THE BAR AND HORSESHOE IRON INDUSTRY.

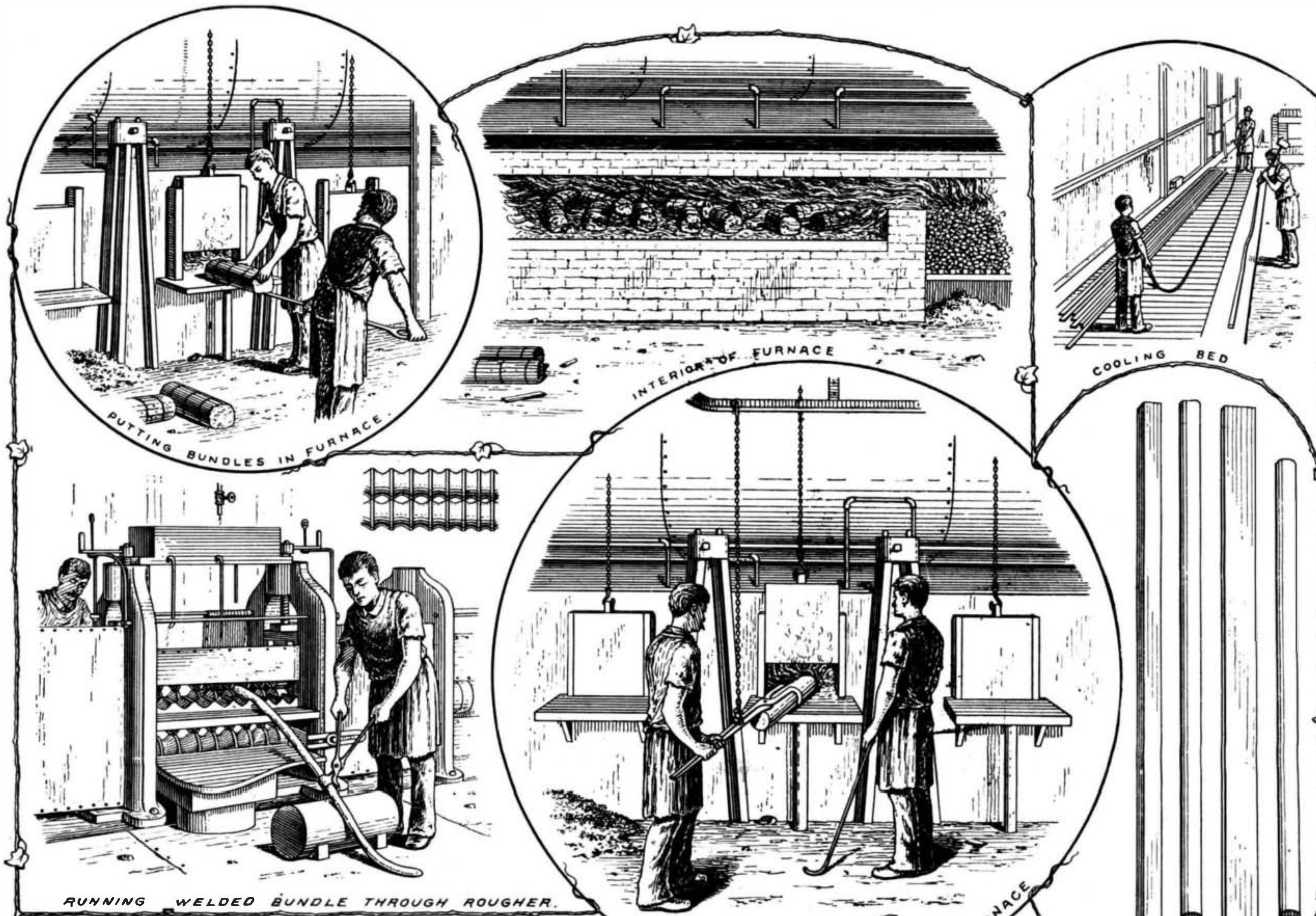
The bar, round, half round, and flat iron used by wheelwrights, horseshoeing establishments, etc., is made principally from wrought iron scraps. These scraps, consisting of old railings, tires, hinges, etc., are collected together by junkmen and sold to the manufacturers, who work the material over and turn it again into new iron. The scraps are first cut up into lengths and formed into bundles of 250 pounds each, the bundles being about 24 inches in length and about 8 inches in diameter. They are then placed into a furnace by means of long-handled iron peels or shovels by the attendants and left for the heat to weld the material together. The furnace is lined on the inside with fire brick. The bottom or flooring on which the bundles of wrought iron scrap are placed is made of fire sand. This bed of sand is about 6 inches in depth, the fire when passing over it causing it to harden and become like stone. The sand after two or three heatings melts. It is then run off and new sand added in its place. The furnace is 5 feet 6 inches in width, 22 feet in length and 3 feet in height inside. The fire box, which is at one end, is 3 feet 6 inches square. The fire and heat is forced through the furnace from the fire box by means of a blower, the fire passing through an opening built at the top the same width as the furnace and about 1 foot in height. The iron casing around the furnace is prevented from getting red hot by means of a 6 inch water jacket or reservoir which passes along the front and top of furnace, the cool stream of water passing through, keeping the temperature down so that the attendants can easily remove the bundles without burning themselves. The fire and heat, after passing through the furnace, is used also for heating the boiler. The boiler rests over the top of the furnace, the bottom and sides being incased in a brick-lined iron shell. The flames from the furnace are drawn through this casing and around the boiler and pass out into the chimney. About 50 or 60 of the bundles are placed in the furnace at a time, which after 30 minutes heating the pieces weld together in each bundle and each forms itself into a solid mass. When at a white heat they are removed from the furnace by means of a long pair of tongs which are attached to a trolley. They are then taken to what is called a rougher. The rougher contains three grooved rolls through which the welded bundle is passed back and forth to stretch it out into proper shape for the finishing machine. The roughing rolls are about 4 feet in length and about 1 foot in diameter and made of gun metal. The rolls contain different sized oval grooves, one being placed directly over the other. An operator puts one end of the bundle, which has been considerably reduced in size by the welding process, in one of the large grooves of the two bottom rolls, the revolving of which draws the iron through, which is immediately turned over by another attendant, who passes it back again through the top rolls.

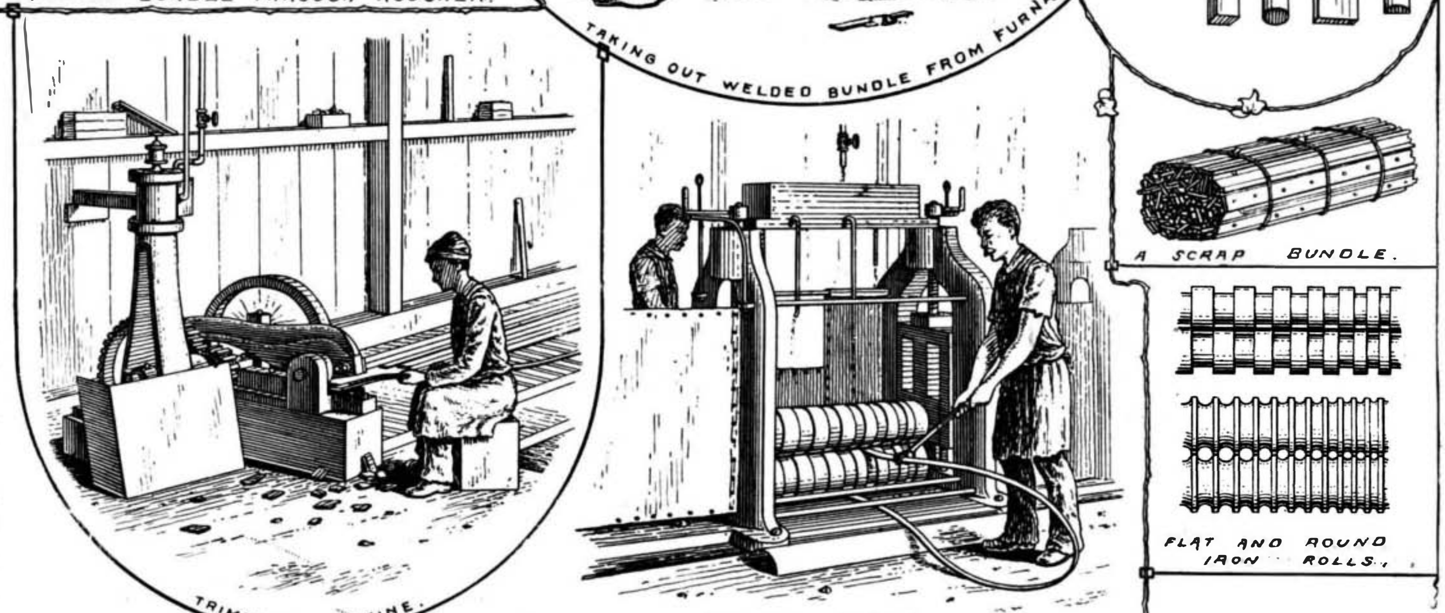
Each time it passes through the machine the end is placed into a smaller groove. The rolls travel at the rate of 210 revolutions per minute. The billet is passed through the rougher about 12 times, which stretches it out about 10 or 12 feet in length, the operation taking but a few seconds. From the rougher the hot iron is passed over to the finishing machine. This machine contains two grooved rolls, one placed over the other. They are about 3 feet in length and about 1 foot in diameter. The grooves are square and also of different widths and depth. The collars of the top roll fit into the grooves of the bottom roll, and can be raised and lowered according to the thickness of the iron wanted. The operator with his tongs places the end of the piece of iron in one of the large grooves between the rolls, the revolving of which forces it through and also stretches it out into a flat shape.

The operator on the other side of the machine then passes it back again underneath to his partner, who turns it over and runs it back again through a smaller groove, stretching it out again. This operation is continued until the proper length is obtained. For round, half round, and bar iron the operation is about the same. The time consumed in running the iron through the rougher and finisher is about 50 seconds, the iron passing back and forth through the machines about 20 times. As the bar of red hot iron passes through the finishing machine a stream of cold water is allowed to run on it, which takes off the scales.

The bar of iron, which is about 45 feet in length, is then placed upon a cooling bed. This cooling bed is made of iron bars 4 feet in length, placed about 1 inch apart, underneath which is an air space about 4 feet square. The iron strips are left on this bed for about 25 minutes to cool and then taken and trimmed and cut up into proper lengths. Refined iron is heated over twice. The bundles are first welded in the furnace and run through a rougher and made into billets from 4 to 6 feet in length. They are then cut up into pieces of the right weight to make them the proper length and reheated and run through the machines again.

The billets are cut up into pieces weighing from 25 to 115 pounds each, the smallest pieces being formed into $\frac{1}{2}$ inch round and the largest into 1 inch round iron, the flat iron in size from $\frac{1}{4}\times\frac{3}{4}$ inch upward. 65 men turn out about 60 tons of finished material weekly. The sketches were taken from the Standard Rolling Mill, New York City.





THE BAR AND HORSESHOE IRON INDUSTRY.

THE monument erected to Lincoln in Edinburgh is the only memorial of the kind in Europe.

Parks and Park Planting.

If the word "park" in popular usage ever suggested a group of well defined ideas, it has in these later days lost its distinctiveness, so that to one man it may mean a country fair ground, and to another a forest, a game preserve, a field for athletic sports, a race track, an arboretum or a military parade ground; in fact, it is applied in a confused way to any space that is not roofed over.

This is a misfortune, for when we are discussing questions of park design or park maintenance, or inquiring what are the true functions of a park, or what should be excluded from it as destructive of its value, we must have a clear idea of what it is and what it is for. We have always used the word to indicate primarily a place where the mind and body are refreshed by rural scenery. Of course, a park will also furnish fresh air and sunshine, opportunities for bodily exercise and rest, but beyond these, and more important than these, is the refreshment of mind which comes from the influence of beautiful natural scenery. The paths and roads are not, therefore, merely places to walk in or drive over; their fundamental use is to make the scenery of the park available to persons on foot or in carriages or on horseback, so that they may find that relief and repose which natural beauty alone can bring to city-wearied senses.

The value of a city park, therefore, for a city population is greater or less, according as the poetic charm of its scenery is preserved and developed. It seems to be an admitted fact also that quiet, pastoral prospects have the greatest intrinsic value in enabling us to resist the wearing influence of city life and recover wasted mental energy, and it, therefore, follows that the best work is not one in which the architectural features predominate, or in which the planting aims to be highly ornamental or decorative. In a paper published during the past year at Vienna, called Der Park, by Franz Graf, there is an instructive discussion on the quality of landscape beauty required for a park, part of which will be found in a condensed form in the paragraphs which follow.

A park is more than mere woodland and field, but, on the other hand, it is not a garden in the narrow sense of the word. The designers of parks invariably fall into errors of disposition and treatment when they forget this distinction. A park is not a garden, although its mere extent is not the distinctive mark of the difference between the two. There are large gardens and there are small parks, and the purpose of both is to awaken pleasurable sensations. In achieving this end, however, a garden is treated like a miniature painting. Flowers and other materials which are in themselves minutely beautiful receive loving attention in every detail. Such a garden delights us with its color, enlivens us with its perfume, cools us with its shade, but here its service ends.

A park picture is drawn with a bolder hand, so that delicate work on details is dissipated and wasted. It must have something more than sensuous beauty—broader and grander features which make appeal through the imagination to the nobler faculties. Years ago our ancestors caught the right idea when, tired of the endless avenues and clipped trees of Lenotre, they began in an imitative way to make copies of nature in their English gardens by mingling grottoes and artificial ruins and brightly colored dairy buildings with their scenery. They aimed to simulate pastoral scenery, but they overshot the mark, forgetting that a park is not a mere imitation of woodland and field, any more than it is a series of formal flower beds.

Of course, a park must be beautiful, for if it does not speak to the eye like a picture, it will not appeal to the heart like a song; and if it shows no refinement of taste, it falls far below the rank of what a forest or meadow or a vineyard may happen to be.

It is a happy accident when a forest, which is treated in strict accordance with the forester's craft, chances also to be striking from a pictorial point of view, or when a meadow or vineyard, by reason of the fortunate dispositions of its hills and valleys, its foliage and its water, is beautiful as well as useful.

But the first purpose of a park is to secure these results which in the woods and the meadow are happy accidents. Not only is beauty essential to a park; its whole value lies in beauty. But it must be that serene and enduring beauty which is embodied in its essential and permanent features, and not merely the transient and superficial beauty of floral embroidery. It must have dignity of expression, and not mere prettiness.

Again, although a park must be beautiful, it may be bad art to crowd it full of plants and structures simply because they are beautiful. We too often see a huddle of expensive rarities which struggle with each other to reach the light, and yet leave no reposeful spot for the eye to rest upon. This is why stretches of turf and simple wood borders are more refreshing as a spectacle to the weary than any collection of oddities which excite the eye rather than rest it, by their glowing colors and conspicuous forms. This does not mean that a park should have no beauty of detail, but in the hand of an artist who wishes to produce an effect upon the imagination, a few beautiful things, harmoniously adjusted, mean more beauty for the whole than beautiful objects in such profusion that they cannot be grouped into any quiet and consistent picture. And since we aim at permanent beauty rather than any transient impression, this consideration alone explains why tender exotics, which seem to shudder in a cold climate, and imported novelties, which drag out a homesick life in exile, are not to be compared with native oaks and pines, which rejoice in the vigor of health, and grow more beautiful through years, and even through centuries.

This longevity of the noblest trees and their continued growth in dignity and beauty suggest the thought that one who creates a great park must plant for posterity. What is called planting for immediate effect is usually a makeshift, and, like other makeshifts, an expensive blunder.

Light is the life of plants, and as the whole plant is condemned to death if it gets no light, any part of it which the sunbeams no longer reach is doomed. The advice to set the sapling where it will have enough light whan it becomes a tree is simple, but it is constantly disregarded. Even if we are planting to exclude some disagreeable object from sight, it is better to set the trees so that they can have abundant room for their roots and light for their tops, even though during a few years we must wait patiently for the wall of foliage which is to do duty as a screen.

If we plant this screen thickly, the offensive object will be quickly hidden, but it will be only a short time before the lower branches give up their struggle for life, and there will remain a roof of foliage with bare trunks which hardly obstructs the view. A much more serious matter it is to destroy a good tree that is in the way. It requires firmness of purpose to destroy an object which is beautiful in itself, but it is much better to suffer a pang for such a loss than to have the lifelong vexation of knowing that a tree, though noble in itself, is out of harmony and proportion with its surroundings, or that it compels some inconvenient adjustment of walks or drives, and that it will keep on doing this forever. The proper way is to plan and plant for posterity, and even if the removal of a tree leaves a wound which can only be healed in fifty years, it should be remembered that the sapling planted near it will not only fill its place, but make a complete and satisfying picture which will give unalloyed delight for centuries.—Garden and Forest.

Phosphoric Acid in the Manufacture of Superphosphates.

Speaking of the development during the past few years of high-grade supers, Mr. Wyatt says these supers are made to contain about 45 per cent. of P_2O_5 in a "water" and "citrate" soluble form. The method employed in so doing is both scientific and rational, since it consists in supplanting the oil of vitriol usually used as a solvent for the raw phosphate with phosphoric acid itself.

In the manufacture of superphosphates as now carried out, the desired solubility, either in water or in citrate of ammonia is attained at the cost of doubling the bulk of the raw material by the addition of sulphuric acid, which practically serves no other purpose and has no other value than that of a solvent. If such raw material, therefore, contain 60 per cent of tricalcic phosphate, the "super" can only contain 30 per cent, and this, from the agricultural consumers' standpoint, is certainly an anomaly, and, apart from any question of solubility, must remain so for two reasons:

(1) A ton of 60 per cent phosphate of lime, finely ground, but insoluble in water or citrate of ammonia, can be purchased at some central point for say £2.

(2) A ton of superphosphate, containing only 30 per cent phosphate of lime, cannot be purchased at the same spot for less than £3.

In the one case, freight is paid upon only 40 per cent of waste material, whereas in the other it is paid upon 70 per cent of practically valueless matter.

That a legitimate profit should attach to the manipulation of an inert, and its transformation into an active body, is beyond question, but I cannot see why such enormous and unreasonable benefit should be derived from the trade in fertilizers by the railroad companies. If it were for no other object, therefore, than the reduction of such detrimental freight charges to a minimum limit, I think it is well worth while to consider briefly the practicability of superseding the old method of manufacture.

The reactions involved in the process of superphosphate mixing have served to demonstrate that the cheapest and best known method of making liquid phosphoric acid from calcic phosphates is by driving it from its combination with lime by means of the stronger oil of vitriol, and by utilizing many low-grade phosphates which now, for lack of a sufficiently cheap freight, have practically no market value.

PREPARATION OF THE LIQUID PHOSPHORIC ACID.

The only essential conditions to the manufacture are: (a) That the material used shall contain a minimum of carbonate of lime, in order that no unnecessary excess of the sulphuric acid be required for its decomposition. (b) That it shall contain as small a percentage as possible of any combination of iron and alumina, since both of these bodies contribute to the formation of a gelatinous mass that seriously interferes with the course of the operations.

If the exact chemical composition of the raw phosphate is known, the quantity of sulphuric acid necessary to insure the desired dissociation of all the phosphoric acid from the various bases present is very readily calculated.

The operations are conducted in large tanks made of suitable wood, lined with lead and provided with agitators. The required quantity of sulphuric acid, say, for example, 2,000 pounds of 50° B. strength (106° Tw.), is mixed in each tank with sufficient water to reduce it to a density of 14° B. (22° Tw.) The agitators being in active motion, a sufficient quantity, say 2,000 pounds, of finely ground phosphate is slowly added to each tank, and stirring is continued for five hours, open steam being occasionally blown in by an injector through the side of the tank in order to keep the mixture quite hot.

When the five hours have expired, the cream from each tank is run off into filters made from large wooden vessels lined with lead and provided with false bottoms, where the hydrated sulphate of lime separates from the solution of phosphoric acid. The latter passes through the filter as a bright straw-colored fluid, of a gravity which, commencing at about 12° B. (18° Tw.), gradually becomes reduced by careful washing to 1° B.

The exercise of ordinary care and precautions prevents all cracks from being formed on the surface of the gypsum contained in the filters, and the lixiviation of the mass is stopped directly the gravity of the filtrate reaches 1° B. The hydrated sulphate of lime is now raked together into the center of the filters to drain, and is finally carried to the dump, while the last runnings from the filters, which are too weak for economical concentration, are used to dilute the strong sulphuric acid required for subsequent operations.

The filtered phosphoric acid liquor is pumped into an elevated tank, and thence it runs by gravitation to a series of leaden evaporators of any convenient form of construction, heated either by direct fire from the top or from the bottom, or by waste steam from boilers.

During the progress of the evaporation the acid solution practically deposits all its sulphate of lime, and it finally attains a density of about 44° B. (91° Tw.) At this strength it should contain about 45 per cent of phosphoric anhydride, with only a mere trace of lime, magnesia and iron and alumina, and is now ready for use in place of sulphuric acid in the manufacture of soluble and assimilable phosphates.

USE IN MANUFACTURE OF SUPERS.

Its mixture with the raw phosphate can be effected in the usual superphosphate mixers, on the same system of calculation and by the same method of manipulation as are now used with oil of vitriol, and it very soon sets into a porous mass, which, although not very dry, is sufficiently stiff to be easily dug out. This mass is cut up into pieces of reasonable size and dried by hot air in any form of shed that will facilitate effective and rapid work. Directly it is sufficiently dry for the market, it is put through a disintegrator and filled into bags.

If you will compare this material with the present staple superphosphate, which barely contains the equivalent of 30 per cent of bone phosphate of lime made soluble, you will find that, in addition to its lower manufacturing cost, it contains the equivalent of 99 per cent, or more than three times as much bone phosphate of lime, made equally as soluble and available. It could, therefore, be distributed at an economy of two-thirds of the freight now actually paid for useless material, and you will agree with me that this is a consideration of the highest consequence, seeing that the world must have phosphate, and that the raw materal, while it is of the best quality known, is confined to an area somewhat remote from the large mass of consumers.—Chem. Tr. Jour.

The Ship Canal to the Lakes Again.

A bill has been introduced in the Senate authorizing the President to appoint three persons to confer with any similar committee appointed by Great Britain or Canada, and report as to the feasibility of a canal for ocean vessels between the Atlantic and the lakes; where it can be most conveniently located; the probable cost, with estimates in detail; and if any part of the canal should be built in Canada, what arrangements are necessary to preserve it for use to the people of this country. All the necessary facts relating to the construction and use of such deep water channel are also to be reported on, and it is proposed to appropriate $10,000, or so much thereof as may be necessary for actual traveling and other necessary expenses, the members of the commission to serve without pay.

Storm Window for Locomotive Cabs.

The Tinker Storm Window Company, of Springfield, Mass., are manufacturing a window for locomotive cabs on which frost will not form and obstruct the engineer's view. To the inside of a regular cab door is secured a specially designed window so constructed as to form a watertight space about five-eighths inch in width between the two panes of glass, which space is filled with water, or, if preferred, any other suitable transparent liquid. The water is heated sufficiently so that the snow, ice, frost, etc., will not adhere to the surface of the glass, thus providing a clear glass in front of the engineer during the worst storm or coldest weather. The necessary warmth is imparted to the water by a tube between the glasses, through which a small jet of steam passes.

When filled with water the appearance of the window does not differ from a single pane of plate glass. It is claimed to be easily regulated by the engineer, to require but little steam, and to accomplish its work in a most satisfactory manner.

A New Method of Preparing Diastase.

A new method of preparing diastase, the ferment which produces malting, has recently been discovered by Jokichi Tokamine, a Japanese who has studied in the universities of Glasgow and Tokio.

By cultivating a mushroom growth, Eurotium oryzae, on wheat bran he has found that at an early stage it bears on its roots minute crystals of diastase, while the unripe spores contain a powerful ferment. Diastase of sufficient commercial purity was obtained in considerable quantities by washing the bran and crystallizing the diastase from the solution. A mixture of equal parts of this diastase and crude wheat bran added in the proportion of 10 per cent of the grain mashed will produce, it is said, a more perfect conversion than 10 per cent of the best malt. The wheat bran after the fungus has been grown may be used for cattle feed. The ferment will continue to produce fermentation in a sugar solution until nearly 20 per cent of alcohol is present.

PNEUMATIC BERTHS AND CUSHIONS IN PARLOR CARS.

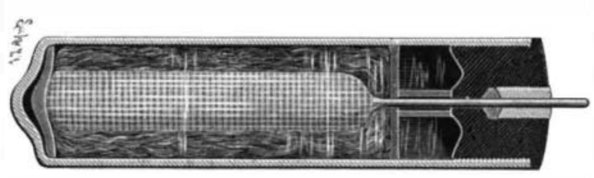
According to the improvement forming the subject of the accompanying illustration, the cushions for the seats, as well as the bed or mattress, in a combined sleeping and parlor car, are connected with the compressed air pipes of the train, and adapted to be inflated by opening suitable valves in connecting pipes, or be collapsed and compactly stored, according to the daily or nightly requirements in such service.

A patent for this invention has been recently issued to Mr. Linford F. Ruth, of Connellsville, Pa. The mattresses or bed cushions, and also the chair cushions, are simply air-tight bags of soft rubber or other suitable material, and from a main compressed air pipe running centrally under the floor three branch pipes lead to them in each car section, one of the branches supplying air to the two chairs and the other two branches supplying air to the upper and lower berth mattresses respectively. In each branch is a three-way cock for admitting or cutting off the air supply, and opening a vent or discharge. The mattress or berth cushion is creased to fold like an accordion, and is attached at the head and foot to a flexible strip winding upon the barrel of a spring, whereby it is drawn in collapsed condition into a covering or casing at the side of the car when not in use. To guide it to position and support it when extended, it has hooks which catch over transverse steel frame supports, connected at right angles to vertical standards adapted to fold flat against the side of the car. The entrance of the air causes the inflation and extension of the mattress, which at its outer edge is connected to a panel rail moving in and out with it, and on turning the valve to discharge the air, the mattress is drawn back in folded position by the tension of the spring. Each section has a base compartment under each seat for blankets, bed linen, etc., and the chair swivels on the base about the compressed air inlet pipe, the chair back frame folding forward when the cushions are collapsed. The cushions are distended or collapsed by the adjustment of the valves in the same manner as the mattresses are. The sections are separated by curtains arranged on vertical spring rollers, and the curtains that close in the sections from the aisle hang from a rod held by arms to rock in such way that the curtains may be swung back against the ceiling, as shown at the right in the illustration. This improvement is designed to not only save time and trouble in adapting any portion of the car to either use, as required, but is also calculated to render the car much more sanitary and comfortable.

RUTH'S COMBINED SLEEPING AND PARLOR CAR.

A COMPACT BATTERY.

In some things bigness is a valuable feature, in others, smallness is a desideratum. In the case of the battery herein illustrated, full size, we have what is probably the smallest, lightest, and most compact practicable battery made, while it yields a large current (2 amperes) at a reasonably high voltage (1·1 volts). It will thus be seen that while this battery is at one extreme in point of size, it is at the other extreme as regards the work it can do. It is capable of ringing a door bell for twenty-eight hours continuously, equal to about one and a half years in ordinary use. It will work a Faradic motor from 52 to 100 continuous hours, and 2 cells on a sparking coil in a gas light will



CAPO-FARAD BATTERY (FULL SIZE).

give nearly 360,000 ignitions. For testing and blasting it is found to be very efficient and convenient.

The battery consists of a zinc cell $\frac{11}{16}$ inch in diameter and 2¾ inches long, closed with a hard rubber stopper, and containing an electrode formed of fused silver chloride. The chloride is cast upon a zigzag silver wire, the straight end of which extends through a stuffing box in the cover, forming one pole of the battery. The zinc cylinder forms the other pole. The cylinder of fused chloride of silver is inclosed in a covering of textile material, and held in place by hard rubber disks at opposite ends. The disk adjoining the hard rubber stopper is held in place by a short piece of elastic tubing surrounding the silver wire. The space between the silver chloride and the zinc is filled with fibrous material which is saturated with the electrolytic liquid with which the cell is filled.

For many purposes where this battery is to be carried in the pocket, it is inclosed in a casing containing two, four, eight or more cells. A four-cell battery with casing weighs but five ounces.

These batteries are used in the Treasury Department and in other places in connection with small electric lamps for temporarily illuminating vaults, safes, etc. A single cell of this battery is so light that it may be mailed for two cents. It will work in any position, does not polarize, is not affected by climate, and the strength remains constant up to the moment of its final exhaustion.

Mr. James J. Pearson, manager of the Nassau Electrical Company, of 108 Liberty Street, N. Y., after a long series of experiments, has brought the Capo-Farad battery to its present state of perfection.

Work on an Ostrich Farm.

The ostrich farms of South Africa are very curious and interesting places. The equipments are generally very simple and inexpensive and the crop is found to be very profitable. The first requirement of an ostrich farm is a "camp" or pasture for the birds, and these vary in size from 3.000 to 8,000 acres. Such a camp generally holds comfortably about 300 ostriches. The camp must always be good pasture ground. and here the birds remain for the entire year, except when they are brought together once every four months to be plucked.

The ostrich builds its nest in the sand in a very careless fashion and here it lays its eggs. The nest is crudely constructed, consisting simply of a round hollow carved out in the sand. Sometimes the female bird scratches this hole or nest, but the nest is generally formed by the birds having set continuously upon one spot for a long time. One bird will lay from ten to twenty eggs, but often three or four birds will lay in the same nest. Often there will be as many as seventy or eighty eggs in a single nest. In this case most of the eggs are taken out, since an ostrich cannot cover more than sixteen eggs. About forty-four days are required for hatching, and when a nest is hatched the little birds are brought under cover and fed. They are usually fed both morning and evening on barley or rape.

When the time comes to pluck the birds, the real work on an ostrich farm begins. They are usually rounded up by a number of men on horseback. At first they are very fierce, but when all are huddled together in a kraal every bird becomes docile and manageable. The birds are taken one at a time and a bag or stocking is placed over its head. It is then quickly clipped by two skilled attendants. The prime feathers are usually plucked in June. Prime feathers are the long white fancy feathers, and they number from eighteen to twenty on each wing. Four months after this the picking the stumps of these feathers are drawn out, and two months after this the "primes" or short black tail feathers are taken out. The general rule in plucking is to obtain as many feathers as possible without injuring the ostrich or robbing the bird of a suitable winter coat.

The Cooper's Hawk.

Mr. Chas. B. Cook, writing to the Country Gentleman, says the Cooper's hawk so closely resembles the pigeon or sharp-shinned hawk that the two species may be economically treated together. The following description will apply to both species: Upper parts of the head, brownish black; back, bluish gray, with the upper side of the tail crossed by black bands; the lower portions white, with breast and sides marked with bars of red. The length of the Cooper's hawk varies from 16 to 20 inches; extent about 30. The sharp-shinned hawk measures about six inches less.

Both these species are very abundant over the greater part of North America. They are the hawks that are distinctively chicken hawks, and mostly responsible for the reputation that has been falsely conferred upon the beneficial species.

On the wing, these hawks may be distinguished from the beneficial sorts by their nervous, rapid and irregular flight. They have the habit of flying low, and are rarely seen soaring in the sky like their larger cousins. The subsist in the main on a bird diet, but occasionally insects and even small quadrupeds are consumed.

In some parts of the northwest the Cooper's hawk has earned a good reputation, but over the greater part of its range it is a terror to bird and fowl alike. Even the swift-flying partridge or grouse, fully aware of its enemy's presence, must be in a dense thicket to stand any chance of escape, and even then an escape is due to a timely drop into some brush pile, where its protective color and motionless form come to the rescue. When a sharp-shinned or Cooper's hawk attacks a flock of poultry, its visits are likely to be continued indefinitely. Dr. Warren states, in Fisher's Hawks and Owls of the United States, p. 38, that one pair "destroyed some fifty chickens from one farm, twelve of which were taken in a single day."

The sharp-shinned hawk is very fond of pigeons and often works fearful havoc among some fanciers' dovecotes. A few years ago the writer was watching a flock of doves feeding near, when a sharp-shinned hawk swooped down on one of them, but missed his bird, as the pigeon fairly brushed him off in flying through the lowest space in a board fence. The hawk followed, passing through the next space above, but evidently out of respect for the pigeon's presence of mind, he ceased pursuit and quietly fluttered off toward the woods.

Both the above species at times are exceedingly bold, and seem to depend on their rapid wings to carry them off in safety. A few years ago one was known to attack the person of Mr. C. D. Walcott, in Lewis County, New York. The bird continued the assault for some time before it was dealt a fatal blow with a hammer.

These birds' bad habits incidentally turn them to good in the case of the English sparrow. In cold weather, when most native birds have gone south and the barnyard fowls are in winter quarters, the English sparrows furnish a constant supply of food. This trait, coupled with their insect-eating habits, shows us that there is some utility even among the most fierce and relentless of the feathered tribes.