THE KRUPP TWELVE HUNDRED POUNDER GUN.

In a recent issue we published an engraving showing the most important types of the armored vessels which have been built during late years. These floating forts represent the theories of one party, of the two which are contesting the question whether the victories in future naval conflicts will be gained by the thickest armor or the heaviest guns. The result of this competition is a constant transition in the prevalent system of warfare; and hence upon what strength, whether of shield or of gun, combatants will rely in conflicts yet to come, neither opinion nor prophecy can be predicated. The naval engineers construct vessels with solid iron walls, some 24 inches thick; but hardly are the ships launched before a gun is produced by the artillerists, capable of penetrating the armor at long range; then follows a new vessel, succeeded by a yet more powerful gun; and so the duel continues, each side gaining the advantage in turn until one can see no definite end unless he venture into the realms of theory, and vainly endeavor to imagine the impossible conditions of that time-honored mechanical puzzle, "the irresistible force meeting the immovable body."

The majority of the experiments, and very costly ones they are, are carried on in England. New ironclads are almost entirely of English construction, the exceptions being a few built by Russia. In the making of heavy guns, however, England is not alone, as Germany, through the great steel works of Krupp, enters the field as a rival—the German policy apparently being first to allow England to vanquish the armor of her own engineers, by the heavy guns of her own artillerists, and then to produce German cannon superior to the English gun. A very recent instance of this has occurred in the construction of the 81-tun gun by England, the tests of which are hardly concluded before Krupp announces the undertaking of a 124-tun cannon, capable of throwing bolts which will pierce 23·8 inch armor at seven and a half miles range. The distinctive features of the English guns we have already described. In the present article we give an excellent engraving of one of the large Krupp guns (which we take from the pages of Knight's "New Mechanical Dictionary"*), from which the general characteristics of the German breech-loading system will be understood.

The gun itself is made of crucible cast steel, of a quality especially adapted for the purpose, and is constructed on the built-up system. It consists of an inner tube weighing 20 tuns, upon which are shrunk cast steel rings, forming at the breech a three-fold, and at the muzzle a two-fold, layer of metal. Both tube and rings are formed from massive ingots without welding. The caliber of the gun is 14 inches, weight 50 tuns, total length 17½ feet; weight of solid shot 1,212 lbs.; weight of shell 1,080 lbs.; charge of powder from 110 to 130 lbs. The breech-loading is on Krupp's patent plan. The shot or shell is raised by a tackle and is rolled into the side of the breech through an aperture closed by a slide. The gun is mounted on a steel carriage weighing some 15 tuns, supported on a center pintle chassis weighing 25 tuns.

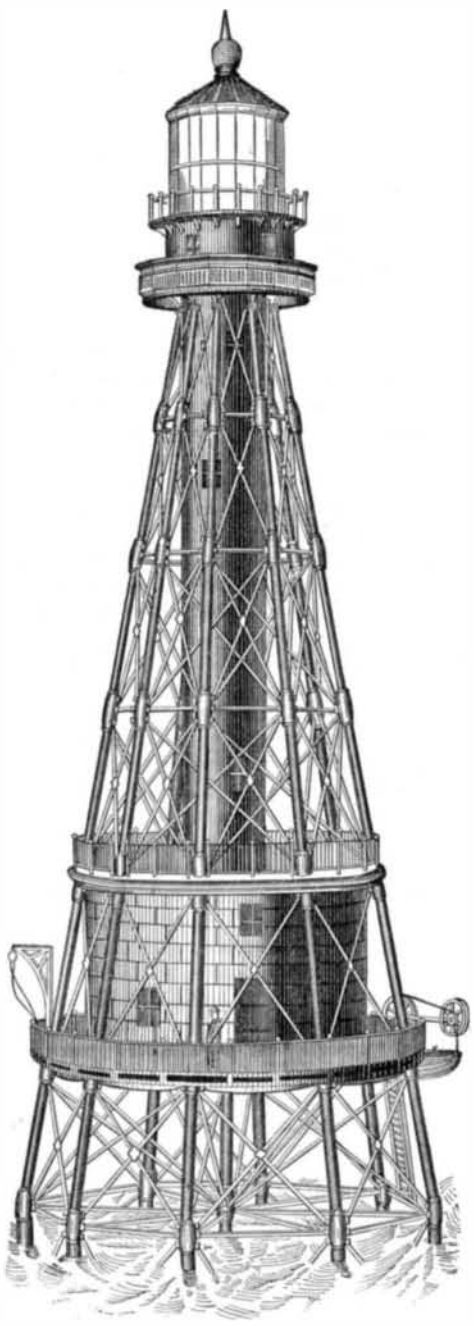
Postal and Telegraph Service.

The twenty-first annual report of the British Post Office has just been issued, giving the postal and telegraphic statistics for 1874. It appears that the estimated number of letters sent through the post during the year was 967,000,000, besides about 79,000,000 post cards, and 259,000,000 newspapers and book packets. On an average there were 30 letters to each head of the population in the United Kingdom, but the national average was 33 per head for England, 25 for Scotland, and 14 for Ireland, showing some interesting facts in regard to the comparative educational, social, and commercial relationship of each division. The return letters amounted to about 4½ millions, giving an average of about one on each 220.

*Published in numbers by Messrs. Hurd & Houghton, New York city.

THE TRINITY SHOALS LIGHTHOUSE.

An interesting application of iron to the construction of



a building requiring exceptional strength and stability is represented in the annexed engraving of one of the two similar lighthouses erected at Trinity Shoals and at Timbalier, in the Gulf of Mexico. The structure is supported upon nine screw piles—a central one surrounded by eight others, at distances of somewhat less than fifteen feet four inches each being twenty feet distant from the central one and secured together at the ground by adjustable wrought iron links, and above by diagonal braces and by radial struts to the central pile. The summit of each pile is incased in a cast iron socket for receiving the column and the radial and diagonal braces. The jointed columns which support the lantern have a similar provision for their diagonal braces, the arrangement for which will be understood from the illustration, which we take from Knight's "New Mechanical Dictionary." The different series of columns are joined together by sleeves. The first series above the foundation is 20 feet long, the second 15 feet, the next two 18 feet. The fourth, fifth, and sixth are respectively 15 feet 6 inches, 14 feet, and 12 feet 6 inches. The columns of the first series are of wrought iron, forged tapering; those above are of hollow cast iron, each series successively decreasing in diameter. The lantern is supported on a cylinder of boiler iron, resting on a platform at the top of the columns.

Anthracite Coke.

The high calorific power of anthracite, consisting as it does of nearly pure carbon, and the low percentage of sulphur and ash contained in most varieties, naturally render it of great value as a fuel in the cupola and the blast furnace; while from its abundance in many districts, and the cheapness with which it may generally be worked, it should at once be the best and the cheapest fuel that could be used. The practical drawbacks to its use, which diminish its value and to a great extent restrict its employment, are the difficulty of utilizing the slack or small anthracite, of which a good deal is made in mining and handling, and in breaking the large pieces, and the tendency of many anthracites to split up into small particles if suddenly heated. In the blast furnace this decrepitation is especially injurious, as the fine dust is apt to form, together with the cinder, pasty masses that can neither be melted nor burnt away, and may choke the furnace up or seriously derange its working.

These difficulties in the way of using anthracite generally in its natural or raw state, have led to many attempts to make it into a serviceable coke, by coking it in admixture with a greater or less proportion of binding coal, pitch, or other bituminous substances. None of these attempts, until very recently, appear however to have been commercially successfully; none, at least of those made in South Wales, have been carried out largely or continuously; as, though coherent coke was made, it was friable and of inferior quality.

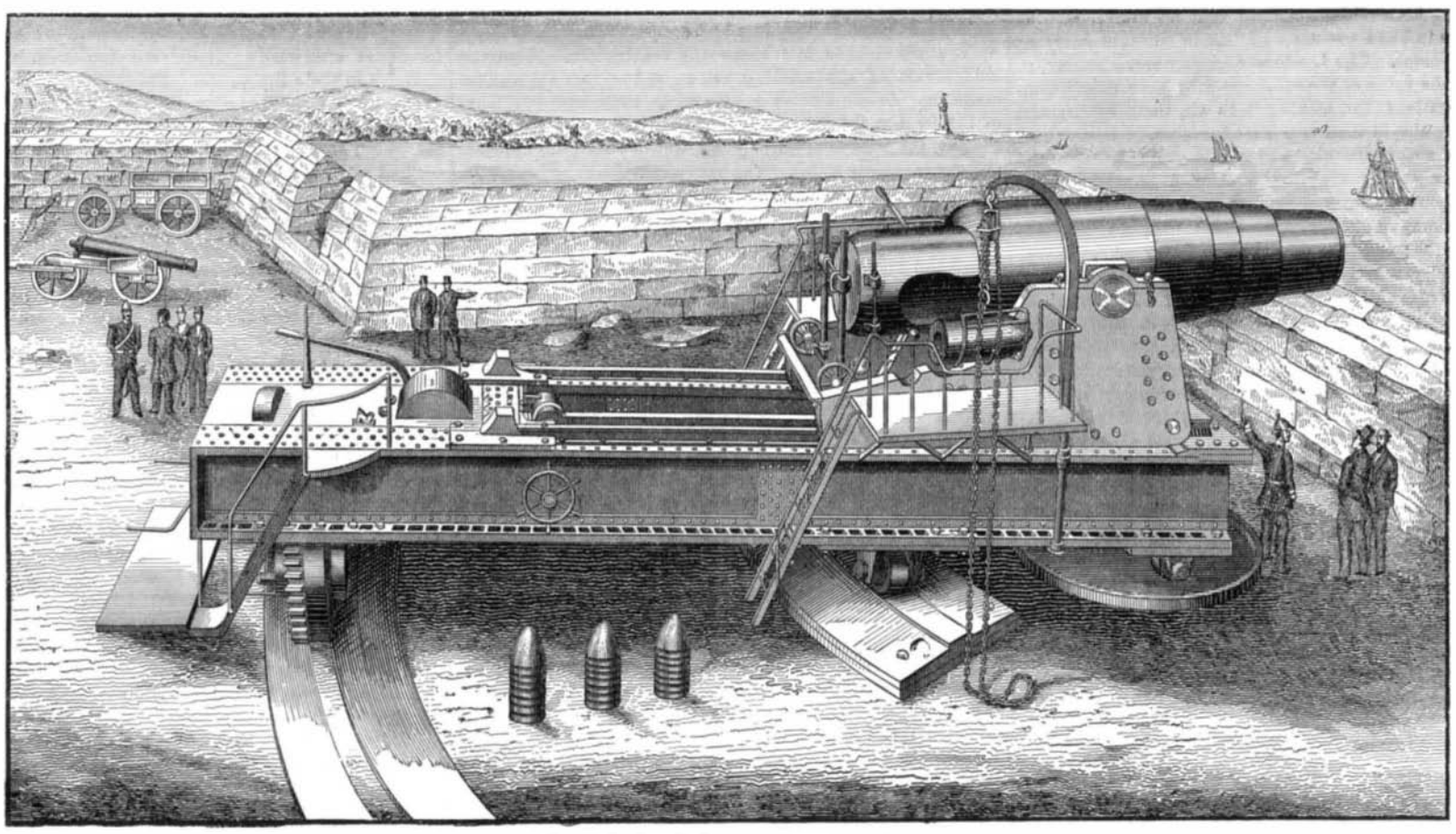
Some samples exhibited would appear, however, to show that the production, on a working scale, of a hard and sound anthracite coke is not at all impossible.

They are fair specimens of the coke now being made by the process of Messrs. Penrose and Richards, of Swansea, to whom the writer is indebted for them, as well as for the information as to the mode of manufacture, and the characters of the coke obtained, on which the present note is based.

The materials used are any quality of anthracite or semi-anthracite, if free from shale or stones, good bituminous or binding coal, and pitch, in the following proportions:

Anthracite, 60; bituminous coal, 35; pitch, 5.

Specimens have been shown of coke made of Messrs. Brock and Sons' anthracite, from Cwmllynfell Colliery, near Cwm Amman; of a mixture of this with Yniscedwyn anthracite; and of culm or semi-anthracite from Birch Rock Colliery, near Pontardylais. The bituminous coal used in making all the samples exhibited was that from Tyrissa Colliery, near Swansea.



KRUPP'S MONSTER FIELD GUN.

The materials are passed, together, through a Carr's disintegrator, to crush and mix them: the proportions in which they are mixed being regulated by supplying the feeding hopper of the disintegrator by three elevators, one carrying up each constituent, and each provided with buckets of such size and number as to bring up the relative quantity required. Samples are shown of the anthracite, bituminous coal, and pitch, in the condition in which they are supplied to the disintegrator, and of the crushed mixture produced.

The ovens used are of the oblong shape generally employed in South Wales: 15 feet long, by 5 feet 7 inches wide at the back and 6 feet 2 inches in front. and 4 feet 4 inches high to the under side of the arch. Each oven is charged, through a hole in the roof, with about four tuns of the crushed mixture; this is leveled by a rabble put in through the door at the end; and a small quantity of bituminous coal, sufficient to form a layer about 2 inches thick, is thrown in and spread uniformly over the surface. The oven is then lighted, by throwing a few shovelfuls of hot embers on the top of the charge, immediately inside of the door, and the coking is managed as in working an ordinary charge of bituminous coal. The object of covering the charge with a layer of bituminous coal is to prevent the burning away of the pitch, and its use appears to be essential for the production of a hard and strong coke. Ordinary slack, of the same quality as that in the mixture, is used for the covering; this is mostly very small, but is not specially crushed.

Rather more than two charges per week are made in each oven; the coke is watered in the oven, and is then drawn out in one mass, by a chain and hand winch.

The yield of coke is 80 per cent of the weight of the charge. The coke is steel gray in color, and very much harder than the anthracite from which it is made: so hard, indeed, that it scratches glass with comparative ease. In a common fire, or under the action of a blast, it burns away without showing any tendency to crumble or decrepitate. It is about 23 per cent heavier than the best coke made from Welsh bituminous coal; so that in sending a cargo abroad recently, a vessel that could not carry more than 240 tuns of ordinary coke was able to take in as much as 310 tuns of anthracite coke. Another valuable consequence of the dense compact character of the coke, in addition to the saving in cost of carriage, is that, even if soaked in water, it takes up very little, only from 1·5 to 2 per cent of its weight; while many kinds of ordinary coke absorb readily 10 per cent or more. The coke is harder and more dense, the finer the materials are crushed, and the more intimately they are mixed.

In practical use, both in the cupola and in the blast furnace, the coke, so far as it has been tried, has given remarkably good results. These are probably due in part to its hardness and density, or rather to the high temperature required to set it on fire, which brings the zone of combustion closer to the tweers, and diminishes the waste of fuel in the upper part of the furnace caused by the transformation of $C O_2$ into C O: and in part to its freedom from water, and the small amount of ash that it contains.

In a small foundry cupola, in which 1 lb. of good Welsh coke, that from Bryndu, near Bridgend, melts 10 lbs. of iron, 1 lb. of anthracite coke melts 16 lbs. and the metal is hotter when tapped out; and in a trial carried out at Messrs. Tangye's Works, near Birmingham, anthracite coke melted well with 25 per cent more burden than that placed on ordinary coke, and would probably have done more, but the managers were unwilling to run any risk of deranging the working of the cupola, and did not push the experiment further.

In a trial made in one of the blast furnaces at Landore, working on spiegeleisen, the burden, in using anthracite coke, was increased 28½ per cent; and the economy might probably have been raised to 30 per cent or more, but the stock of coke in hand was not sufficient to admit of carrying on the experiment. The Landore company are, however, so satisfied of the value of the coke that they have nearly completed preparations for making it in all their ovens, and using nothing else in their two blast furnaces.

The cost of anthracite coke is about the same as that of the best ordinary coke made in the district. Anthracite, in Wales, is about 48 cents a tun cheaper than bituminous coal—an economy in one constituent that balances the extra cost of the pitch; and in making best ordinary coke, the coal used is ground, at a cost of about 12 cents a tun, just as in the case of coke from anthracite. The yield of 80 per cent in coking anthracite, against 70 per cent or less in coking bituminous coal, is again in favor of the former.

The cost of the crushing and mixing arrangements, to grind 1000 tuns a day, is estimated by the inventors at from $10,000 to $12,500. This would include a 6 feet 3 inch disintegrator, with driving power, elevators, and shed.

The process has been carried on near Swansea for about nine months; and though it was suspended for some time during last winter, on account of the colliers' strike, between 2,000 and 3,000 tuns have in all been made.

The field for the application of any practical method of utilizing small anthracite is very great; the quantity available in Wales and in America is almost unlimited, and very much of that raised is now unsaleable, merely because it is too small to be used. In Pennsylvania, according to Mr. Bell, from one fifth to one half of the material brought to the surface in the anthracite collieries, is thus thrown aside: partly shale and stones, but chiefly small and dust coal, perfectly clean and bright.

AN engine cylinder piston will not wear the packing in the stuffing box if it is incased with brass, and brass should always be put on the plunger of the feed pump.

The British Channel Tunnel.

The proposition to unite England and France by means of a railway tunnel beneath the waters of the English Channel, which has, during the past few years, figured largely among the items and comments of the engineering press and in the discussions of various learned bodies abroad, has at length assumed such definite shape that the actual undertaking of the enterprise in the near future is rendered highly probable.

To cut a tunnel of the enormous length of twenty miles, beneath the waters of the ocean, is an undertaking which, to most minds, will appear to be attended with so much hazard and uncertainty—to say nothing of expense—as to be practically impossible of completion; nevertheless, after a most thorough investigation of the subject, and full consideration of the difficulties, dangers, and uncertainties surrounding it, the most eminent engineers of England and France have pronounced their conviction that the project is feasible, and that the building of the Channel Tunnel is simply a matter of expense. We present herewith the main facts connected with the history of the prospected entireprise.

The Channel Tunnel Company was established in 1872, and comprises two societies—one French and the other English. It was first intended to form an international company; but owing to certain differences between the French and English laws, the promoters of the undertaking were forced to resort to the abovenamed combination. Under this arrangement each society, before expending money upon preliminary investigations, made application to its own government for the legislative concessions needed before the work could be undertaken, which concessions, it is announced, were obtained without difficulty. The first society will therefore open the door of France beneath the sea in conformity with French legislation, and the second society will do the same on the English coast according to English legislation. The assent of the two governments having been obtained, the preliminary work was begun. The first inquiry was a geological one, by carefully measuring to ascertain on each side of the channel the outcrops of the beds that lay underneath, accurately as could be done by that process. The gray chalk—a mass of strata about 500 feet thick and impervious to water—which forms the principal mass of the cliff at both Dover and Calais, strikes across the channel so with little divergence from horizontality that a tunnel could be pierced within the vertical bounds of its thickness, presuming it to be continuous all the way across. From the geological map constructed on the data thus obtained, it appeared that a line between St. Margaret's Bay (a depression in the chalk cliffs about four miles east of Dover) and a point on the French side, about midway between Calais and Sangatte, would be suitable to carry the tunnel through the lower chalk.

To verify this presumption, an examination across the channel was made by dropping from a steamer a weighted instrument in 500 places, the apparatus running with great velocity to the bottom, and bringing up chalk wherever it was expected. The device employed in this work consisted of an iron tube, over which a hollow shot, fitting loosely, was raised and let fall upon a flange attached to the tube, the end of which is in this way driven into the substance of the sea bottom, the core thus obtained giving the required sample of the rock perforated. The results obtained afforded a complete confirmation of the correctness of inferences drawn from the maps previously made, and were sufficiently satisfactory to establish the feasibility of the project on purely geological grounds.

The line of the main tunnel as proposed, which is to be large enough for a double line of railway, is drawn straight between the proposed termini on both sides. In longitudinal section it presents a slight fall of 1 in 2,640 from the center towards either extremity, and the vertical depth of the highest point of the floor is 436 feet from Trinity high water mark and 200 feet below the sea bottom. From the land levels of the existing railways, the two approaches make long descents of over four miles, each with gradients of 1 in 89 into the tunnel ends, over two miles being under the sea, the total of the whole amount of tunneling amounting to over thirty miles. The maximum depth of water on the line of the proposed tunnel nowhere exceeds 180 feet below high water mark, the water being deepest in the center, and gradually diminishing in depths towards the sides. Below the railway approaches, and continuous with the floor of the submarine tunnel, there will be at each end a driftway leading to vertical shafts ashore for ventilation and drainage. These terminal shafts and driftings comprise the preliminary work which it is intended to make as a test of the general practicability of the undertaking, and of which they will, when completed, form essential portions. On the French side the work of sinking the shaft has just been commenced, while that on the English side is nearly or quite completed. It is proposed to execute the work with the aid of the tunneling machinery recently invented by Mr. Dickinson Brunton. This machine works after the fashion of an auger, and the *débris* excavated falls upon an endless band which carries it to the wagons in the rear. By this means a driftway, seven feet in diameter, can be advanced at the rate of about a yard and a quarter per hour, at which rate it would only require two years to pierce the channel through, a machine being worked from both sides. For this preliminary work, the engineer's estimates of time and cost are four years and $8,000,000 respectively, but experienced contractors declare that only half the time and money would be required. It has also been computed that, after the driftway is finished, four years' time and $20,000,000 will complete the entire work.

It has been ascertained by actual experiment that, provided the chalk be solid, the water will not permeate it, in proof of which, the Brighton tunnel (5¼ miles in length, in close proximity to the seashore, and from 12 to 20 feet below the sea level, and excavated in the comparatively incompact upper chalk) is offered in illustration. In this case comparatively little water was met with. Taking everything into consideration, therefore, it is reasonable to infer that the only natural obstacle that could hinder the completion of the work would be the existence of open, unfilled fissures in the bed rock, reaching from the sea bottom to the depth of 200 feet through the rock. The probability of the existence of such fissures and the chances of striking them on the line of the proposed tunnel are extremely small.

The preliminary work abovenamed is being steadily advanced; and should the results obtained continue to verify the anticipations formed by the engineers in charge, the actual undertaking of the tunnel proper will not be long delayed. The funds for the preliminary work are guaranteed by several prominent corporations and the Rothschilds, and there is every reason to believe that the two governments interested will come to the aid of the projectors of the work, at the proper time, by the grant of a liberal subsidy.—*Dr. W. H. Wahl.*

The Mass Copper of Lake Superior Mines, and the Method of Mining it.

BY PROFESSOR WILLIAM P. BLAKE, OF NEW HAVEN, CONN.

The occurrence of enormous masses of pure copper has given the mining districts of Lake Superior worldwide reputation. The first masses brought from there excited great attention, and directed the notice of the mining world to the few particular mines from which they were taken. It may not now be generally known that nearly all the veins which are worked, and which cut across the trap ridge, contain mass copper, and that large masses are continually being raised from them.

The largest continuous mass which has been taken out was probably that from the Minnesota in 1857, which is variously stated as weighing 420 tuns and 470 tuns. Its length was about 45 feet, its breadth or hight 22 feet, and its greatest thickness 8 feet. All such masses are very irregular and ragged in their form and thickness, thinning out gradually from a foot to a few inches, and struggling through the vein until they connect with other large masses. This was the character of a mass found in the Phœnix mine, one of the oldest on the Lake, which mass altogether weighed some 600 tuns. But this was really a series of masses more or less connected by strings of metal, yet no one large part of it weighed, singly, over 200 tuns. A similar series of masses, weighing about 600 tuns, was extracted from the Minnesota. Some of the Phœnix masses were four or five feet thick of solid copper. The Cliff mine has yielded masses weighing from 100 to 150 tuns in one piece. One of 40 tuns was taken out this year, besides numerous blocks weighing from 1 to 8 tuns. This mine and the Central are now yielding mass copper in abundance.

It is of course impossible to pick, or to drill, or to break out such huge masses of solid metal, when they are found by drifting upon the course of the vein. The method is as follows: The miner picks out, or excavates, a narrow passage or chamber upon one side of the mass, laying it bare as far as possible over its whole surface. It is usually firmly held by its close union with the vein stuff, or by its irregular projections, above, below, and at the end. If it then cannot be dislodged by levers, the excavation of a chamber is commenced behind the mass, and this excavation is made large enough to receive from five to twenty or more kegs of powder. In one instance, in the Cliff mine, a charge of 21 kegs of powder threw down 200 tuns of copper. Bags of sand are used for tamping, and the drift is closed up by a barricade of refuse and loose dirt. After such a blast the drift is, of course, charged with foul air, and it cannot safely be entered for hours afterwards. If entered too soon, men lose all strength in their limbs, and fall down.

The huge masses of copper dislodged in this way are too large to be handled and got to the surface. They have to be cut up. The copper cutters are called in, and the mass is marked off in squares or blocks of suitable size. Copper cutting is a distinct art, and requires considerable skill and experience. Ordinary miners, however skillful they may be cannot cut up copper without long training.

The tools are simply narrow chisels and striking hammers The chisels are shaped like the parting tools of turners. They are made of flat bars of half inch steel, about 2 inches wide and 18 inches long. They are chamfered each way like a cold chisel, to form the cutting edge. This edge is made a little longer than the thickness of the bar. The cutter holds the chisel and two men strike it. A thin slice or chip of copper is in this way cut out in a narrow channel across the mass of copper The operation is repeated until the narrow cut, but little over half an inch wide, has been carried through the mass. The chips cut out in this way are long narrow strips of copper only about half as long as the groove from which they are taken, the metal being condensed and thickened by the force of the blow.

This work is necessarily slow and tedious, and it costs $12 per square foot by contract. At this price, the cutters make $2 per day.

It is inconvenient to handle masses weighing over 6 tuns. Such masses, when hoisted, are landed upon very strong platform trucks, and are then dumped in the rock house upon a large pile of dry pine logs. When a considerable number of masses has accumulated, the logs are fired and the whole pile is heated to redness, for the purpose of loosening the very considerable quantities of vein stone which are enclosed in the ragged cavities. This vein stone consists chiefly of calcite; and after cooling off, it is so much softened that the

greater portion can be knocked out by pounding upon the copper.

The masses are then marked, numbered, and recorded, and are shipped to the smelting works, where they are melted down in reverberatories.

Knight's Mechanical Dictionary.

This excellent publication, from which we often give extracts and select engravings, has lately been purchased by the firms of Messrs. Hurd & Houghton, New York city, and Messrs. H. O. Houghton & Co., Riverside Press, Cambridge, Mass., from Messrs. J B. Ford & Co., the former publishers. The well known reputation of the new publishers is abundant assurance that the work will lose nothing, in point of superiority, in the manner in which the few parts yet to be issued will be brought before the public. We learn from Mr. Knight that the Dictionary will be rapidly pushed forward to completion, and will probably be finished within four months. Some twenty seven numbers have already been published.

NEW BOOKS AND PUBLICATIONS.

CAMP LIFE IN FLORIDA, a Handbook for Sportsman and Settlers. Compiled by Charles Hallock. New York city: Published by the "Forest & Stream" Publishing Company. American News Company, Agents.

We have heard so much of the Adirondacks, during late years, as the "sportsman's paradise" *par excellence*, that it is altogether refreshing to take up a book which suggests the advantages of one of the most beautiful and, save a small part of Florida visited by invalids, least frequented portions of the country. The compiler has embodied, in a handy volume, some excellent papers published in *Forest and Stream*, which were the result of the labors of an exploring expedition sent out by the enterprising publishers of that journal during the last two winters. We can commend it as something very much better than the hybrid productions, half fact, half fiction, in which modern writers, describing the scenes of past sporting adventure, are very prone to indulge.

ORNAMENTAL DESIGNS FOR FRET-WORK, FANCY CARVING, AND HOME DECORATIONS. Part 1, price 75 cents; Parts 2 and 3, $1 each. Edited and Published by Henry T. Williams, 46 Beekman street, New York city.

Since the introduction of the ingenious machine saws for amateurs, with some of which the readers of the SCIENTIFIC AMERICAN are already familiar through the illustrations and descriptions published from time to time, there has been a growing taste for this most fascinating and artistic branch of woodworking. So many beautiful home adornments can be cut out of various colored woods that an endless fund of amusement is found in the manufacture, and in many instances considerable profit beside. The work (published in numbers), the title to which we give above, is one which will be an invaluable aid in the designing of objects to be carved, embracing artistic designs for picture frames, wall pockets, brackets, book racks, book stands, baskets, easels, platters; in fact, a great variety of other fancy articles can be produced by fine saws. The numbers are mailed on receipt of price.

GASFITTER'S AND PLUMBER'S GUIDE. By Joseph D. Galloway, Gas Engineer. Published by the Author. Price, in paper, 75 cents. Philadelphia, Pa.: 1332 Chestnut street.

A handy volume of practical suggestions for the trades to which it is addressed. There are a large number of useful recipes, and a few illustrated descriptions of patented devices invented by the author, together with tables relating to weight of pipes and wire, and other data referred to constantly by workmen. The directions are clear and concise, and comprehensible by any one of average intelligence. The book contains about 100 pages; and its accuracy is vouched for by the long practical experience of its author.

IMPROVED DIARY AND MARGINAL INDEXED BOOK OF DAILY RECORD. Revised and Arranged by M. N. Lovell. Mailed, post paid, for $2.00. Erie, Pa.: Erie Publishing Company.

This diary is so arranged that, by means of marginal indexes, the user can at once turn to the page on which the events of any day are recorded; and also, through an alphabetical index, he can easily find notes of various days on which similar events have happened. It is available for five years. For inventors desiring to keep proper chronological records of their ideas, it will prove a useful aid. It is especially well suited to be in one's pocket during visits to the Centennial, as it affords excellent facilities for jotting down notes, and grouping and easily finding them at will.

REPORT OF GENERAL CHARLES K. GRAHAM, Engineer-in-Chief of the Department of Docks, for the Year ending April 30, 1875. New York city: M. B. Brown, 201 William street.

Recent American and Foreign Patents.

NEW AGRICULTURAL INVENTIONS.

IMPROVED COMBINED CULTIVATOR AND HARROW.

George Croll, Tontogany, O.—This relates mainly to a new mechanical construction, which is such that the beams which receive the shovel plows may be adjusted to run level, whatever the position of the draft bars, and so that, when the said bars are parallel, the beams may incline toward each other. Braces are added, which may be adjusted to correspond with the draft bars.

IMPROVED ANTI-SUCKING BIT FOR CALVES, ETC.

John H. Bailey, Toledo, Iowa.—This is a novel device to prevent the sucking of calves or colts. It consists in a tubular bit, having open ends in communication with the external air, and an opening located inside of the mouth, so that, when the animal attempts to suck, air only will be drawn in through the bit.

IMPROVED MACHINE FOR BINDING GRAIN.

Argyle W. Tucker, Waxahachie, Tex., assignor to himself and L. J. Stroop, same place.—This machine combines several novel and ingenious devices, which together operate as follows: A band procurer moves forward into a band trough and takes up enough straw for a band. On the latter the gavel is caused to fall and then is compressed between fingers. The free end of the band is next carried over and caught by a forked needle, by which it is twisted around the stationary end. As the needle makes its last half revolution, it draws the stationary end out of the jaws of the band procurer and tucks the free end of the band under the body of the same. The mechanism then leaves the sheaf free, and a fork, moving upward and outward, throws it from the machine.

IMPROVED CORN-SHELLER FEEDER.

William B. Quarton, Fremont, Iowa.—This invention relates to certain improvements in feeders for corn shellers in which the ears of corn are carried up by means of endless belts and delivered to the holes or feeding throats of the machine. The improvement consists in using a single broad apron, or wide endless belt, which moves beneath the channels in the feeder, and is provided with buckets, which receive and carry up the ears. It also consists in dividers of considerable hight, which are applicable to machines having four or more throats, and divide the channels into sets of two, thus causing the ears, which are dumped promiscuously, to assume a longitudinal position in the channels, and thereby increasing the feeding capacity of the device.

NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED AUTOGRAPHIC TELEGRAPHIC INSTRUMENT.

John C. Ludwig, San Francisco, Cal.—This invention relates to a new telegraphic instrument belonging to the autographic or *fac simile* class, and designed to produce a record in the same handwriting as the original written message. The invention consists in an oscillating traverser, vibrating in unison with a similar traverser, at another station, which first traverser makes the circuit through the conducting lines of writing upon a slip of paper, and the second traverser effects the record by puncturing the paper through the instrumentality of a spark from an induction coil, so that the message is recorded in facsimile by a series of little holes or punctures. Another important feature of the invention is the method of preparing the paper upon which the message is written, and it consists in treating it with a mixture of ferrocyanide of potassium and coal oil, which renders the paper non-conducting except in the lines of writing made by an ordinary lead pencil. The invention also consists in numerous other details of construction for which reference must be made to the specification.

IMPROVED SEWING MACHINE FRAME.

Harriet Ruth Tracy, New York city.—This invention consists in an improved construction of the end frame for sewing machines, which frame is provided with peculiarly arranged casters or rollers, and with lugs or ears which adapt the frame to receive a hinge-folding section of drawers without alteration or injury to the said frame.

IMPROVED CAR LIFTER.

General John D. Imboden, Richmond, Va.—This invention relates to means for transferring loaded cars from a track of one width to that of another without breaking bulk. It consists in using inclines located in a pit under the railroad track, movable truck frames, and a vertical lifter; also in combining with the latter crutches, a pitman and stirrups connected with the crosshead of an engine.

IMPROVED COTTON PRESS.

W. W. Wallace, Neckesville, Tex.—This invention relates to the mode of actuating the follower of a cotton press so as to combine convenience and facility of operation with a maximum of compressing power. It consists in connecting the lever arms and follower by arms that are pivoted to each, while the windlass is arranged under the press follower and connected by cords with a set of levers.

IMPROVED EYELETING MACHINE.

John J. Allred, Charlotte, N. C., assignor to himself and Alson G. Jordan, same place.—In this machine, the magazine containing the eyelets and the chute for conducting them to the inserting tool slide forward to carry the eyelet over the tool by a spring, and are forced back by a cam lever worked by the slide of the tool. In going back they work the feeder, by which the eyelets are delivered from the magazine into the chute. The slide of the inserting tool also works the feed, and the punch is worked by a cam on the driving shaft and a spring. The general arrangement is simple and doubtless effective.

NEW HOUSEHOLD ARTICLES.

IMPROVED CLOTHES HOLDER.

James Lesh, Warren, Pa. The invention is an improved device for holding bed clothes or coverings properly stretched, and preventing their being thrown or pushed off in consequence of the restive movements of children while asleep. It is also applicable for holding lap robes when riding. The same consists of an elastic band having a sheath or guard hook attached at one end, and tapes or cords attached to the other. The hook is inserted through the clothes or robe, and the strings are tied to the person or to some fixed object. The elasticity of the band enables the clothes or robe to yield and adjust themselves to the movement of the legs or body.

IMPROVED IRONING STAND.

John Finfrock, Piqua, Ohio.—The invention relates to the manufacture of ironing stands, so that garments can be conveniently manipulated in the process of ironing, and so that they may be readily folded up and packed in a small space. The stand consists of two posts, provided with crossbars at top and connected by a rail jointed at one point, the board being open at the end and provided with a clamp screw.

IMPROVED INVALID BEDSTEAD.

William Huntress, Richmond, Va.—A portion of the mattress is supported on a hinged frame, which, being dropped, allows a vessel and a chute to be adjusted in a portion of the bed convenient for the requirements of the occupant.

IMPROVED PICTURE NAIL.

John P. Stockton, Jr., New York city.—This inventor proposes a nail having a stationary disk upon it which presses close against the wall, and so affords an additional support, and having a knob composed of two parts, the inner portion being loose. The idea is to allow of the ready adjustment of the suspending cord or wire without requiring the raising of the suspended object.

NEW WOODWORK AND HOUSE AND CARRIAGE BUILDING INVENTIONS.

IMPROVED WAGON BRAKE.

Halvord Markrud, Ettrick, Wis.—This inventor proposes an arrangement of brakes in connection with the tongue, which is pivoted to the hounds and has rear branches which act upon the horizontal brake levers. By this, when the wagon presses forward against the tongue, the levers are operated to press shoes forward against the wheels, and the friction of the wheels causes the shoes to rise, bringing their wider part against the wheels and making the pressure greater. When the wagon is backed, suitable devices prevent the shoes from acting upon the wheels.

IMPROVED WAGON BOX.

Timothy Jennings, Moulton, Iowa.—This invention relates mainly to an improved and strong construction of a wagon body which may at any time be used with or without top box, which forms a rigidly attached extension of the same. The different binding straps and stays connect the body in a solid and durable manner, so as to impart to it the required strength and resistance to heavy loads, while they may be readily replaced without difficulty when they get broken or injured by use.

IMPROVED SHIFTING BUGGY TOP.

Henry M. Gillespie and Virgil True, Laclede, Mo.—This invention relates to certain improvements in shifting tops for carriages, buggies, etc; and it consists in a horizontal bottom rail, to which the top frame is attached, which said rail is slid into grooves around the top edge of the seat and held therein by a locking key. It also consists in a double set of vertical supporting props for the top, whereby the latter is more securely held in an elevated position.

IMPROVED SCROLL SAW.

Wm. C. Margedant, Hamilton, Ohio. The object of this invention is to provide a straining device for a scroll saw adapted to a great length of stroke, and of uniform tension or strain through all parts of said stroke. It consists in a spring bent in a circular, elliptical, or oval form, so that the two ends approach each other, in combination with a lever placed between said ends and swiveling upon either an independent or imaginary fulcrum, so that as the lever is depressed the ends of the spring are active upon the same upon opposite sides of the fulcrum, and as the lever approaches its limit of movement the ends of the spring approach an alignment, and the strain of the spring is correspondingly diminished, just in proportion as the leverage of the lever increases, thus rendering the strain uniform throughout its entire movement. The invention also consists in the peculiar construction of a hollow pitman pin, to be filled with lubricating material, and designed to operate as an automatic lubricator.

IMPROVED BAND SAWING MACHINE.

Wm. C. Margedant, Hamilton, Ohio.—This invention relates to ingenious and valuable improvements in band sawing machines; and it consists principally in the construction of the upper band saw wheel, which is made with an independent loosely sliding face, periphery, or rim, upon which the saw blade runs, the object being to obviate the bad effects arising out of the momentum of the said upper wheel when the lower wheel and actuating mechanism are stopped. The invention also consists m a double acting brake, designed to operate upon both sides of the periphery of the driving wheel to prevent strain and uneven wear upon the shaft, and also in the peculiar construction of back thrust guides, which consist in a series of balls or spheres, which are so arranged as to present always a new surface to the back of the saw blade. The invention also further consists in the means for adjusting the upper band saw wheel, and in other details of construction.

IMPROVED WATER SUPPLY AND VENT FOR TRAPS.

John H. Morrell, New York city.—This inventor has recently devised several useful devices of similar nature to the present one, many of which have been illustrated in late issues of this journal. He now suggests certain new improvements in conducting water from the roof of a building to the water closet, or other traps connected with the building, by leading a pipe from the roof, and connecting it at a point below the drop cup or pan of the water closet, either to the bowl or pipe leading therefrom to the trap. The object is to prevent the escape of sewer gas into the house.

IMPROVED MACHINE FOR BORING BLIND-STILES.

Freeland H. Dam, St. Cloud, Minn.—This is a machine for boring blind stiles, fence rails, and other articles with holes of uniform depth at equal space from each other, and for carrying on the boring operation continuously. By suitable mechanism the exact feed of the boring tools, in either direction, is easily and quickly produced; and by the alternate action of the same one stile is bored while the other stile is fed forward, so that a continuous work of the machine is obtained.

NEW CHEMICAL AND MISCELLANEOUS INVENTIONS.

IMPROVED COMBINED CANE AND WHIP.

Oliver H. Saxton, Washington Court House, O.—This inventor has devised an ingenious combination of a cane and a carriage whip. The whip portion proper is flexible and made solid, and is attached to tubular sections, which are telescopic, so that, to extend the whip, they may be drawn out and secured by their screw joints.

IMPROVED BOTTLE STOPPER.

Adolph Luthy, New York city.—In this a curved-wire spring lever, that carries the stopper, is secured on the bottle by a bail pivoted to the neck band of the same, binding on a recessed top rest of the stopper plate. The lever is first pressed tightly on the stopper, and the bail then slid up over the same, holding both stopper and lever firmly in position by the spring action of the stopper and lever. The device is cheap and easily operated.

IMPROVED SCHOOL DESK.

Thomas Redmayne, Sheffield, England, assignor to William Redmayne.—This inventor proposes to make the plane surface which forms the desk capable of being adjusted and fixed either in a horizontal position, to serve as a table, in a slightly inclined position, to serve as a desk, or in a nearly vertical position, to serve as a back to the seat, which is ordinarily arranged in connection with such desks. The invention consists in mechanism for adjusting and altering the angle of the desk, and also of mechanism for locking or fixing the board or desk when it has been adjusted in the required position, so that it cannot be altered, except by releasing the locking mechanism.

IMPROVED TAILOR'S APPARATUS FOR DRAFTING PATTERNS

John Bellamy, New York city.—This inventor has devised an ingenious chart, which represents, in miniature, the forms of the different parts of the shirt. The points to draw and cut to are numbered on all the parts to correspond with the actual measures on a scale of proper size for laying off the true measures on the cloth to be cut. A different scale is used for each different size or number of shirt.

IMPROVED BELL METAL TOY BALL.

Jonathan C. Clark, Middle Haddam, Conn.—This is a hollow ball, which is made of bell metal, and in one side of which is formed a slot to allow the metal to vibrate, and thus give a sound. In the ball are formed a number of holes to allow the sound to escape freely, and within the cavity of the bell is placed a small ball, to act as a hammer to cause a sound as the said ball is rolled or shaken.

IMPROVED CIGAR PIPE.

Robert L. Weed, New York city.—This inventor proposes to overcome the prejudices of people who object to pipes by a little device which enables a smoker to enjoy his favorite tobacco, and at the same time to appear as if inhaling the fragrance of a cigar. It consists in a hollow sectional tube, resembling a cigar, made of wood or other suitable material. The tobacco may be readily compressed by the finger into both sections, so as to form a filling corresponding to that of a cigar, while the smoker can always secure and know the kind and quality of tobacco which he is about to use.

IMPROVED YARN-PRINTING MACHINE.

James Short, New Brunswick, N. J.—This is a very ingenious machine, devised for printing the yarn used in carpet manufacture. Its mechanism it would be impossible to explain without the aid of detached drawings; but the essential portion consists of new operative mechanism for a thread printing drum, by which the latter is greatly simplified.

IMPROVED GLOBE ATTACHMENT TO CLOCKS.

Henry Fick, New York city.—In order to show the position of the earth at any hour, this inventor arranges a globe so attached to a clock that it turns in unison therewith, and, at the same time, is free to be turned forward or backward by hand at any time in case it may be required to do so. When let go by the hand, the globe will automatically return to its true position, relatively, to the clock.