. As a cylinder, the glass looks as if it were pretty well ruined, with a crack running its entire length, but the process is only another step in its transformation into

The cylinder is now ready for the laying-in furnace. This is in a separate building, and of late years has been made one of the most complete parts of the entire plant. The hearth of the furnace is circular, and is divided into several sectors, separated from each other by fire-clay bridges. As the hearth revolves, these sections pass through a corresponding number of compartments, in which the temperature may be varied at heated, and is known as the laying-in oven. In this the cylinder becomes gradually warmed. A partial revolution of the hearth then carries it to the next compartment, the laying-out oven, where the heat is sufficient to make the glass plastic. On the floor of each section of the hearth a large flat stone, made of fire-clay and prepared with the greatest care, so as to be perfectly smooth, is adapted to receive the cylinder. While brackets at the side of the stone; but as soon as it reaches the laying-out oven, it is removed to the stone, and the crack being uppermost, is allowed to unfold until it lies open like a sheet of rumpled paper. It is then carried by the revolution of the hearth to the flattening oven, where a workman, as shown, irons out the plastic sheet until it lies perfectly smooth and flat. Further revolutions of the hearth carry the glass, now in a smooth sheet, to the dumb oven, where it slowly cools, and then to the entrance of the annealing oven, next door to the laying-in oven, making the circuit finally complete.

When the comparatively cool sheet of glass reaches this stage of its journey, it is picked up with a large two-pronged fork and placed upon a rod or bar projecting from the annealing oven. These rods are found an immense improvement over the car formerly used. They handle each sheet separately, and with the receipt of each fresh sheet they move the entire contents discovered by Herr E. Schulze, in 1869, in the yolk of the annealing oven toward the outer end, discharging a finished sheet at that end. The glass remains in able frames.

The process is completed. The surface of the glass, just as it comes from the annealing furnace, is remarkably brilliant and as beautifully clean as if it had been washed in hot water and dried with linen. In all had next investigated the origin of this cholesterine stages of the process the advantages of natural gas become each day more evident. The more intense heat of the new fuel gives a better fusion, while the con- to the conclusion that the cholesterine fat contained tamination of the "metal," from particles of coal and in the yolk of sheep was derived neither from the cinder, is entirely avoided. It is, however, in the blowing furnace and flattening oven that the most marked nor from the sebaceous texture of the under advantages are obtained. With coal, the sheets of skin, but was seated exclusively in the hairs and in sulphur. As these impurities had been gathered manufacture, while on the other hand it induced a while the glass was in a semi-plastic condition, no subsequent washing or acid bath could entirely restore the distribution of cholesterine fat in the animal kingbrilliant surface.

A comparison between new and old glass will make these differences very plain. But perhaps one can best appreciate the influence of gas upon the industry by glancing at the history of those establishments which are not so fortunate as to possess it. So radical, indeed, has been the change wrought by the new fuel, that several important glassworks in other parts of the country have admitted that the competition is too unequal, and have either suspended business or transferred themselves to the shadow of the nearest gas derduring the past few months. It is a gratification to was always present in small quantities. It might be 000. The manufacturers of England, France, and Gerexamine the products of such firms as the Messrs. | conjectured that it would likewise be found in the many send us about \$2,000,000 worth annually.

the only man in the works who can manage so large a McKee and others who have done so much to advance this industry, and to feel that our architects can now honestly recommend the use of American glass.

#### The Relations of the Government to Chemistry.

In a presidential address before the Chemical Society of Washington, Prof. F. W. Clarke recently reviewed the connection between the laboratory and the Gov ernment. While he finds a most encouraging growth in chemistry during the past twelve years, and an increasing disposition on the part of the Government to avail itself of chemical assistance, he also points out certain tendencies which at present menace the highest development of the science.

Nearly all of the departments of the Government are now provided with their own special laboratories, and in some cases it has been found necessary to devote several to the work of one department. With the increasing demands of a large industry, and the growing spirit of investigation, more laboratories will be needed. The development which these necessities involve requires, however, the advantage of a discriminating supervision if it is to afford the highest usefulness. The present chemical "plant" of the Government has not been the result of any definite plan. It is simply the outcome of every-day necessities, and, as such, it is without the organization needed for the prosecution of a great work. Much important apparatus is still wanting, while the scattered nature of the work has made the duplication of other portions necessary. In addition to this serious want of proper equipment, the Government chemists are severally called upon to do a greater variety of work than is compatible with excel

To uninformed officials, a chemist is simply a chemist; and as a consequence, problems of the most varied character are distributed among the different workers with an impartiality which would do great credit under other circumstances, but which in the present in pleasure. The first compartment is only moderately stance is nothing less than disastrous. The science is already so large that specialization becomes essential to success. With this scattering of effort and multiplication of poorly equipped laboratories, excellence will hardly be possible, for the range of work will be too broad and the appliances too meager. Prof. Clarke, therefore, strongly recommends a concentration of forces in one complete and thoroughly equipped national laboratory, divided into the proper number of in the laying-in oven, the cylinder is supported by two departments, and presided over by a corps of skilled specialists. He also favors the union of the chemical and physical laboratories in one building and under one director, with facilities in both for scientific reearch as well as practical work.

#### Lanoline or Cholesterine Fat.

At a recent meeting of the Physiological Society, Berlin, Professor Liebreich gave a short sketch of a series of investigations which had engaged him for some years, and had led to the introduction of a new substance into the pharmacopæia. He premised that the denomination "fats" would have to cover more than it had hitherto done, and not merely such substances as were capable of decomposition into fatty acids and glycerine. All substances, on the contrary, would have to be conceived of as neutral fats which contained sebacic acids, no matter with what organic base these were combined. Such a neutral fat was of the fleece of sheep, and which consisted of a sebacic acid and cholesterine. This cholesterine fat the oven from 30 to 40 minutes. When discharged, of sheep's wool, or "lanoline," had been studied by the sheets are cut into proper sizes and stored in suit- Professor Liebreich, as to the method of obtaining it, on account of its excellent qualities in the way of a salve constituent. It was now being extracted from woolen hairs by means of a centrifugal machine, and had become an article of trade. Professor Liebreich fat, and, with the help of the uncommonly sensitive cholestol reaction of Professor Liebermann, had come sudorific glands nor from the sebaceous glands, glass formerly came from the ovens coated with smoke, the epidermis cells. This fact led, on the one and, what was infinitely worse, with a white deposit of hand, to the production of the substance as a kind of very extensive series of experiments respecting the dom. The speaker found it in the epidermis, the hairs, and nails of men, in the hairs of all mammalia he had examined, in the hoofs of horses, in the paws of swine, in the horns of cattle, in the prickles of the hedgehog, in the feathers of fowls, geese, and a large number of other birds, in the plated sheaths of the tortoise; in short, in all horned textures which, with long and toilsome labor, he had examined. speaker had, in addition, found the cholesterine fat in the kidneys and the liver of mammalia; yet it was not beyond question that in these organs the cholesrick. A number of such migrations have been reported terine fat did not proceed from the blood, in which it

intestinal canal, and generally wherever epithelial cells occurred. The constant presence in all epithelial formations of a particular fat, which was there formed in the keratine cells, rendered it highly probable that the hairs of the mammalia and the feathers of birds owed their elasticity and pliancy not, or at all events not exclusively, to the secretion of the sebaceous or caudal glands, but to the cholesterine fat generated in the horn cells themselves. The quality sed by cholesterine fat of not oxidizing, or oxidizing only under very rare conditions, rendered it, as was very readily conceivable, most peculiarly adapted for lubricating the skin and feathers. Beyond the property of not becoming rancid, lanoline possessed a whole series of other advantages distinguishing it quite peculiarly as a salve constituent. It absorbed, for example, 100 per cent of water, and by so doing became a soft substance easy to the touch, penetrating the skin with altogether extraordinary facility, and, after but a short rubbing into the cutis, disappeared from view. Professor Liebreich had already prepared into salves a great number of medicamental stuffs by means of "lanoline," and had made experiments with them which yielded entirely satisfactory results. Lanoline, dark brown in a dry state, grew pale like wax in light, and showed other qualities besides, assigning it a place between the ordinary glycerine fats and the wax kind of fats.

#### Unconstitutional Tax on "Drummers."

In the case of Walling vs. the People of the State of Michigan, decided by the Supreme Court of the United States, on Jan. 18th, it appeared that the plaintiff in error was prosecuted in the police court of Grand Rapids, Mich., under a Michigan law imposing a tax upon persons engaged in the business of selling in that State liquor to be shipped from any other State. The plaintiff in error was a "drummer" for a Chicago firm, and was charged in one court with selling liquor at wholesale without a license, and in another with soliciting and taking orders for its sale without a license. He was convicted, sentenced to pay a fine, and imprisoned in default of payment. Upon appeal the conviction was affirmed by the Supreme Court of Michigan. The decision of the Michigan court has just been reversed by the Supreme Court of the United States, which holds that a discriminating tax imposed by a State operating to the disadvantage of the products of other States when introduced into the first-mentioned State is in effect a regulation in restraint of commerce among the States, and as such is a usurpation of the power conferred by the Constitution upon the Congress of the United States. The Supreme Court of Michigan held that the tax imposed by the act was an exercise of the police power of the State for the discouragement of the use of intoxicating liquors and the preservation of the health and morals of the people. The Supreme Court of the United States declares that this would be a perfect justification of the act if it did not discriminate against the citizens and the products of other States, and thus usurp one of the prerogatives of the national legislature. The court sums up its opinion as follows: "We think that the act in question operates as a regulation of commerce among the States in a matter within the exclusive power of Congress, and that it is for this reason repugnant to the Constitution of the United States and void."

#### Gresham's Injector.

Among the most interesting features of the machinery department of the recent Inventors' Exhibition, held in London, was the new automatic restarting injector, exhibited by the well known engineer and inventor, James Gresham, of Manchester. It received the first premium, and was selected by the managers to supply the boilers which furnished the steam for the motive power used in the exhibition. Among its most valuable points were its wide steam range, the injector working equally well and reliable at high and low pressures; its instantaneous and perfectly automatic performance, as soon as steam and water were turned on; and its restarting quality, which enabled it to take up the feed water at once, and without any handling of valves, after the supply had been withdrawn or interrupted from any cause whatsoever. This last feature seems to make the Gresham injector peculiarly adapted for the feed of boilers or traction and farm engines, and on tug boats and steam craft generally, where the supply of feed water is so liable to interruption from traveling over rough surfaces on the one hand, and from the motion of the waves on the other.

THE value of the hardware produced in the United States each year is now about \$60,000,000, and half of it is made in Connecticut. This does not include firearms, agricultural implements, cut nails, or ornamental ironwork. These, with other articles which may be regarded by some as belonging to the list of hardware, would swell the total to far above \$100,000,-

#### BOLLEE'S STEAM CARRIAGE.

Mr. Amedee Bollee has just sent us a description of a small sized steam carriage that he has recently constructed and experimented with. We present an enaddition, we give the details of construction that Mr. Bollee sends us.

The carriage frame, which is wholly of iron and steel, is 61/4 feet in length by 23/4 in width, and rests upon four steel wheels, through the intermedium of are actuated by a differential motion, which, on curves, allows the two wheels to assume different velocities. the carriage to overturn, and to make the steering of it very easy.

The generator, which is placed in front, carries all the requisite apparatus. It is of a new system, that permits of a wide heating surface with little weight. water-a relatively large bulk, that has the effect of keeping the pressure more regular. It easily develops was about one hundred and eighty pounds to the about seventy. While running, the water is fed by a pump, and, during stoppages, by an injector. The motor, which is in the rear, is an expansion and reversible one, and has a power of 1,446 foot pounds.

boiler, and the one to the right has within reach all the apparatus necessary to run the engine. The fuel, which is stored at each side of the boiler, suffices for a run of sixty miles. weight of the carriage, when empty, is 1,430 pounds. It easily ascends the steepest gradients, and its mean speed is 15 miles per hour. Mr. Bollee has several times obtained speeds of from 21 to 24 miles.

The apparatus may be given various forms and dimensions. In the fancy ones the boiler is in the rear.— La Nature.

#### The Merchant Navy of the World.

The Bureau Veritas publishes the following statistics respecting the merchant navy of the world in 1885: The total number of sailing vessels in existence that year was 43,692, with an aggregate tonnage of 12,867,375; that of steamers was 8,394, with a tonnage of 6,719,101,

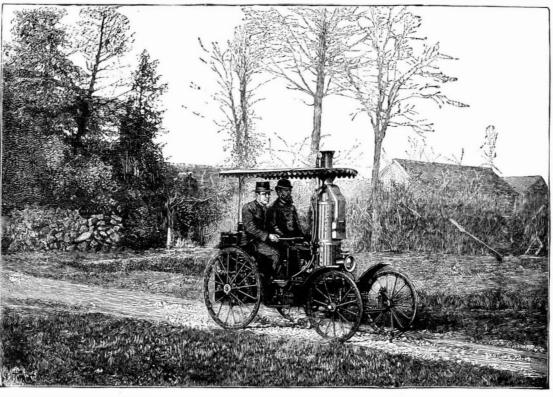
making a total of 52,086 vessels and 19,586,476 tons. thirteen sheets of new paper. As I said before, we fear as a competitor in the creation of a swift mer-The largest fleet, naturally, is that of England, with 4,852 steamers, with a tonnage of 4,159,003, and 14,939 sailing vessels, of 4,714,746 tons. Next follows France, with 505 steamers, of 498,646 tons, and 2,173 sailing vessels, of 398,561 tons. Germany possesses 509 steamers, with a tonnage of 110,064, and 2,424 sailing vessels, with 863,611 tons. With regard to the importance of their steam navy, the maritime countries are classified as follows: England, France, Germany, United States, Spain, Holland, Italy, Russia, and Norway, which last country owns 103,792 tons of steam shipping. With regard to sailing vessels, the classification as regards importance is as follows: England, United States, Norway, Germany, Italy, France, Russia, Spain, Sweden, and Holland.

#### Use of Sandpaper.

In handling this subject, we expect to tread on the toes of both bosses and workmen. Still, we think a few suggestions will not be amiss. Sandpaper occupies a very important position; and, as it is more frequently used, and in greater quantities, than almost any other single article, it becomes a serious question as to cost. The workman, if so disposed, can materially reduce or increase the cost by using the paper up thoroughly or only using it half. We have seen some throw the piece away if only the edge was off the paper; others would use the edges and corners, and the center be good; and others, again, the center, and leave the corners good. That is a waste. As the paper is given to use, it is immaterial what shape you use it in, so that it has answered its purpose. It does no good to pile it up, or stow it away in a box to be used again; except in a very few cases, it never gets used again, and only accumulates for nothing. We generally use ours up until there is no virtue left in it, diseased bone wherever it was necessary as easily as nearly \$2,000,000 a year.

and then throw it away, either into the fire or into the waste box.

Now, we know there are some bosses who never seem satisfied unless they see a box of refuse paper graving of the apparatus made from a photograph around, and insist that we must use it, because it is to taken by Mr. Sollier, an amateur at Mans, and, in them like getting double service out of it. So they do, but at what a cost! Sandpaper, as bought by them stands them in the neighborhood of about one-half cent per sheet. Divide that into, say, eight parts, which makes the cost about one-sixteenth of a cent per part. It is used until the cutting edge is off, and then springs, so as to prevent jolting. The driving wheels, thrown to one side. It has done all that can be exwhich are in the rear, are 31/4 feet in diameter, and pected from one-sixteenth of a cent. Now, to use it again will require at least two-thirds more time than at first. Say a man is getting 20 cents an hour; he The steering wheels are 2½ feet in diameter, and are can use the eighth part of a sheet up in about from peculiarly mounted, so as to render it impossible for five to ten minutes, according to the condition of the job he is doing. Give in ten minutes, and he has done, say, one-half of a large panel. Now make him do the other half with the same piece of paper, and I think I would not be far wrong when I place the time at half an hour, even if he could do it at all, which I It is very easily cleaned. It holds 7½ gallons of doubt. The question is, Which is the more valuable, the paper or the man's time? In the first instance, the man occupies one-third of the half hour at a cost of 31 a power of 2½ horses. On the trial trip the pressure cents in time and one-sixteenth cent in paper. To cover the same amount of surface with the same piece square inch, although the ordinary pressure is only of paper again would bring the cost of the time occupied on the second half to 10 cents, from which might be deducted one thirty-second of a cent for the use of the old paper. In other words, trying to save one-sixteenth of a cent, we have actually lost twenty minutes | As to comparative safety in collisions with other ves-



BOLLEE'S STEAM CARRIAGE.

use our paper as long as there is any virtue in it, and no longer. We turn and cut it up so as to get all there is of service in it, and then cast it away.—Carriage Monthly.

#### Electrical Surgery.

A student 22 years old, in the College of Burlington, Vt., slipped on the pavement about two months ago and strained his thigh. He soon lost the use of his left leg and suffered excruciating pain. He came to New York, was placed on a cot in the Post-graduate Hospital, and on January 25, Dr. J. Milton Roberts, a professor in the institution, performed on him a remarkable operation.

The young man was put under the influence of ether, and Dr. Roberts, with a scalpel, laid bare a splendid additions to the steel fleet already in existence portion of the hip bone about three inches wide. Then he called into play a bone cutting machine, invented by himself and called the electro-osteotome. It is worked by an electric battery and can revolve surgical instruments 12,000 revolutions, if necessary, in a minute.

The Doctor attached a small drill to the instrument and cut out portions of the hip bone up to its head, a distance of four inches. These pieces of bone under the microscope showed disease. The Doctor then used still larger drills until there was a space large enough to admit the entrance of a man's finger. He now wanted to see the exact condition of affairs inside of the bone. To do so he used a novelty for this class of

if the bone were open before him on an operating table. Dr. Roberts put in a drainage tube to take off diseased matter that might form, sewed up the wound, and applied antiseptic bandages. A hypodermic injection of morphine was given to the patient, and when he recovered from the effect of the ether he was in a satisfactory condition, and it is conjectured that he will in a comparatively short time be able to use his disabled limb.

#### Steel Ships.

As wood, in the construction of ships, was gradually replaced by iron, so iron, in its turn, is giving way to steel. The latter phase of the evolution has been very rapid. It is only seven years ago that steel began to attract attention as a substitute for iron in ship building. Its free use had just then been made possibleon the score of economy-by the perfection of the Bessemer process. But for the triumphant success of that cheap method of steel manufacture, such a thing as a steel hull would have remained the dream of naval architects. Seven years of trial have proved the advantages of steel over iron as a material for ships, as those of iron over wood had been previously demonstrated. The prime cost of vessels is increased by the change, but there is a great gain in durability, which makes the use of steel cheaper than that of iron in the long run.

The carrying capacity of a steel vessel is greater than one composed of iron. The tougher metal better stands the tremendous wear and tear of quick voyages. The passengers, two in number, sit behind the in time and 6% cents in money—enough to buy over sels or with icebergs, the shock can be sustained with

> less damage to steel than to iron. For every exigency that taxes the strength of a hull, iron is less suitable than steel. It is rare that theory has been so well verified by practice. The position of steel as the material into which the navies of the world are destined to be transmuted in the early future seems now to be secure.

There is no known rival to steel in ship building. If aluminum could be produced as cheaply, its extraordinary tensile strength and its wonderful lightness would recommend it to such a use. But the great cost of its extraction from the superabundant clay in which it is found puts that use out of the question at present. After all the alleged improvements in its manufacture, its wholesale price was, at the date of the last government report on "Mineral Resources," not less than \$6 a pound. And there is no other metal—or other material of any kind-from which steel has anything to

cantile marine or an efficient war navy.

The Clyde statistics for 1885 tell the story of the gain made by steel on iron during the year. Of all the tonnage constructed and launched on the river last year, steel showed a percentage of 48. No further back than 1879 the percentage of steel tonnage produced on the Clyde was only 101/4. The proportion of steel to iron hulls has increased with great uniformity from year to year. The experience of the Clyde ship builders may be taken as that of all their craft.

The North German Lloyd now has three new steel steamers under headway at Govan, near Glasgow. The Havre line gives its orders for four more vessels of steel to the St. Nazaire shipyard in France. The descriptions of all these steamers show that they will be on the Atlantic. This revolution, now so silently but surely progressing, is not confined to Scotland or France. Every country which makes any serious pretensions to ship building assists in the transforming process.—Journal of Commerce.

#### California Soda.

Works have been begun at Owens Lake, in California. A portable engine is employed; and as soon as a vat is filled, the engine is moved to another, and the water is left to evaporate from the one that had been filled. This process will be repeated at all the vats until the soda sediment in the accumulating water in the pit reaches the surface. It will take about a year work—a tiny incandescent electric light, about as big to get a crop of soda by this method, which will bring as a pea. This Dr. Roberts introduced inside of the \$35 per ton. It is expected that fifty tons of soda to passage in the bone, and the several flashes of light the acre will be annually gathered. The number of enabled him to see just where the diseased bone was, vats will be increased till they hold an area of 50,000 Then he took up his drill again, and cut out the acres of soda, the income from which is expected to be

#### ENGINEERING INVENTIONS.

A railroad gate has been patented by Mr. James H. Pollard, of Clarence, Mo. This invention covers a novel construction and combination of parts in a gate, so arranged that an approaching train strikes a projection of a bar pivoted in connection with the rails, whereby the gate is automatically opened by the train, and is closed automatically after the train has passed.

A gate has been patented by Mr. Fred. W. Sensiba, of Talbot, Mich. It is intended especially for drawbridges, and is hung upon a shaft which is rotary reciprocated by connections from another shaft rotated by a weight and held from revolution by the end of a lever, with other novel features, whereby the gate will be automatic in its action so long as the weight

A car seat recorder has been patented by Messrs. Joseph K. Bywaters and John G. Burke, of Paris, Texas. It is located in the middle of the car seat, the seat being thus divided into two parts, and is connected by gearing with the car axle, so that when depressed by the weight of a passenger it will record the number of miles traveled by the vehicle while the seat is so occupied.

#### AGRICULTURAL INVENTIONS.

A two horse hay rake has been patented by Messrs. Alexander Anderson and Robert Rutherford, of Brush Creek, Iowa. It is made with a truck connected with the reach frame of the rake by hooks on the reach frame engaging an annular plate, and a king bolt forming a fifth wheel, and provided with a hinged tongue, whereby all weight from the rake will be taken from the horses' necks.

A check rower has been patented by Mr. Jeremiah C. Butler, of Lexington, Mo. The shaft revolving wheel is secured on one and the marking wheel on the other end of a shaft journaled in suitable bearings above the runners, and the arms of the marking wheel are so curved that in leaving the ground they make a clear and distinct mark, the machine being very simple in construction and operation.

A cotton cultivator has been patented by Messrs. Joseph Wilkinson and Frank Curtin, of Kentuck, Ala. It is so constructed that front hoes will bar off and rear ones side up the cotton, while the chopping mechanism intermediate of said hoes will cut the cotton into stands, it being arranged so the frame [carrying the cultivating and chopping mechanism may be lower ed to cause the mechanism to operate in the ground to any desired depth.

A hay rack has been patented by Mr. Joseph A. Withrow, of Scranton City, Iowa. Combined with a central bar are transverse bars, adjustable angled rods, longitudinal bars, slotted curved springs and clips, with other novel features, so the rack may be readily applied to wagons for transporting hay and grain, and adjusted to wagons of different sizes, or it may be converted into a frame to receive a canvas covering for a wagon to adapt it for use by excursionists

#### MISCELLANEOUS INVENTIONS.

A windmill has been patented by Mr. Joshua G. Benster, of Duncan, Neb. This invention relates to solid vertical wheel windmills, and it provides for such construction as to be self-regulating in winds of widely varying force, while it is adapted for a variety of uses in driving small machines and for pumping.

A gate has been patented by Mr. Geo. A. Grant, of Eddyville, Iowa. It is composed of a num ber of wires hinged at one end to a fixed post and their opposite ends secured to a movable upright, the invention covering novel features in the construction and operation of such a gate.

A hame tug has been patented by Mr. John T. Condon, of Kingsley, Ohio. Its construction is such as to provide a strong pivot and one that prevents any rotary or twisting movement of the tug, which rests against the roll of the collar, while the tug stands out and will not dig into and wear the collar.

A roller skate has been patented by Mr. James B. Harris, Jr., of Geneseo, N. Y. It has a socket arm with an adjustable stop, the arm being fixed to and extending from one of the roller carriers, the object of the invention being to allow persons using roller skates to stop instantly or slacken speed at will.

A stand for photographic cameras has been patented by Messrs. William H. Lewis and Erastus B. Barker, of New York city. It is a camera tripod in which the legs, which are composed of three or more sections, are built up to give a regular tapering and firmer support for the stand, while the whole is very light and may be packed in small space.

A pen holder has been patented by dle is split at one end, and has a clamping screw for drawing the parts together, with angled clamps for receiving ordinary pens, and arms in the slot of the pen handle, whereby ordinary pens may be used to make parallel lines at such distance apart as desired.

A gasometer has been patented by Mr. George E. Johnson, of Albion, Ind. It is designed for the use of dentists and others, for producing anæsthesia by nitrous oxide and other agents, and has a dry gas chamber, so the water forming the seal cannot ab sorb much gas, and the gasometer is small as compared with its capacity.

A mixing and vaporizing device for inhalers has also been patented by the above inventor. It is for thoroughly mixing anæsthetics, such as nitrous oxide or laughing gas and ether, at the time they are being used, and consists of a simple apparatus with chambers connected by bores with a common tube, with gauge, regulating screw, etc.

An exhibitor for paper hangings, etc. has been patented by Mr. Lewellen A. Ely, of Muir, Mich. Combined with an upright rod or tube, with a

sleeve surrounding it, are frames hung on the sleeve, and handles on the sleeve for turning it, making a de vice for effectively displaying paper, borders, pictures, oil cloths, carpets, etc.

A mop wringer has been patented by Mr. Daniel Lynch, of Glens Falls, N. Y. It consists of a frame adapted to rest upon the top of a bucketor tub. and has two sets of fingers, one made to work toward and within the other to squeeze or wring the cloth of the mop as it is drawn through the two closed sets of rows or fingers, thus saving time and labor

An umbrella casing has been patented by Mr Romeo E. Ghezzi, of New York city. It is formed of a series of telescoping tubes, making a shell to hold the covering and frame of an umbrella together very compactly, and which can be applied and removed quickly, serving when so desired as a drip cup for the water running down from the umbrella.

An embroidering machine has been patented by Messrs. Henry E. Schmitz and Edward Aldom, of Brooklyn, N.Y. It is a novel attachment for sewing machines, in which a single thread chain stitch is used to secure on the surface of the material to be embroidered a strip or length of cord, braid, chenille, beading, or other embroidering strip, of any desired color.

A machine for building wire fences has been patented by Mr. William H. Bigelow, of Worthington, Minn. It consists of a platform suitably mounted on wheels for moving from place to place, carrying an earth auger and means for driving posts, with apparatus for stretching and fastening as many wires as desired on the posts so driven.

A prairie fire extinguisher has been patented by Mr. Arthur W. Rumsey, of New Kiowa, Kansas. It has a water tank and beaters, so arranged that when propelled over the lines of a fire it will beat out and extinguish the fire at each side, and burn a swath or belt around haystacks, buildings, or farms, for protection against approaching fires.

A plastic compound to be used in the manufacture of burial caskets, furniture, etc., has been patented by Mr. Thomas Law, of Moulton, Iowa. It consists of rosin, black lead, sulphur, and rubber, melted and mixed together in stated proportions, that will readily mould and harden to make a waterproof and imperishable compound, and will also form an excellent

A cotton chopper and cultivator combined has been patented by Mr. Joseph L. Murray, of Weimar, Texas. It has a cultivating plow located in the rear of the chopping apparatus, and in line with the point at which the chopping apparatus cuts out the row, whereby the cut out portion will be cultivated, and mechanism whereby the cultivating plow may be elevated over the stands of plants.

A head screen has been patented by Mr. Horace Garst, of Council Bluffs, Iowa. It is made of mosquito netting or fine gauze, in the shape of a bag, with a band at its upper end to fit upon a hat body, and a band at its lower end to fit loosely around the neck, with flexible weights at the lower edges, the whole so arranged that the screen can be raised and worn around

An attachment for rod rolling mills has been patented by Mr. Andrew J. Day, of Pittsburg, Pa. It is for use in connection with the ordinary form of rolls, and so designed that the rod, having once been delivered to the bite of the second pair of rolls, will take care of itself until the operation of rolling has been completed, avoiding the kinking which has heretofore required the careful attention of skilled workmen

A lamp chimney cleaner has been patented by Mr. Andrew S. Reisor, of Reisor, La. It consists of a wire bent double and provided with a slip bar or loop, with a clamp wire hinged to the bend of the main wire and adapted to be locked on a pad or mop by means of the slip bar or loop, so it can be conveniently applied to the inside surfaces of chimneys or globes.

A feed mechanism for stone sawing machines has been patented by Mr. Francis H. Cook, of Rutland, Vt. It consists of cone-shaped spreaders arranged beneath the feeding tubes, with deflecting racks beneath the spreaders, and other novel features, whereby the sand or other abrading agent may be evenly distributed over a large surface, or confined to a particular portion when such delivery is required.

A door lock has been patented by Messrs. Garret G. Ackerson and Julius F. Shy, of St. Louis, Mo. The key holes for opposite sides of the door are out of line with each other, and the locking bolt has two key bit receiving notches, and there are also special key hole guard plates, making a simple and strong lock, not easily picked, and preventing peeping through key holes.

A gate has been patented by Messrs. William L. and John C. Wilson, of Cynthiana, Ind. A lever is pivoted to the lower rear part and extends diag-Mr. Marshall J. Hughes, of Jersey City, N. J. The han-lever is pivoted to the lower rear part and extends diagonally upward and forward about to the top of the gate, a draw up rod connecting the lever with the upper rear part of the gate, with other novel features, to prevent the sagging of gates, and to hold their outer ends up any desired distance from the ground.

An electric leak alarm for pipes has been patented by Mr. Henry G. Bauman, of Pittsburg, Pa. It consists of a jacket inclosing the joint of a pipe with a flexible metallic diaphragm and an insulated contact screw supported near the diaphragm, with electrical conductors connected with the pipe or jacket and with the insulating contact screw, to give alarm in case of leaks in the joints of pipes.

A signal horn has been patented by Mr. Charles A. Volke, of Stapleton, N. Y. It consists of a tube closed at one end, and with a neck at the other end for connection to a steam or air pipe, the tube having a mouth at one side, below which it is divided by a bridge, making upper and lower chambers, connected by a narrow slit in the bridge, there being an adjustable valve for varying the tone

by Mr. Frederick A. S. Perry, of New York city. It New York,

consists of a latch adapted to be held in a slot in the blind, in connection with a spring and sliding jointed rod, and other novel features, whereby the blinds can be readily closed, and locked in place when closed, without extending the arm out of the windows to release them from their open position.

A beehive has been patented by Mr. William O. Vincent, of Newfoundland, Ky. This in vention covers a novel construction and combination of parts, whereby a hive may be used to receive three distinct swarms of bees, or otherwise the bees can be allowed to pass back and forth between the brood chamber and the honey box, and the bees can generally be readily controlled and fed and protected from moths.

A fire escape has been patented by Mr. Theodore D. Jenkins, of Jersey City, N. J. A metal box has arms and guides for an escape line, with a lever arrangement, whereby, when the line is secured by one end in a window and the other end cast out, one may place a belt about the person, grasp a lever, and leave the window, the rate of descent being readily controlled by the lever.

A floor grinding machine has been patented by Mr. James B. Harris, Jr., of Geneseo, N. Y. A grinding wheel or block is fixed in a frame which also carries a seat for the operator, so that the weight of the latter can be thrown upon the grinding wheel, and the machine will abrade or level surfaces which it is drawn arross, being especially designed for leveling the floors of skating rinks.

A vehicle curtain has been patented by Mr. Joseph E. Bimm, of Dayton, O. The construction is such that the curtains can be so attached to the vehicle top that when not in use they are preserved from injury, and at the same time are ready and handy foruse when required, and the arrangement is such that the entire vehicle top, with the curtains, can be made and trimmed up independently of the vehicle body.

A plate joint for stoves or ranges has been patented by Mr. Nathaniel A. Boynton, of New York city. Cast metal plates having parallel ribs are used in connection with sheet or wrought metal plates having marginal flanges bent to form an obtuse angle with their bodies, and arranged to fit within the grooves formed by the ribs of the cast metal plates, to make the cessary compartments and walls of the flues in a stove or range.

A composition for making sewer invert blocks has been patented by Mr. Samuel A. Miller, of Philadelphia, Pa. It is formed of hydraulic cement, sand, iron scale, or slag and iron, or steel sludge, the ingredients being thoroughly mixed with as small a quantity of water as possible; the composition is rammed down into a mould, and a mixture of one part of sand and one of cement is applied to the face of the bottom block of the mould, to give a hard and smooth finish to the top surface of the invert block, while the rest of the block is made to have great strength and durability, and to resist great pressure.

A machine for making stereotype marix impressions has been patented by Mr. Friedrich Schreiner, of Philadelphia, Pa. It is designed for making impressions of each line successively on soft paper. from which a stereotype cast of the impressed sheet may be taken and used for printing, while an extra copy may also be obtained at the same time on tissue or carbon paper. A type case for use in connection with these machines has also been patented by the same inventor, and it holds the types in such a manner that as soon as they are released from the holder where used for taking an impression, they are automatically drawn back into the place which they had before.

#### NEW BOOKS AND PUBLICATIONS.

A HISTORY OF THE UNITED STATES, FROM THE DISCOVERY OF AMERICA, IN 1492, to 1885. By Emery E. Childs. New York: Baker & Taylor, 1885.

In a space of about 250 pages Mr. Childs has brought together a condensed account of American history, from the landing of Columbus to the World's Fair at New Orleans. It has been arranged in chronological order, and will be found a very convenient reference book. The main feature of the work is the careful record which has been made of important inventions, discov eries, the growth of national industries, and other matters of moment which have no direct political interest. It is a successful attempt to bring within the covers of a brief pocket edition about the same information that Professor McMaster has collected in his larger volumes, and will be appreciated by those who want a complete compendium in the fewest possible

THE HOLLY MANUFACTURING Co., of Lockport, N. Y., has issued a very attractive pamphlet, descriptive of the Holly System of Water Works and the Gaskill Pumping Engine used in connection with the system. It is designed to supply water to towns operation of machinery is continuous; but as the demand for water is subject to constant variations, means are provided for the automatic regulation of the pumps, so that the amount of water delivered corresponds at any moment with the exact requirements. When the pressure in the mains falls below the standard, the regulator promptly acts to admit steam for a longer period into the cylinders; but when the pressure exceeds the prescribed standard, the action of the regulator is reversed, and less water is pumped. Another and important feature of the system is that by providing water under large pressure in the mains, the necessity of fire engines is avoided. The reports of the performance of the Gaskill engine are highly satisfactory. The pamphlet will possess considerable value for those interested in projected water works.

DESIGNS FOR STABLES. We have received from W. T. Comstock, of New York, "Thirteen Designs for Stables." being the third of a series of architectural designs of unusual merit. The plates, with specifications and details of construction, will be A shutter fastener has been patented | sent for \$1.00 by the publisher, No. 6 Astor Place,

#### 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,

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exist in thousands of forms, but are surpassed by the marvels of invention. Those who are in need of profitable work that can be done while living at home should at once send their addresses to Hallett & Co., Portland, Maine, and receive free full information how either sex, which sages, can earn from \$5 to \$25 per day and upward. You are started free. Capital not required. Some have made over \$50 in a single day at this work. All succeed

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Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Pumps for liquids, air, and gases. New catalogue will be ready in March.

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

Woodw'kg. Mch'y, Engines, and Boilers. Most complete stock in U.S. Prices to meet times. Send stamps for catalogues. Forsaith M. Co., Manchester, N. H.

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

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

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

Send for Monthly Machinery List

to the George Place Machinery Company, 121 Chambers and 103 Reade Streets, New York,

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

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J. Wood Working Machinery. Full line. Williamsport Machine Co., "Limited," 110 W. 3d St., Williamsport, Pa.

Iron Planer, Lathe, Drill, and other machine tools of modern design. New Haven Mfg. Co., New Haven, Conn. Curtis Pressure Regulator and Steam Trap. See p. 142

Nustrom's Mechanics.—A pocket book of mechanics and engineering, containing a memorandum of facts and connection of practice and theory, by J. W. Nystrom, C.E., 18th edition, revised and greatly enlarged, 12mo, roan tuck. Price, \$3.50. For sale by Munn & Co., 361 Broadway, New York city.

Iron, Steel, and Copper Drop Forgings of every description. Billings & Spencer Co., Hartford, Conn

#### Dynamo Machines

for all purposes. Dynamo machines of highest efficiency, accurately calculated (as to capacity, etc.), and built to meet requirements in connection with all

Industrial Applications of Electricity, including: Electric Lighting, Transmission of Power Electro Mechanical Machinery, Electro Deposition of Metals, Electro Chemical Work, Telegraphy in place of Batteries, Electric Motors, of various horse power to be run by Dynamo Currents. All dynamo and motor apparatus built to suit the work required and according to the best of known models for economy and efficiency.

#### J. H. Bunnell & Co.

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

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

Crescent Solidified Oil and Lubricators. Something new. Crescent Mfg. Co., Cleveland, O.

Steam Hammers, Improved Hydraulic Jacks, and Tube

Expanders. R. Dudgeon, 24 Columbia St., New York. Emerson's Per Rook of Saws free. Reduced prices for 1885. 50,000 Sawyers and Lumbermen. Emerson, Smith & Co., Limited, Beaver Falls, Pa.

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

"How to Keep Boilers Clean." Send your address for free 88 page book. Jas. C. Hotchkiss, 86 John St., N. Y. Barrel, Keg, Hogshead, StaveMach'y. See adv. p. 76. Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 46. Hercules Lacing and Superior Leather Belting made by Page Belting Co., Concord, N. H. See adv. page 158. Timber Gaining Machine. All kinds Wood Working Machinery. C. B. Rogers & Co., Norwich, Conn.

Manufacture of Soaps, Candles, Lubricants, and Glyceine. Illustrated. Price, \$4.00. E. & F. N. Spon, New

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

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

Supplement Catalogue.—Persons in pursuit of infor on of any special engineering, mechanical, or scient tific subject, can have catalogue of contents of the Sci-ENTIFIC 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.



#### HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

Heferences to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

- (1) H. R. writes: We are about to lath and plaster a room in basement of store, to be used a laundry. Can you suggest any way to effectually keep the fumes out of the store? A. Cover the ceiling upon the beams with tarred roofing paper well lapped. then fur and lath, or paint the ceiling after plastering.
- (2) E. S. asks the cause of an engine knocking or thumping when oil or tallow is put in the cylinder? A. Possibly the piston rings are loose or have play between the head and follower. The lubrication giving them an easy motion, the inletting of steam at each end would send them alternately against the oppo
- (3) J. M. H. writes: Why does the iron made now rust so badly and decay, while the iron made many years ago rusts comparatively but little? A. The iron made 40 to 50 years ago in the United States was largely charcoal ircn, and was purer and better than the same grades as made at the present day. Our common iron is filled with slag, and looks coarse and fibrous when rusted to show the grain. There is good iron made now at a price, such as the Swedes, Norway, and Ausable horse nail iron.
- (4) F. H. L. asks: 1. What are the soft iron castings to be used for the electric machine described in Supplement, 161, and how are they to be obtained? Are they malleable iron castings? A. The castings referred to are made from soft gray iron. They are better for the purpose than malleable iron. You can probably secure such castings in foundries in your own place. Malleable iron castings are unsuited to this purpose unless thoroughly annealed. 2. Is an armature with one, and would it increase the power of the machine described in Supplement, 161? If so, what num- boring ordinary rock? A. The speed of the periphery use a number of pieces of Norway sheet iron about one be difficult to construct an armature of the size referred to, with several coils, although a number of coils would not considered in this figure. undoubtedly increase the efficiency of the machine. For a small machine, we know of nothing better than that described in the Supplement referred to. Your form of armature would be very good if for a larger machine than that described. 3. Can you suggest a better pliable insulator than silk coated with shellac varnish? A. We know of no better insulator than silk or shellac, or
- (5) G. M. L. asks: How can I make an induction coil, such as are used in medical batteries. also what number of the Scientific American or Sup-PLEMENT contains descriptions for making different coils? I wish to make a coil that will best operate on a Smee battery. A. To make an induction coil for medical purposes, use a magnetic core formed of a bundle of soft iron wires three-eighths of an inch in diameter and 4 inches long. Wind this with 3 or 4 thicknesses of writing paper, or place it in a suitable thin spool; wind on the spool 4 layers of No. 18 magnet wire for the primary. Wrap the primary coil with 2 or 3 layers of writing paper, and upon this wind 8 or 10 layers of

rections for making induction coils.

- (6) J. D. L. writes: I wish to make an induction coil that will give an inch spark. Will one 6 inches long and 3 inches in diameter be large enough? The primary coil is 2 layers of No. 18 silk insulated copper wire; how much secondary wire will I need? How large and how many condenser plates will I need? A. We think your coil will be too small to yield a one inch spark. Better follow directions given in Supplement, 160; it will cost little, if any, more to make a coil of that size. We cannot without considerable trouble give you detailed information for making a coil to give a spark exactly one inch long.
- (7) G. A. C. writes: In the Scientific AMERICAN of July 11, 1885, Note 1, there is a recipe for cement which is proof against even boiling acids. Now, I wish to know if I can make battery cells of India rubber, say 2 in. square by 4 in. high, and cement with the above, so that they will last. If not, will you please inform me of a way to make them? A. By employing a cement made of gutta-percha, pitch, and sh lac, equal parts melted together, you will be able to cure the corners of your battery cells together, successfully. We would advise, however, binding the corners with strips of soft rubber, attached by means of the
- (8) G. S. B. asks: 1. Why does the cloudiness of the air and the number of rainy days in the year increase gradually from the equator to the polar regions, while the annual quantity of rainfall decreases in the same direction? A. Because the atmospheric currents move from the equator toward the poles, carrying moisture, which is precipitated from decreasing temperature, until finally, in the higher latitudes, the clouds near the earth are seen only in light drizzling rains. The fogs of the northern latitudes are mostly produced by the evaporation from the warm sea in contact with or into a cold atmosphere, which condenses the moisture to fog. 2. Why do fogs and clouds reign supreme in the polar regions except during the winter? A. Although there is much fog on the sea in high latitudes, their supremacy is a misnomer, prompted probably by comparison with sunny clime
- (9) J. D. C.—The belt has no influence upon the regulating power of the flywheel, whether it runs on the flywheel as a pulley or on a separate pulley. The placing of a belt upon the flywheel as a pulley or on a separate wheel or pulley is entirely a matter of convenience in arranging the transmission of power. The weight of flywheel and pulley on an engine shaft at their radius of gyration is the real measure of their equalizing power, although the belting and shafting of pulleys that are running regularly are an additional aid.
- (10) V. W.—The eyebrows may be darkened permanently by the use of a silver hair dye, which can be obtained from any druggist. The dealers in ladies' hair, etc., will also furnish you with suitable preparation to use. For coarse skin, etc., we can only recommend you to consult with some competent phy-
- (11) C. S. asks how to waterproof the tackle and rigging of vessels. A. Either of the followingcan be used: 1. India rubber in small pieces 1 ounce, boiled oil 1 pint; dissolve by heat, then add 1 pint hot boiled oil, stir well, and cool. 2. Melt in 1 pint boiled oil 2 ounces each of beeswax and yellow resin. These olutions should be used when warn
- (12) E. W. writes: I have a small engine, 2 inches bore by 31/2 inches stroke. What size boiler is necessary, and how is the best way to make? A. Your engine will give you a half horse power with 75 pounds steam. You will require a boiler having 10 square feet of heating surface; a cylinder of three-sixteenths inch iron, 16 inches diameter, well riveted, 2 feet long, with 20 tubes 1 inch, heads 1/4 inch. Set vertical on an iron furnace lined with firebrick, such as used in stoves, with a sheet iron cap on top of boiler and stove pipe to chimney. Water gauge and gauge cock on side of shell. Take steam from top of shell.
- (13) F. W. G. asks: 1. What amount of weight would borts or black diamonds (when set in drill bits) hold up without crushing? Suppose the bit stood on rock, and the pressure was downward, from weight of drill rods upon the bit. A. The borts will not crush when the drill rods stand upon them in the drill hole or on ordinary stone, always provided that care is used in letting the rods and bit down, so as not to hammer the borts out of their sockets; also not to turn the bit when great weight is on it, which wound with several coils much superior to that wound may also tear the borts out of their setting. 2. At what speed are diamond drills generally rotated when ber of coils would give the best results, and how would of diamond drill should be from 50 to 75 feet per you construct the armature? Would it not be best to minute. 3. What amount of twisting or torsion strain would 3 inch lap-welded gas pipe stand if made from sixteenth cut in spur wheel form, and all fastened to-gether and keyed on the axis, for the core? A. It would pipe is 4 tons at 1 foot from center. Its safe working strain is one-quarter of this. The coupling joint is
  - (14) A member of the House of Representatives, U. S., asks the materials, quantities, and manner of making the starch by which laundries put the fine polish on shirt bosoms, etc. A. This information is given in answer to query 7 in SCIENTIFIC AMERICAN for December 12, 1885, and has frequently been published by us.
  - (15) J. P. P.—It is extremely doubtful if you can rip 11/2 pine and hard wood with a 6 or 8 inch saw with any speed or comfort. You will find it hard work to cut half through by foot power. You can rabbet with a wide saw or a wabble saw. We can recommend "Art Furniture Designs," 4to, \$3.00; Eastlake's "Hints on Household Taste," 8vo, \$3.00, which we can furnish.
  - (16) E. R. B. asks: Does the bile ever enter the stomach? If so, does it remain long enough to be a cause of biliousness? A. The hepatic duct, which conveys the bile from the liver, opens, not into the

We are sole manufacturers of the Fibrous Asbestos No. 36 silk covered wire. Supplement, 160, gives dil inches below. There is normally, therefore, no bile ever in the stomach, but it is abnormally often thrown backward into it, and thus produces irritation and nausea. Bilious vomiting is not a cause of biliousness as the term is used; it is the result of it.

> (17) J. C. S. asks the materials used in the manufacture of a paint sold under one of the special trade marks used by paint combinations which the trade has on sale. A. We cannot be expected to know their ingredients, nor to state their peculiarities in these columns, if we did know them. We do not consider any of them equal to pure white lead and oil. The spurious whites made to imitate white lead mostly have baryta for their base, mixed with cheap white earths for bulk. We consider them dear to use, cheap

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

F. B.—The specimen is pyrite, or sulphate of iron

#### INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted.

March 2, 1886,

#### AND EACH BEARING THAT DATE.

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

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	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain Electric machine regulator, dynamo, N. Tesla, 336,961, Electric machines, armature for dynamo. F. Bain Electric machines, circuit connection for dynamo, N. McCarty Electrical conductor, H. A. Clark Electrical machine, frictional, A. L. Robbins Electricity for destroying living organisms in the	387,004 837,041 386,962 337,042 837,010 836,992 336,947
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 837,041 386,962 387,042 837,010 836,992 386,947
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain Electric machine regulator, dynamo, N. Tesla, 336,961, Electric machines, armature for dynamo. F. Bain Electric machines, circuit connection for dynamo, N. McCarty Electrical conductor, H. A. Clark Electrical machine, frictional, A. L. Robbins Electricity for destroying living organisms in the	387,041 386,962 387,042 387,042 387,010 336,992 386,947
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain  S36,961, Electric machine regulator, dynamo, N. Tesla, 336,961, Electric machines, armature for dynamo. F. Bain  Electric machines, circuit connection for dynamo, N. McCarty  Electrical conductor, H. A. Clark  Electrical machine, frictional, A. L. Robbins Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al  Electrolier, extension, J. T. Robb  Elevator. See Water elevator.	387,004 837,041 386,962 337,042 837,010 336,992 336,947 337,334 337,199
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain  Electric machine regulator, dynamo, N. Tesla, 336,961, Electric machines, armature for dynamo. F. Bain  Electric machines, circuit connection for dynamo, N. McCarty  Electrical conductor, H. A. Clark  Electrical machine, frictional, A. L. Robbins  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al.  Electrolier, extension, J. T. Robb  Elevator. See Water elevator.  Elevator bucket, H. B. Haigh	387,004 337,041 336,962 337,042 337,010 336,992 336,947 337,334 337,199 336,916
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 837,041 386,962 387,042 837,010 336,992 336,947 337,334 337,199 836,916 337,317
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain  Electric machine regulator, dynamo, N. Tesla, 336,961, Electric machines, armature for dynamo. F. Bain  Electric machines, circuit connection for dynamo, N. McCarty  Electrical conductor, H. A. Clark  Electrical machine, frictional, A. L. Robbins  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al.  Electrolier, extension, J. T. Robb  Elevator. See Water elevator.  Elevator bucket, H. B. Haigh  Elevator safety attachment. H. R. Ferris  Elevator safety device, A. O. Wuensche  Embroidering machine, Schmitz & Aldom	387,004 837,041 336,962 337,010 336,992 336,947 337,334 337,199 336,916 337,317 337,355 337,088
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 837,041 336,962 337,010 336,992 336,947 337,334 337,199 336,916 337,317 337,355 337,088
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain 336,961, Electric machine regulator, dynamo, N. Tesla, 336,961, Electric machines, armature for dynamo. F. Bain Electric machines, circuit connection for dynamo, N. McCarty Electrical conductor, H. A. Clark Electrical machine, frictional, A. L. Robbins Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al Electrolier, extension, J. T. Robb Elevator. See Water elevator. Elevator safety attachment. H. R. Ferris Elevator safety device, A. O. Wuensche Embroidering machine, Schmitz & Aldom Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine.	387,004 \$37,041 386,962 387,042 387,010 336,992 336,947 337,334 337,199 336,916 337,317 337,855 357,088
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 537,041 386,963 337,042 337,010 336,992 336,947 337,834 337,199 336,916 337,317 337,855 337,088
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 837,041 336,962 337,042 837,010 336,992 336,947 337,334 337,199 336,916 337,317 337,355 337,088
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 837,041 386,962 337,042 337,010 336,992 336,947 337,334 337,199 336,916 337,317 337,355 337,088
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 837,041 386,962 387,042 837,010 336,992 336,947 337,334 337,199 336,916 337,317 337,855 337,088 336,976 337,227 336,902
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 837,041 386,962 337,042 837,010 336,992 336,947 337,334 337,199 336,916 337,317 337,355 337,088 336,976 337,227 336,902 337,203
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 837,041 386,962 387,042 387,010 336,992 336,947 337,334 337,199 336,916 337,317 337,355 337,088 336,976 337,227 336,902 337,203 337,193 337,193
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 837,041 386,962 387,042 837,010 336,992 336,947 337,334 337,199 336,916 337,317 337,355 337,088 336,976 387,227 386,902 387,203 387,192 387,192 387,196 387,196 387,196 387,196
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 837,041 386,962 387,042 387,010 386,992 386,947 387,317 387,317 387,355 387,293 387,988 386,976 387,293 387,192 387,193
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 \$37,041 386,962 387,042 387,010 336,992 336,947 337,334 337,199 336,916 337,317 337,355 337,368 336,976 337,227 336,902 337,203 337,192 337,193 337,192 337,193 337,192 337,193 337,192 337,193 337,192 337,193 337,194 337,195 337,196
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain  Electric machine regulator, dynamo, N. Tesla, 336,961, Electric machines, armature for dynamo. F. Bain  Electric machines, circuit connection for dynamo, N. McCarty  Electrical conductor, H. A. Clark  Electrical machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al.  Electrolier, extension, J. T. Robb  Elevator. See Water elevator.  Elevator bucket, H. B. Haigh  Elevator safety attachment. H. R. Ferris  Elevator safety device, A. O. Wensche  Embroidering machine, Schmitz & Aldom  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steum engine.  Envelope machines, drying attachment for, E. H. Woodford  Evaporators, apparatus for automatically feeding liquids to, M. C. Barden  Excavating apparatus, doorless, P. F. Dewey  Extension key, J. H. Shaw  Extension screen, adjustable, T. C. Peck  Fabric turfing implement, M. A. Rafter  Fabric turfing machine, M. F. Connett, Jr  Fare boxes, money drawer for, W. H. Harrisor  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts	387,004 \$37,041 386,962 387,042 387,010 386,992 386,947 387,334 387,199 386,916 387,317 387,355 387,088 387,227 386,902 387,203 387,203 387,203 387,203 387,203 387,203 387,203 387,203 387,203 387,203 387,210 386,936
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 \$37,041 386,962 387,042 387,010 336,992 336,947 337,334 337,199 336,916 337,317 337,355 337,088 336,976 337,227 336,902 337,192 337,193 337,194 337,195 337,185 337,185 337,185
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 \$37,041 386,962 387,042 387,010 336,992 336,947 337,334 337,199 336,916 337,317 337,355 337,088 336,976 337,227 336,902 337,192 337,193 337,194 337,195 337,185 337,185 337,185
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 \$37,041 386,962 387,042 387,010 336,992 336,947 337,334 337,199 336,916 337,317 337,355 337,368 336,976 337,227 336,902 337,192 337,192 337,193 337,193 337,193 337,193 337,193 337,193 337,193 337,193 337,193 337,262 337,193 337,193 337,193 337,193 337,193 337,193 337,262 337,193 337,193 337,193 337,262 337,193 337,263 347,263 347,263 347,263 347,263 347,263 347,263 347,263 347
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 \$37,041 386,962 387,042 \$37,010 336,992 336,947 337,317 337,355 337,388 336,976 337,227 336,902 337,203 337,192 337,192 337,193
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 \$37,041 386,962 337,042 337,042 337,042 336,992 336,992 337,317 337,355 337,365 337,203 337,203 337,203 337,196 337,203 337,196 337,306 337,306 337,210 337,318 337,210 337,318 337,210 337,318 337,210 337,318 337,210 337,318
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 \$37,041 336,962 337,042 337,042 337,042 337,042 337,334 337,199 336,947 337,355 337,356 337,368 337,192 337,193 336,976 337,203 337,193
	Electric lighting system, Mackie & McCarty.  Electric machine, dynamo, F. Bain.  Electric machine regulator, dynamo, N. Tesla,  336,961,  Electric machines, armature for dynamo. F.  Bain.  Electric machines, circuit connection for dynamo, N. McCarty.  Electrical conductor, H. A. Clark.  Electrical machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S.  Jones et al.  Electrolier, extension, J. T. Robb.  Elevator. See Water elevator.  Elevator safety attachment. H. R. Ferris.  Elevator safety device, A. O. Wensche.  Embroidering machine, Schmitz & Aldom.  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steam engine.  Envelope machines, drying attachment for, E. H.  Woodford.  Evaporators, apparatus for automatically feeding liquids to, M. C. Barden.  Excavating apparatus, odorless, P. F. Dewey.  Extension key, J. H. Shaw.  Extension screen, adjustable, T. C. Peck.  Fabric turfing implement, M. A. Rafter.  Fabric turfing machine, M. F. Connett, Jr.  Fare boxes, money drawer for, W. H. Harrisor  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney.  Feed water heater, J. Mahoney.  Feed water heater, J. Mahoney.  Feed water heater, O'Brien & Weaver.  Fence post, J. Burns.  Fence stay, wire, W. C. Gholson.  Fertilizer distributer, J. H. & T. Dodds.  Fifth wheel anti-rattler, J. Long  File, bill and letter, J. S. Vanhorn.  337,244,  Filing device, bill and letter, J. S. Vanhorn.	387,004 \$37,041 386,962 387,042 387,042 387,043 386,992 386,947 387,334 387,199 386,916 387,317 387,955 387,088 386,976 387,227 386,902 387,196 387,203 387,196 387,210
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain	387,004 \$37,041 386,962 387,042 387,014 387,014 387,019 386,916 387,199 386,916 387,317 387,253 387,208 387,227 386,902 387,298 387,198 387,298 387,198 387,298 387,198 387,298 387,198 387,298 387,198 387,298 387,198 387,298 387,198 387,298 387,198 387,213 387,214 387,214 387,214
	Electric lighting system, Mackie & McCarty Electric machine, dynamo, F. Bain  Electric machine regulator, dynamo, N. Tesla, 336,961, Electric machines, armature for dynamo. F. Bain  Electric machines, circuit connection for dynamo, N. McCarty  Electrical conductor, H. A. Clark  Electrical machine, frictional, A. L. Robbins  Electricial machine, frictional, A. L. Robbins  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al  Electrolier, extension, J. T. Robb  Elevator. See Water elevator  Elevator safety attachment. H. R. Ferris  Elevator safety device, A. O. Wensche  Embroidering machine, Schmitz & Aldom  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steum engine.  Envelope machines, drying attachment for, E. H. Woodford  Evaporators, apparatus for automatically feeding liquids to, M. C. Barden  Excavating apparatus, doorless, P. F. Dewey  Extension key, J. H. Shaw  Extension screen, adjustable, T. C. Peck  Fabric turfing implement, M. A. Rafter  Fabric turfing machine, M. F. Connett, Jr  Fare boxes, money drawer for, W. H. Harrisor  Fastener, metallic, G. W. McGill  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney  Feed water heater, J. Mahoney  Feed water heater, J. Mahoney  Fereilizer distributer, J. H. & T. Dodds  Frire larm boxes, attachment for, H. H. Rebellow  Filtering device, bill and letter, J. S. Vanhorn	387,004 \$37,041 386,962 387,042 387,042 387,043 387,043 386,992 386,947 387,334 387,199 386,916 387,317 387,958 387,268 387,227 386,902 387,203 387,203 387,203 387,203 387,198 387,210 387,213 386,927 387,213 386,927 387,112 386,927 387,112 386,927 387,112 386,927 387,112 386,927 387,112 386,927 387,112 386,927 387,112 386,927 387,112 386,927 387,114 387,050 387,154
	Electric lighting system, Mackie & McCarty.  Electric machine, dynamo, F. Bain.  Electric machine regulator, dynamo, N. Tesla, 336,961,  Electric machines, armature for dynamo. F. Bain.  Electric machines, circuit connection for dynamo, N. McCarty.  Electrical conductor, H. A. Clark.  Electrical machine, frictional, A. L. Robbins.  Electricial machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al.  Electrolier, extension, J. T. Robb.  Elevator. See Water elevator.  Elevator bucket, H. B. Haigh.  Elevator safety attachment. H. R. Ferris.  Elevator safety device, A. O. Wuensche.  Embroidering machine, Schmitz & Aldom.  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steam engine.  Envelope machines, drying attachment for, E. H. Woodford.  Evaporators, apparatus for automatically feeding liquids to, M. C. Barden.  Excavating apparatus, odorless, P. F. Dewey.  Extension screen, adjustable, T. C. Peck.  Fabric turfing implement, M. A. Rafter.  Fabric turfing machine, M. F. Connett, Jr.  Fare boxes, money drawer for, W. H. Harrisor.  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney.  Ferd water heater, O'Brien & Weaver.  Fence post, J. Burns.  Fence stay, wire, W. C. Gholson.  Ference post, J. Burns.  Fence stay, wire, W. C. Gholson.  Ference stay, wire, W. C. Gholson.  Ference post, J. Burns.  Fence stay, wire, W. C. Gholson.  Ference post, J. Burns.  Fence stay, wire, W. C. Gholson.  Ference post, J. Burns.  Fence stay, wire, W. C. Gholson.  Ference post, J. Burns.  Fence stay, wire, W. C. Gholson.  Ference post, J. Burns.  Fence stay, wire, W. C. Gholson.  Ference post, J. Burns.  F	387,004 \$37,041 386,962 387,042 387,013 386,992 386,947 387,317 387,353 387,088 386,976 387,227 386,902 387,203 387,203 387,196 387,210 387,210 387,210 387,259 387,182 387,210 387,259 387,182 387,210 387,259 387,184 387,259
	Electric lighting system, Mackie & McCarty Electric machine regulator, dynamo, N. Tesla, 336,961, Electric machines, armature for dynamo, F. Bain Electric machines, armature for dynamo, F. Bain	387,004 \$37,041 386,962 387,042 387,010 336,992 336,947 337,334 337,199 336,916 337,317 337,855 337,088 336,976 337,227 336,902 337,192 337,193 337,194 337,194 337,194
	Electric lighting system, Mackie & McCarty.  Electric machine, dynamo, F. Bain.  Electric machine regulator, dynamo, N. Tesla,  336,961,  Electric machines, armature for dynamo. F.  Bain.  Electric machines, circuit connection for dynamo, N. McCarty.  Electrical conductor, H. A. Clark.  Electrical conductor, H. A. Clark.  Electricial machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S.  Jones et al.  Electrolier, extension, J. T. Robb.  Elevator. See Water elevator.  Elevator bucket, H. B. Haigh.  Elevator safety attachment. H. R. Ferris.  Elevator safety device, A. O. Wuensche.  Embroidering machine, Schmitz & Aldom.  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine.  Steam engine.  Envelope machines, drying attachment for, E. H.  Woodford.  Evaporators, apparatus for automatically feeding liquids to, M. C. Barden.  Excavating apparatus, odorless, P. F. Dewey.  Extension key, J. H. Shaw.  Extension screen, adjustable, T. C. Peck.  Fabric turfing implement, M. A. Rafter.  Fabric turfing machine, M. F. Connett, Jr.  Fare boxes, money drawer for, W. H. Harrisor.  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney.  Feed water heater, J. Berne,  Fence stay, wire, W. C. Gholson.  File bill and letter, J. S. Vanhorn.  File handle, J. Chantrell.  Filty device, bill and letter, J. S. Vanhorn.  Filter ing device for feed water pipes, J. Heath.  Fire alarm boxes, attachment for, H. H. Reb-  beck.  Firearm, G. W. Cilley.  Fire escape, J. D. Jenkins.	387,004 \$37,041 386,962 387,042 387,013 386,992 386,947 387,334 387,199 386,916 387,317 387,355 387,088 386,976 387,227 386,902 387,198 387,198 386,889 387,259 387,112 386,899 387,112 386,899 387,112 386,899 387,112 386,897 387,114 387,060 387,154 387,198 386,894 387,198 386,894 387,198 386,894 387,198
	Electric lighting system, Mackie & McCarty.  Electric machine, dynamo, F. Bain.  Electric machine regulator, dynamo, N. Tesla, 336,961,  Electric machines, armature for dynamo. F. Bain.  Electric machines, circuit connection for dynamo, N. McCarty.  Electrical conductor, H. A. Clark.  Electrical machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al.  Electrolier, extension, J. T. Robb.  Elevator. See Water elevator.  Elevator bucket, H. B. Haigh.  Elevator safety attachment. H. R. Ferris.  Elevator safety device, A. O. Wuensche.  Embroidering machine, Schmitz & Aldom.  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine.  Exevelope machines, drying attachment for, E. H. Woodford.  Exaporators, apparatus for automatically feeding liquids to, M. C. Barden.  Excavating apparatus, odorless, P. F. Dewey.  Extension key, J. H. Shaw.  Extension screen, adjustable, T. C. Peck.  Fabric turfing implement, M. A. Rafter.  Fabric turfing machine, M. F. Connett, Jr.  Fare boxes, money drawer for, W. H. Harrison.  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney.  Feed water heater, O'Brien & Weaver.  Fence post, J. Burns.  Fence stay, wire, W. C. Gholson.  Fences, machine for building wire, W. H. Bigelow.  Fertilizer distributer, J. H. & T. Dodds.  Fifth wheel anti-rattler, J. Long  Frillier distributer, J. H. & T. Dodds.  Fifth wheel anti-rattler, J. S. Vanhorn.  File handle, J. Chantrell.  Fire escape, J. Bien.  Fire escape, J. D. Jenkins.  Fire extinguisher, hand grenade, A. E. Lytle.	387,004 \$37,041 336,962 337,042 337,042 337,042 337,042 336,992 336,992 337,394 337,199 336,916 337,317 337,355 337,088 336,976 337,227 336,902 337,088 337,192 337,196 337,193 336,829 337,196 337,182 337,182 337,183 336,829 337,184 337,182 337,184 337,184 337,184 337,184 337,184 337,184 337,184 337,184 337,184 337,184 337,184 337,184 337,184 337,184 337,184 337,184 337,196 337,196 337,196 337,196 337,196 337,196 337,196 337,196
	Electric lighting system, Mackie & McCarty.  Electric machine, dynamo, F. Bain.  Electric machine regulator, dynamo, N. Tesla, 336,961,  Electric machines, armature for dynamo. F. Bain.  Electric machines, circuit connection for dynamo, N. McCarty.  Electrical conductor, H. A. Clark.  Electrical conductor, H. A. Clark.  Electricial machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al.  Electrolier, extension, J. T. Robb.  Elevator. See Water elevator.  Elevator safety attachment. H. R. Ferris.  Elevator safety device, A. O. Wensche.  Embroidering machine, Schmitz & Aldom.  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steam engine.  Envelope machines, drying attachment for, E. H. Woodford.  Evaporators, apparatus for automatically feeding liquids to, M. C. Barden.  Excavating apparatus, odorless, P. F. Dewey.  Extension key, J. H. Shaw.  Extension screen, adjustable, T. C. Peck.  Fabric turfing implement, M. A. Rafter.  Fabric turfing machine, M. F. Connett, Jr.  Fare boxes, money drawer for, W. H. Harrisor  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney.  Fere boxes, machine for building wire, W. H. Bigelow.  Fence stay, wire, W. C. Gholson.  Fercilizer distributer, J. H. & T. Dodds.  Fifth wheel anti-rattler, J. Long  Fille, bill and letter, J. S. Vanhorn.  Fille handle, J. Chantrell.  Fille arm boxes, attachment for, H. H. Rebbeck.  Firearm, G. W. Cilley.  Fire extinguisher, prairie, A. W. Bumsey.	387,004 \$37,041 386,962 387,042 387,042 387,043 386,992 386,947 387,334 387,199 386,916 387,317 387,955 387,088 386,976 387,227 386,902 387,198 387,210 387,210 387,306 387,262 387,182 387,196 387,259 387,182 387,210 386,889 387,259 387,154 387,050 387,154 387,050 387,154 387,198 386,897 387,198 386,894 387,198 386,897 387,344 387,064 387,344 387,064 387,344 387,064
;	Electric lighting system, Mackie & McCarty.  Electric machine, dynamo, F. Bain.  Electric machine regulator, dynamo, N. Tesla, 336,961,  Electric machines, armature for dynamo. F. Bain.  Electric machines, circuit connection for dynamo, N. McCarty.  Electrical conductor, H. A. Clark.  Electrical conductor, H. A. Clark.  Electricial machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al.  Electrolier, extension, J. T. Robb.  Elevator. See Water elevator.  Elevator safety attachment. H. R. Ferris.  Elevator safety device, A. O. Wensche.  Embroidering machine, Schmitz & Aldom.  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steam engine.  Envelope machines, drying attachment for, E. H. Woodford.  Evaporators, apparatus for automatically feeding liquids to, M. C. Barden.  Excavating apparatus, odorless, P. F. Dewey.  Extension key, J. H. Shaw.  Extension screen, adjustable, T. C. Peck.  Fabric turfing implement, M. A. Rafter.  Fabric turfing machine, M. F. Connett, Jr.  Fare boxes, money drawer for, W. H. Harrisor  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney.  Fere boxes, machine for building wire, W. H. Bigelow.  Fence stay, wire, W. C. Gholson.  Fercilizer distributer, J. H. & T. Dodds.  Fifth wheel anti-rattler, J. Long  Fille, bill and letter, J. S. Vanhorn.  Fille handle, J. Chantrell.  Fille arm boxes, attachment for, H. H. Rebbeck.  Firearm, G. W. Cilley.  Fire extinguisher, prairie, A. W. Bumsey.	387,004 \$37,041 386,962 387,042 387,042 387,043 386,992 386,947 387,334 387,199 386,916 387,317 387,955 387,088 386,976 387,227 386,902 387,198 387,210 387,210 387,306 387,262 387,182 387,196 387,259 387,182 387,210 386,889 387,259 387,154 387,050 387,154 387,050 387,154 387,198 386,897 387,198 386,894 387,198 386,897 387,344 387,064 387,344 387,064 387,344 387,064
3	Electric lighting system, Mackie & McCarty.  Electric machine regulator, dynamo, N. Tesla,  336,961,  Electric machines, armature for dynamo, F. Bain  Electric machines, circuit connection for dynamo, N. McCarty.  Electrical conductor, H. A. Clark.  Electrical machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al.  Electrolier, extension, J. T. Robb.  Elevator bucket, H. B. Haigh  Elevator safety attachment. H. R. Ferris.  Elevator safety device, A. O. Wuensche.  Embroidering machine, Schmitz & Aldom.  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steam engine.  Envelope machines, drying attachment for, E. H. Woodford.  Evaporators, apparatus for automatically feeding liquids to, M. C. Barden  Excavating apparatus, odorless, P. F. Dewey  Extension key, J. H. Shaw  Extension screen, adjustable, T. C. Peck  Fabric turfing implement, M. A. Rafter  Fabric turfing machine, M. F. Connett, Jr. Fare boxes, money drawer for, W. H. Harrison  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney.  Feed water heater, J. Mahoney.  Fence stay, wire, W. C. Gholson  Fences, machine for building wire, W. H. Bigelow  Fertilizer distributer, J. H. & T. Dodds  Filte hill and letter, J. S. Vanhorn.  Filte handle, J. Chantrell  Filter alarm boxes, attachment for, H. H. Rebbeck  Fire arm, G. W. Cilley  Fire extinguisher, hand grenade, A. E. Lytle  Fire pot, tinner's, J. Carte	387,004 \$37,041 386,962 387,042 387,042 387,043 386,992 386,947 387,334 387,199 386,916 387,317 387,955 387,088 386,976 387,227 386,902 387,198 387,210 387,210 387,306 387,262 387,182 387,196 387,259 387,182 387,210 386,889 387,259 387,154 387,050 387,154 387,050 387,154 387,198 386,897 387,198 386,894 387,198 386,897 387,344 387,064 387,344 387,064 387,344 387,064
3	Electric lighting system, Mackie & McCarty.  Electric machine, dynamo, F. Bain.  336,961,  Electric machines, armature for dynamo. F. Bain.  Electric machines, circuit connection for dynamo, N. McCarty.  Electrical conductor, H. A. Clark.  Electrical machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al.  Electrolier, extension, J. T. Robb.  Elevator. See Water elevator.  Elevator bucket, H. B. Haigh.  Elevator safety attachment. H. R. Ferris.  Elevator safety device, A. O. Wuensche.  Embroidering machine, Schmitz & Aldom.  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steam engine.  Envelope machines, drying attachment for, E. H. Woodford.  Evaporators, apparatus for automatically feeding liquids to, M. C. Barden.  Excavating apparatus, odorless, P. F. Dewey.  Extension key, J. H. Shaw.  Extension screen, adjustable, T. C. Peck.  Fabric turfing implement, M. A. Rafter.  Fabric turfing machine, M. F. Connett, Jr.  Fare boxes, money drawer for, W. H. Harrison.  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney.  Feed water heater, O'Brien & Weaver.  Fence post, J. Burns  Fence stay, wire, W. C. Gholson.  Ferce stay, wire, W. C. Gholson.  Fercilizer distributer, J. H. & T. Dodds.  Fifth wheel anti-rattler, J. Long  File bill and letter, J. S. Vanhorn.  File handle, J. Chantrell.  S37,244,  Filing device, bill and letter, J. S. Vanhorn.  File re scape, J. D. Jenkins.  Fire escape, J. Blen.  Fire escape, J. D. Jenkins.  Fire extinguisher, hand grenade, A. E. Lytle.  Fire extinguisher, prairie, A. W. Bumsey.  Fire extinguisher, prairie	387,004 \$37,041 386,962 387,042 387,042 387,042 387,019 386,947 387,334 387,199 386,916 387,287 387,287 387,287 387,283 387,199 387,198 386,897 387,198 386,898
8 8	Electric machine, dynamo, F. Bain  Electric machine regulator, dynamo, N. Tesla, 336,961,  Electric machines, armature for dynamo. F. Bain  Electric machines, circuit connection for dynamo, N. McCarty  Electrical conductor, H. A. Clark  Electrical machine, frictional, A. L. Robbins  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al.  Electrolier, extension, J. T. Robb  Elevator. See Water elevator  Elevator bucket, H. B. Haigh  Elevator safety attachment. H. R. Ferris  Elevator safety device, A. O. Wuensche  Embroidering machine, Schmitz & Aldom  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steam engine.  Envelope machines, drying attachment for, E. H. Woodford  Exaporators, apparatus for automatically feeding liquids to, M. C. Barden  Excavating apparatus, odorless, P. F. Dewey  Extension key, J. H. Shaw  Extension screen, adjustable, T. C. Peck  Fabric turfing implement, M. A. Rafter  Fabric turfing machine, M. F. Connett, Jr  Fare boxes, money drawer for, W. H. Harrison  Fastener, metallic, G. W. McGill  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney  Feed water heater, O'Brien & Weaver  Fence post, J. Burns  Fence stay, wire, W. C. Gholson  Fences, machine for building wire, W. H. Bigelow  Fertilizer distributer, J. H. & T. Dodds  Fifth wheel anti-rattler, J. Long  Filte handle, J. Chantrell  Fire escape, J. Bien  Fire extinguisher, hand grenade, A. E. Lytle  Fire hand & Cordon  Fishing lines, reel for drying, J. W. Brooks, Jr.	387,004 \$37,041 386,962 387,042 387,042 387,010 386,992 386,947 387,334 387,199 386,916 387,317 387,356 387,282 387,283 387,199 387,196 387,293 387,196 387,293 387,196 387,293 387,196 387,393 387,196 387,393 387,196 387,189 386,899 387,181 387,182 387,184 387,184 387,184 387,184 387,184 387,184 387,184 387,186 387,184 387,186 387,186 387,186 387,186 387,186 387,186 387,198 386,897 387,198 386,898 387,198 386,898 387,086 387,198 386,898 387,086
3 3 3	Electric lighting system, Mackie & McCarty.  Electric machine, dynamo, F. Bain.  Electric machine regulator, dynamo, N. Tesla,  336,961,  Electric machines, armature for dynamo. F.  Bain.  Electric machines, circuit connection for dynamo, N. McCarty.  Electrical conductor, H. A. Clark.  Electrical machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S.  Jones et al.  Electrolier, extension, J. T. Robb.  Elevator. See Water elevator.  Elevator safety attachment. H. R. Ferris.  Elevator safety device, A. O. Wuensche.  Embroidering machine, Schmitz & Aldom.  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steum engine.  Envelope machines, drying attachment for, E. H.  Woodford.  Excavating apparatus for automatically feeding liquids to, M. C. Barden.  Excavating apparatus, doorless, P. F. Dewey.  Extension key, J. H. Shaw.  Extension screen, adjustable, T. C. Peck.  Fabric turfing implement, M. A. Rafter.  Fabric turfing machine, M. F. Connett, Jr.  Fare boxes, money drawer for, W. H. Harrison.  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney.  Feed water heater, J. Burns.  Fence stay, wire, W. C. Gholson.  Fences, machine for building wire, W. H. Bigelow.  Ferilizer distributer, J. H. & T. Dodds.  Fifth wheel anti-rattler, J. Long  File, bill and letter, J. S. Vanhorn.  File handle, J. Chantrell.  Fire alarm boxes, attachment for, H. H. Rebbeck.  Firearm, G. W. Cilley.  Fire extinguisher, pand grenade, A. E. Lytle.  Fire extinguisher, prafrie, A. W. Bumsey.  Fire extinguishing projectile, W. A. Bartlett.  Fisherman's minnow boat, F. F. Ward.  Fishing lone, reel for drying, J. W. Brooks, J	387,004 \$37,041 386,962 387,042 387,042 387,042 387,019 386,916 387,317 387,355 387,088 386,976 387,227 386,902 387,203 387,193 387,196 387,282 387,198 387,282 387,198 387,282 387,198 387,282 387,198 387,284 387,196 387,365 387,196 387,365 387,196
8 8 9	Electric lighting system, Mackie & McCarty.  Electric machine, dynamo, F. Bain.  Electric machine regulator, dynamo, N. Tesla,  336,961,  Electric machines, armature for dynamo. F.  Bain.  Electric machines, circuit connection for dynamo, N. McCarty.  Electrical conductor, H. A. Clark.  Electrical machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S.  Jones et al.  Electrolier, extension, J. T. Robb.  Elevator. See Water elevator.  Elevator bucket, H. B. Haigh.  Elevator safety attachment. H. R. Ferris.  Elevator safety device, A. O. Wuensche.  Embroidering machine, Schmitz & Aldom.  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steam engine.  Envelope machines, drying attachment for, E. H.  Woodford.  Exaporators, apparatus for automatically feeding liquids to, M. C. Barden.  Excavating apparatus, odorless, P. F. Dewey.  Extension screen, adjustable, T. C. Peek.  Fabric turfing implement, M. A. Rafter.  Fabric turfing machine, M. F. Connett, Jr.  Fare boxes, money drawer for, W. H. Harrison.  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney.  Feed water heater, J. Burns.  Fence stay, wire, W. C. Gholson.  Fences, machine for building wire, W. H. Bigelow.  Fertilizer distributer, J. H. & T. Dodds.  Fifth wheel anti-rattler, J. Long  File, bill and letter, J. S. Vanhorn.  File handle, J. Chantrell.  Say, 244,  Filing device, bill and letter, J. S. Vanhorn.  File handle, J. Chantrell.  Fire escape, J. Bien.  Fire extinguisher, prairie, A. W. Bumsey.  Fire pot, tinner's, J. Carter.  Fisherman's m	387,004 \$37,041 386,962 387,042 387,042 387,042 387,043 387,199 386,916 387,317 387,253 387,293 387,293 387,196 387,297 386,902 387,196 387,196 387,196 387,292 387,196 387,293 387,196 387,293 387,196 387,296 387,196 387,296 387,196 387,296 387,196 387,396 387,296 387,196 387,396 387,296 387,196 387,396 387,396 387,396 387,296 387,198 387,296 387,198 387,296 387,198 387,296
332	Electric lighting system, Mackie & McCarty.  Electric machine, dynamo, F. Bain.  Electric machine regulator, dynamo, N. Tesla, 336,961,  Electric machines, armature for dynamo. F. Bain.  Electric machines, circuit connection for dynamo, N. McCarty.  Electrical conductor, H. A. Clark.  Electrical machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al.  Electrolier, extension, J. T. Robb.  Elevator. See Water elevator.  Elevator safety attachment. H. R. Ferris.  Elevator safety device, A. O. Wuensche.  Embroidering machine, Schmitz & Aldom.  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steum engine.  Envelope machines, drying attachment for, E. H. Woodford.  Exaporators, apparatus for automatically feeding liquids to, M. C. Barden.  Excavating apparatus, odorless, P. F. Dewey.  Extension key, J. H. Shaw.  Extension screen, adjustable, T. C. Peck.  Fabric turfing implement, M. A. Rafter.  Fabric turfing machine, M. F. Connett, Jr.  Fare boxes, money drawer for, W. H. Harrison.  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney.  Feed water heater, J. Burns.  Fence stay, wire, W. C. Gholson.  Fences, machine for building wire, W. H. Bigelow.  Fertilizer distributer, J. H. & T. Dodds.  Fifth wheel anti-rattler, J. Long  File, bill and letter, J. S. Vanhorn.  Filtering device, bill and letter, J. S. Vanhorn.  Filter alarm boxes, attachment for, H. H. Rebbeck.  Firearm, G. W. Cilley.  Fire extinguisher, prairie, A. W. Bumsey.  Fisher mars minnow boat. F. F. Ward.  Fishing hook and device for cap	387,004 \$37,041 386,962 387,042 387,042 387,042 387,019 386,916 387,317 387,355 387,088 386,976 387,227 386,902 387,198 386,981 386,981 386,983 387,191 386,983
332	Electric machine, dynamo, F. Bain  Electric machine regulator, dynamo, N. Tesla, 336,961, Electric machines, armature for dynamo. F. Bain  Electric machines, circuit connection for dynamo, N. McCarty  Electrical conductor, H. A. Clark  Electrical machine, frictional, A. L. Robbins  Electricial machine, frictional, A. L. Robbins  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al  Electrolier, extension, J. T. Robb  Elevator. See Water elevator  Elevator safety attachment. H. R. Ferris  Elevator safety device, A. O. Wensche  Embroidering machine, Schmitz & Aldom  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steam engine.  Envelope machines, drying attachment for, E. H. Woodford  Evaporators, apparatus for automatically feeding liquids to, M. C. Barden  Excavating apparatus, odorless, P. F. Dewey  Extension key, J. H. Shaw  Extension screen, adjustable, T. C. Peck  Fabric turfing implement, M. A. Rafter  Fabric turfing machine, M. F. Connett, Jr  Fare boxes, money drawer for, W. H. Harrisor  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney  Fere boxes, machine for building wire, W. H. Bigelow  Ferilizer distributer, J. H. & T. Dodds  Fire handle, J. Chantrell  File bill and letter, J. S. Vanhorn  File handle, J. Chantrell  File bill and letter, J. S. Vanhorn  File cextinguisher, prairie, A. W. Bumsey  Fire extinguisher, prairie, A. W. Bumsey  Fire printing hook	387,004 \$37,041 386,962 387,042 387,042 387,042 387,019 386,916 387,317 387,355 387,088 386,976 387,227 386,902 387,198 386,981 386,981 386,983 387,191 386,983
3 3 3 1 1 3	Electric lighting system, Mackie & McCarty.  Electric machine, dynamo, F. Bain.  Electric machine regulator, dynamo, N. Tesla, 336,961,  Electric machines, armature for dynamo. F. Bain.  Electric machines, circuit connection for dynamo, N. McCarty.  Electrical conductor, H. A. Clark.  Electrical machine, frictional, A. L. Robbins.  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al.  Electrolier, extension, J. T. Robb.  Elevator. See Water elevator.  Elevator safety attachment. H. R. Ferris.  Elevator safety device, A. O. Wuensche.  Embroidering machine, Schmitz & Aldom.  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steum engine.  Envelope machines, drying attachment for, E. H. Woodford.  Exaporators, apparatus for automatically feeding liquids to, M. C. Barden.  Excavating apparatus, odorless, P. F. Dewey.  Extension key, J. H. Shaw.  Extension screen, adjustable, T. C. Peck.  Fabric turfing implement, M. A. Rafter.  Fabric turfing machine, M. F. Connett, Jr.  Fare boxes, money drawer for, W. H. Harrison.  Fastener, metallic, G. W. McGill.  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney.  Feed water heater, J. Burns.  Fence stay, wire, W. C. Gholson.  Fences, machine for building wire, W. H. Bigelow.  Fertilizer distributer, J. H. & T. Dodds.  Fifth wheel anti-rattler, J. Long  File, bill and letter, J. S. Vanhorn.  Filtering device, bill and letter, J. S. Vanhorn.  Filter alarm boxes, attachment for, H. H. Rebbeck.  Firearm, G. W. Cilley.  Fire escape, J. Bien.  Fire escape, J. D. Jenkins.  Fire extinguisher, prairie, A. W. Bumsey.  Fire extinguisher, prairie, A. W. Bunsey.  Fire extinguisher	387,004 \$37,041 386,962 387,042 387,042 387,042 387,019 386,916 387,317 387,355 387,088 386,976 387,227 386,902 387,198 387,283 387,198 386,981 387,198 386,981 386,981 386,981 386,983 387,191 386,983 387,192 386,983 387,191 386,983
	Electric machine, dynamo, F. Bain  Electric machine regulator, dynamo, N. Tesla, 336,961,  Electric machines, armature for dynamo. F. Bain  Electric machines, circuit connection for dynamo, N. McCarty  Electrical conductor, H. A. Clark  Electrical machine, frictional, A. L. Robbins  Electricial machine, frictional, A. L. Robbins  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al  Electrolier, extension, J. T. Robb  Elevator. See Water elevator  Elevator bucket, H. B. Haigh  Elevator safety attachment. H. R. Ferris  Elevator safety device, A. O. Wuensche  Embroidering machine, Schmitz & Aldom  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steam engine.  Envelope machines, drying attachment for, E. H. Woodford  Evaporators, apparatus for automatically feeding liquids to, M. C. Barden  Excavating apparatus, odorless, P. F. Dewey  Extension screen, adjustable, T. C. Peck  Fabric turfing implement, M. A. Rafter  Fabric turfing machine, M. F. Connett, Jr  Fare boxes, money drawer for, W. H. Harrisor  Fastener, metallic, G. W. McGill  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney  Feed water heater, O'Brien & Weaver  Fence post, J. Burns  Fence stay, wire, W. C. Gholson  Fence stay, wire, W. C. Gholson  Ferilizer distributer, J. H. & T. Dodds  Fifth wheel anti-rattler, J. Long  Filtering device, bill and letter, J. S. Vanhorn  Filter, centrifugal, R. L. De Lisser  Filtering device for feed water pipes, J. Heath  Fire extanguisher, hand grenade, A. E. Lytle  Fire extinguishing projectile, W. A. Bartlett  Fire extinguisher, hand grenade, A. E. Lytle  Fire extinguisher, hand grenade, A. E. Lytle  Fire extinguisher, hand grenade, A. E. Lytle  Fire extinguisher, prairie, A. W. Bumsey  Fire extinguisher, prairie, A. W. Bumsey  Fire extinguisher, hand grenade, A. E. Lytle  Fire pot, t	387,004 \$37,041 386,962 387,042 387,042 387,042 387,042 387,043 386,992 386,947 387,353 387,088 386,976 387,227 386,902 387,203 387,196 387,263 387,196 387,263 387,263 387,263 387,182 387,210 387,283 387,210 387,284 387,284 387,286 387,286 387,366 387,363 387,366 387,363 387,364 387,363 387,364 387,363 387,364 387,363 387,364 387,363 387,364 387,363 387,364 387,363 387,364 387,363 387,364 387,363 387,364 387,363 387,364 387,363 387,364 387,363 387,365 387,365 386,983
33201	Electric lighting system, Mackie & McCarty.  Electric machine, dynamo, F. Bain	387,004 \$37,041 386,962 387,042 387,042 387,042 387,019 386,992 386,947 387,317 387,356 387,287 387,292 387,198
5 1 3 3 2 1 1 3 7 5	Electric machine, dynamo, F. Bain  Electric machine regulator, dynamo, N. Tesla, 336,961,  Electric machines, armature for dynamo. F. Bain  Electric machines, circuit connection for dynamo, N. McCarty  Electrical conductor, H. A. Clark  Electrical machine, frictional, A. L. Robbins  Electricial machine, frictional, A. L. Robbins  Electricity for destroying living organisms in the bodies of slaughtered animals, applying, C. S. Jones et al  Electrolier, extension, J. T. Robb  Elevator. See Water elevator  Elevator bucket, H. B. Haigh  Elevator safety attachment. H. R. Ferris  Elevator safety device, A. O. Wuensche  Embroidering machine, Schmitz & Aldom  Engine. See Gas engine. Hydraulic elevator engine. Hydrocarbon engine. Rotary engine. Steam engine.  Envelope machines, drying attachment for, E. H. Woodford  Evaporators, apparatus for automatically feeding liquids to, M. C. Barden  Excavating apparatus, odorless, P. F. Dewey  Extension screen, adjustable, T. C. Peck  Fabric turfing implement, M. A. Rafter  Fabric turfing machine, M. F. Connett, Jr  Fare boxes, money drawer for, W. H. Harrisor  Fastener, metallic, G. W. McGill  Faucet, force and drain, F. R. Tibbitts  Feed water heater, J. Mahoney  Feed water heater, O'Brien & Weaver  Fence post, J. Burns  Fence stay, wire, W. C. Gholson  Fence stay, wire, W. C. Gholson  Ferilizer distributer, J. H. & T. Dodds  Fifth wheel anti-rattler, J. Long  Filtering device, bill and letter, J. S. Vanhorn  Filter, centrifugal, R. L. De Lisser  Filtering device for feed water pipes, J. Heath  Fire extanguisher, hand grenade, A. E. Lytle  Fire extinguishing projectile, W. A. Bartlett  Fire extinguisher, hand grenade, A. E. Lytle  Fire extinguisher, hand grenade, A. E. Lytle  Fire extinguisher, hand grenade, A. E. Lytle  Fire extinguisher, prairie, A. W. Bumsey  Fire extinguisher, prairie, A. W. Bumsey  Fire extinguisher, hand grenade, A. E. Lytle  Fire pot, t	387,004 \$37,041 386,962 387,042 387,042 387,013 386,992 386,947 387,319 386,916 387,317 387,355 387,088 386,976 387,227 386,902 387,198 387,198 387,198 387,210 387,198 387,210 387,198 387,210 387,198 387,210 387,198 387,210 387,198 387,210

phurous, F. Randon...... 337,197

Gas burner, regenerative, H. C. Campbell	Pattern lining, M. Stocker
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Grain separator and cleaner, J. P. Bond.         337,234           Grinding mill, J. B. Allfree         386,979	Plow stock and cultivator combined, J. A. Lifsey. 337, Post. See Fence post.
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Wrench. See Railway nut wrench.		
Wringer. See Mop wringer.		7
DESTONS	Ì	į
DESIGNS.		i
Carpet, D. G. Melville		
Gimp, J. P. Boesen	16,552	]
Jewelry rack, C. Place		ì
	16,553	١

Carpet, D. G. Melville	16,554	
Carpet, T. J. Stearns	16,557	
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Jewelry rack, C. Place	16,555	
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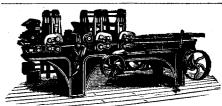
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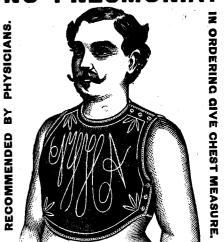
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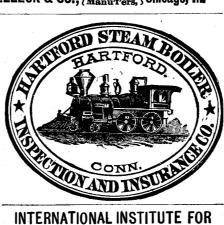
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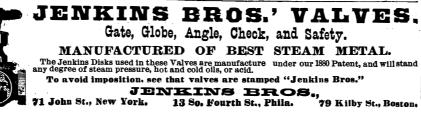
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