

A BARROW WITH TWO WHEELS.

A new form of wheelbarrow has been invented by Henry Gries, of Egg Harbor City, N. J., in which are employed two wheels arranged tandem and two pivoted supporting legs.

The body of the barrow is supported upon the usual two side beams, at the forward end of which the small wheel is journaled, and near the rear end of which a larger wheel is journaled in depending brackets. In bearings on the under faces of the side beams, at the rear of the brackets, a shaft is mounted, which extends beyond the side beams. At the extremities of the shaft supporting legs are mounted, to the free ends of which cords are secured, which are reeved through eyes on the body and side beams, and provided with rings adapted to engage with pins on the ends of the handle.

When the barrow has received its load, the cords are drawn back and attached to the side beams, thus carrying the legs out of contact with the ground, as shown by dotted lines in the illustration. When the barrow is not in motion, the cords are disconnected and the legs permitted to drop to the ground. The legs are held in their supporting position by means of removable pins passed through above the shaft. Stops on the side beams, in front of the shaft, prevent the barrow from moving forward.

A barrow thus constructed, it is claimed, will enable one to carry heavier loads with less fatigue than heretofore, because the larger rear wheel supports the entire weight. The power exerted is used merely to direct and propel.

NEW EXPRESS LOCOMOTIVE FOR THE PENNSYLVANIA RAILROAD.

The Pennsylvania Railroad Company have recently turned out from their Altoona shops three very handsome locomotives known as Class E-1, which are intended for working their fast express trains which run between Philadelphia and Atlantic City.

We have had occasion to refer at times to the remarkable speed which for two years past has been accomplished by the Philadelphia and Reading Railroad between these two cities, the distance from Camden to Atlantic City (55.5 miles) being covered at the rate of from 69 to 74.4 miles an hour. On these runs the speed for several miles would frequently rise to over 80 miles an hour; indeed these high speeds were of daily occurrence. The engines which hauled these trains were known as the "Atlantic" type, and were built under the Vaucrain compound patents. The pair of high-pressure cylinders were 13 inches in diameter and the two low-pressure cylinders 22 inches in diameter, the common stroke being 26 inches. The drivers were 7 feet in diameter, and the total heating surface was 1,836 square feet. The train load varied from five to seven cars.

The distance from Camden to Atlantic City by the Pennsylvania Railroad is 58.3 miles, and the company have put in service recently the very powerful engine shown in our illustration, which has been making some remarkable runs which, considered as feats of heavy, high-speed express service, surpass the work which has been done on the rivalline; however, as will be seen from the subjoined particulars, the Pennsylvania locomotives are considerably larger than the "Atlantic" compounds.

The class E-1 engines are of the simple type, with cylinders 20½ inches diameter by 26 inches stroke. The drivers are 6 feet 8 inches in diameter, and the pair of trailing wheels,

beneath the firebox, are 56 inches in diameter. The boiler is a huge affair, with a 67-inch barrel and a 42-inch combustion chamber. There are 218 square feet of heating surface in the firebox and the total heating surface is enormous, reaching 2,320 square feet. There are three hundred and fifty-three 1¼-inch tubes, the firebox measures 104 by 96 inches, and the grate area is 69.23 square feet. The total weight is 173,450 pounds, of which 101,550 pounds is on the drivers.

While the engine is distinctly of the "Atlantic" type, there are certain features which are novel, such as the including of the sand-box and steam dome under one casing, which results in what looks like a

steam dome of unusual proportions. The effect is not displeasing, as the great size of the engine enables it to support such a large dome without destroying the generally good contour of the engine. It will be noticed, moreover, that the tender is of the English type, being carried on six wheels instead of on eight, as in the usual American practice. The rear pair, however, are equalized.

With an engine of such powerful proportions it is not surprising to learn that the Pennsylvania Railroad is hauling heavy trains at very high continuous speeds.



A TWO-WHEELED BARROW.

Three runs made in the latter part of last month are highly creditable and enable this particular train to take first place among the fast trains of the world. There are trains that make longer runs without a stop, as in the case of the Empire State Express in this country, and several crack expresses in England and France; but the load hauled is not so great, nor is the speed so great by from 14 to 10 miles an hour.

On July 18, 1899, this engine drew a train of seven cars, weighing 466,100 pounds, from Camden to Atlantic City, 58.3 miles, at an average speed from start to stop of 68.6 miles an hour. During this run one stretch of 25 miles was covered at the rate of 83 miles an hour.

Two days later the same engine drew a train of eight cars, weighing 538,850 pounds empty, or, including passengers, etc., 590,000, over the same run at an average speed of 66 miles an hour, 30.6 miles of the distance being made at the rate of 76.5 miles an hour.

On July 31, 1899, eight cars, weighing empty 526,650 pounds, and carrying 369 passengers, made the run at the rate of 69.3 miles an hour, and covered 30.6 miles at the average speed of 81.6 miles an hour, 24.9 miles of this distance being made at the rate of 83 miles an hour.

The Plastering of Wine.

The Lancet recently contained an encyclopædic article on sherry wine, being a report of its analytical commission. One of the most interesting points on which the writer touches is that of the so-called plastering of wine—that is, the addition of calcium sulphate to the must.

As regards sherry wine, it seems that the practice

Much has been said in the French medical journals during the last few years on the question of the injurious effects of plastered wine, and M. Lancereaux has gone so far as to assert that cirrhosis of the liver, usually attributed to the excessive use of alcohol, is in reality the result, not of alcohol of itself, but of the potassium salts contained in plastered wine, and that it does not result from the use of spirits. The writer asserts, however, that among the workmen employed in the sherry bodegas, who drink large quantities of plastered sherry every day, cirrhosis of the liver is unknown, while, on the other hand, it is frequent among the dram drinkers of England and other countries.—N. Y. Medical Journal.

Automobile News.

A plant to employ about six hundred skilled mechanics in the manufacture of an oil motor carriage is to be built at Pittsburg. The Lanchester motor will be built.

A Western motor carriage owner is having his barn enlarged for the storage of motor carriages. He will build a pit from which the motor and mechanism of the motor carriage can be easily inspected and repaired.

The Haynes-Apperson carriage, which left Kokomo, Ind., arrived in Brooklyn on August 5. The journey was made in twenty-one days, but eleven of them were devoted to business matters.

The tires were punctured twice, but there were no other accidents.

Several new publications on the automobile have already appeared or are scheduled to do so. On September 12 the first issue of The Motor Age will appear. This is a continuation of The Motor Vehicle Review of The Cycle Age. The automobile news published in The Cycle Age has been excellent and we shall be glad to welcome this section which is to be published separately and enlarged. We have already referred to The Automobile, an illustrated monthly, the first number of which will appear by October 1. Another journal called The Automobile, also published in New York city, has already appeared, and we shall notice the same as soon as the second edition of the first number has appeared. In addition there are promised The Automobile Review, Speed, and The Autobain. The last three are to be published in Chicago. The Horseless Age has been published in New York for several years and is enjoying a well-deserved popularity.

The German vs. American Pound Weight.

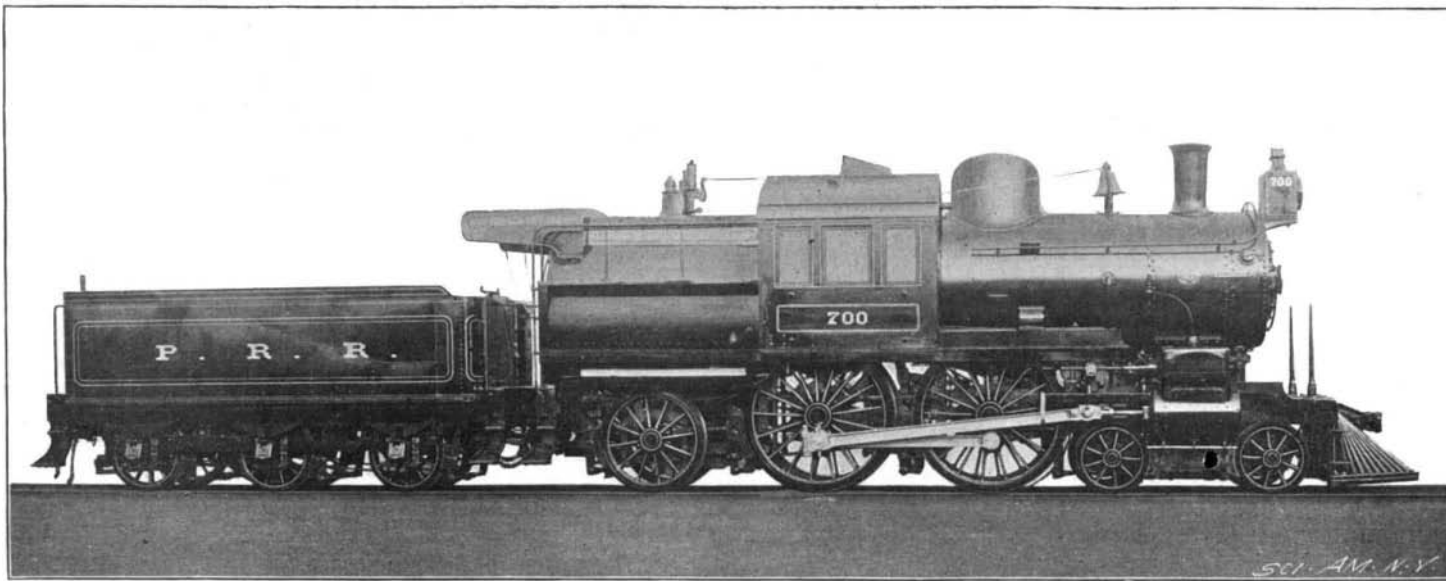
In compliance with a Department instruction, Consul Brodowski, under date of July 7, 1899, transmits the following explanation regarding the continued use of the pound as a weight measure in Germany and the relative values of the German and American pound:

The metric system of weights and measures was introduced into Germany shortly after the Franco-German war, but the Germans in general in their everyday dealings continue the use of the pound almost exclusively, especially older people, who in their younger days were accustomed to this expression. All my bills

here for meat, groceries, etc., are made out in pounds; and a scale of the newest construction, which I purchased to verify the weights of goods delivered, indicates both kilogrammes and pounds. One kilogramme is exactly two former German pounds, and such German pound therefore equals 1.1023 American pounds. If a German firm,

especially a smaller one, which cannot afford to employ an English-speaking clerk, writes its letter to the United States in German and orders its goods in pounds, meaning German pounds, and the American firm makes its estimate in American pounds, the result will be trouble and misunderstanding. It is well, therefore, for our people in their correspondence with German firms to make a note of the difference between the German and the American pound.

An Italian statistician has computed by means of railroad returns that the foreigners who visit Italy spend annually \$61,000,000 in that country.



NEW EXPRESS ENGINE FOR THE FASTEST TRAIN IN THE WORLD.

Cylinders, 20½ by 26 inches; drivers, 6 feet 8 inches; heating surface, 2,320 square feet.

has been followed from a very remote period, since classical authors refer to it as an ancient one. It is stated that the sherry growers find that, as a rule, they do not produce a good article of sherry if they omit to resort to this addition of calcium sulphate.

The writer mentions several theories to account for the improving effect of the plastering, but the one to which he inclines is that of the decomposition it causes of the tartrates contained in the grape juice, whereby tartaric acid is set free and attacks the ethyl of a portion of the alcohol, giving rise to the production of an ether, ethyl tartrate, to which in great measure the wine owes its bouquet and its special flavor.

Pests and Their Antidotes.

BY CHARLES MINOR BLACKFORD, JR., M. D.

Throughout all of living nature, there is a ceaseless warfare going on in which each animal or plant is endeavoring to obtain advantages for itself at the expense of some other organism. From the highest to the lowest, each living being has some "bane," some enemy that seeks its destruction, and in turn it is the pursuer of some other creature to which it is a relentless foe.

This makes the "struggle for existence," and in this struggle only those forms that are peculiarly adapted for defense or concealment will escape and propagate their kind. But for this check, even the animals whose rate of increase is the lowest would overrun the earth, and become a menace to the remainder of organic beings.

For this reason it is always a dangerous thing to introduce a new animal or plant into a region in which its natural enemy may be missing. The United States has had several disastrous experiences of this sort, and all civilized countries are now on the alert to prevent them. One of the most striking illustrations of the danger is given by the history of the Gypsy Moth.

In 1868, Leopold Trouvelot, a noted scientist, was making some researches into the silk-producing organisms, and for this purpose he imported a few specimens of the Gypsy Moth (*Porthetria dispar*). By accident some of the moths escaped through an open window and the unfortunate student at once gave the alarm. The fugitives were carefully sought and the ground about the window was burned over in hope of destroying them. Subsequent events showed that this precaution was futile. The inhospitable climate of New England retarded the increase of the moths, but during the succeeding twenty years they gained in numbers, and in 1889 they had become a devastating army. About the towns of Medford and Malden, Mass., the worms overwhelmed everything. All plant life was threatened; trees of all sorts were stripped of their foliage, even grass was devoured. The sides of houses and fences, clothes hung out to dry, passing vehicles, everything that afforded lodgment became covered with the squirming bodies, and the air was laden with the nauseous odor of the loathsome green worms. Nothing seemed to produce any effect on them, and so grave was the menace that the State authorities had to interfere. A commission was appointed in 1890, and in March of that year \$25,000 was appropriated for the purpose of exterminating the moths.

A large number of men were set to work. The worms, nests and eggs were gathered by painful and burned; the trees were sprayed with Paris green, and walls were scraped to destroy eggs.

In June an additional appropriation of \$25,000 was made, and the work prosecuted with the greatest vigor; but the numbers of the pest defied all efforts. In 1891 the appropriation for destroying the moths was \$50,000, in 1892 it was raised to \$75,000, and in 1893 and 1894, \$100,000 for each year was expended; while in 1895 the State gave \$150,000 on this account. In six years more than half a million was used and the infested area was but little reduced.

Of late years the Gypsy Moth Commission has had better success. The female moth is unable to fly, and so the area over which she can deposit eggs is restricted. The relentless warfare waged on them has at last produced results, and it may be said that this pest is under control. The cost of its suppression has been enormous. The direct monetary expenditure is large, and the indirect losses occasioned by these voracious creatures cannot be estimated.

An example of the unexpected results that may follow the introduction of strange inhabitants is given by the mongoose in Jamaica. The sugar mills of the island were infested with rats. Cats, as usual, proving useless, a number of mongooses were imported to destroy the rats. The mongoose rapidly accomplished this end, and, having exterminated the rats, sought other food. Birds became the victims, and the voracious intruders even learned to climb trees in pursuit of eggs and nestlings.

The mongoose is very prolific, and as the birds diminished under the increasing numbers of their new enemy, insects multiplied. Plants and animals alike suffered. The agricultural industries of the island were on the verge of destruction, and the government has had to take measures looking to the extermination of the mongoose. Nature is such a composite whole that the least interference, unless undertaken with full knowledge, may produce disastrous results.

In many of the rivers of Brazil a plant grows that is called the water hyacinth. It is very ornamental, and a few years ago a landowner on the St. John's River, in Florida, procured a small number for a pond on his estate. They increased rapidly and filled up the pond, whereupon the owner had them gathered up and thrown into the river. The experiment was unfortunate. Free from natural enemies, the hyacinths have flourished so that on many streams navigation is practically impossible. From shore to shore there spreads an impenetrable sheet of vegetation that entangles paddles, oars, or propellers, and arrests all

manner of refuse that should go to the sea. From time to time bodies of this growth become detached and drift down until salt water is reached, when the plants die and are cast ashore in putrescent heaps. A natural enemy has been sought, but, as yet, no appreciable result has been accomplished. In Brazil, a small red spider lives on the hyacinths, and is said to be injurious to it. This spider has been introduced into Florida, but no effect has been perceived.

Other instances of a similar character will suggest themselves. The "Russian thistle" is a striking instance of the spread of a land pest, and the spread of the English sparrow with the alleged evils that have followed it, is another.

Failure has not met all efforts to exterminate pests, and in several cases the successes have been brilliant. Some years ago a new insect was introduced into California from Australia. It is a small insect, and soon after hatching it enjoys a brief period of freedom, during which it can move about. It moves but a few inches, however, and then settles down for life. It inserts a tube into the bark of the tree, covers itself with a waxy scale, and raises a brood.

This scale is impervious to water and protects the owner from ordinary insecticides. It is covered by fine corrugations and from this fact the insect has received the name of fluted scale. Scientifically it is the *Icerya purchasi*, and it grows in such numbers that an affected tree looks as though it were whitewashed.

Soon after its introduction, the fluted scale spread through the orange and lemon groves of California, and threatened them with destruction. It was known that in Australia it was not a serious pest, so an agent of the Agricultural Department was dispatched to study it in its native habitat. He discovered that a red "lady bug," the *Novius cardinalis* preyed on the scale and kept it in check, so he brought a number of them to this country. Only a few survived the long voyage, but those few were tended with scrupulous care, and when their numbers had increased sufficiently, they were turned loose on the infested trees. Within a short space of time the trees were cleared, and at present the scales are being reared to preserve the lady bugs in case of another outbreak. When the lady bug was first discovered, it was called the *Vedalia*, and one enthusiastic grower was so pleased with its performance as to name a daughter after it.

The good effects of the "Vedalia," as it is familiarly called, have not been confined to the United States. A number of acacias were brought from Australia to the Azores Islands to be used as windbreaks. On these acacias were fluted scales, and from the Azores they were carried to Portugal, where the pest soon threatened the very existence of the orange and lemon groves. The Portuguese government appealed to the United States Department of Agriculture for aid, and full reports of the results attained by the *Vedalia* were sent, as well as some of the insects themselves. The reports seemed so incredible that they were put down as American "brag," and of the adults and larvæ sent, no adult and only five larvæ survived. A second shipment was made on November 5, 1897, that reached Lisbon in fairly good condition on December 19. The experience of the United States was repeated, and Portugal was freed from the scale.

This shows the true mode of proceeding when dealing with injurious plants or animals, but it is one that must be entered with care. As Jamaica found with the mongoose, the remedy may be worse than the disease, and the life history of the "bane" must be known as well or better than that of the pest. It has been suggested that the European starling be introduced to reduce the English sparrow, those suggesting it claiming that the birds are natural enemies. This is not true to any great extent, as the two live together in Europe; but even granting the ability of the starling to destroy the sparrow, there is no reason to think that its attention will be confined to this one species. It is to be hoped that this experiment may not be tried, as the possibilities that may follow the naturalization of this prolific and predaceous bird are serious in the extreme.

Helen Kellar at Radcliffe College.

Miss Helen Kellar, the girl who is so remarkably afflicted and so talented, has just completed her preparations for college under the tutorship of Mr. Merton S. Keith. She went to Cambridge in June last, and took the regular examination for Radcliffe College, and it is probable that no person ever before took any examination under such strange conditions. She is blind, deaf, and dumb, and the usual means of communicating the questions to her by means of the fingers could not be done, as Miss Sullivan, the teacher who has spent her life teaching Helen Kellar, was not able to communicate with her, as she does not know Greek, Latin, or the higher mathematics. A gentleman of the Perkins Institute who never had met Helen Kellar took the examination papers as fast as they were presented, and wrote them out in the Braille characters, this system of writing being in punctured points. The questions thus transcribed by him were put in Helen's hands in the examination room in the presence of a proctor who

could not communicate with her, and she wrote out her answers on the typewriter. She was also greatly handicapped by not knowing the American Braille system, as there are two systems, the English and the American, and Miss Kellar knows only the English system, so that she had to read this unfamiliar method of writing. Her Swiss watch made for the blind was also forgotten, and there was no one at hand to give her the time. She passed the examination in every subject; in advanced Greek she received a very high mark. Helen Kellar is now ready for matriculation as a student of Radcliffe College. Her passing the examinations was one of the most remarkable achievements in the history of education. The rules governing examinations were not softened in any degree because of her infirmities, and she sat in total darkness without the touch of a friendly hand, her fingers wandering over the slips printed with unfamiliar characters, and her typewriter, picking out quick and accurate responses to the questions, which were severe.

Chlorides in Sea Air.

M. Armand Gautier recently published in the Bull. Soc. Chim. some investigations which he carried on regarding the maximum quantities of chlorides contained in sea air. The experiments were made at the lighthouse of Rocheouvres, in October, 1898. The air was passed slowly by aspiration through a long tube containing glass wool previously washed and dried, so that any mass held in suspension was deposited: 341 liters of air, under a pressure of 760 to 767 millimeters, at a temperature of 16° Centigrade, were passed through this mass of glass wool, which was then taken to the laboratory and washed in a little warm water. The chlorides contained in the filter were estimated by a silver solution. A total quantity of 0.00462 gramme of chlorine was found, corresponding to 0.0076 of salt, which, by calculation, corresponds to 0.023 gramme of sodium chloride per cubic meter of air. It is believed that this quantity, together with the traces of iodine which accompany it, give sea air the tonic qualities which characterize it.

M. P. GAUTIER describes in a recent communication to the Paris Academy of Sciences the machine used for producing the large mirror which is to be used in connection with the great telescope of the Paris Exposition, which we have already illustrated and described. The grinding machine consists of a heavy cast iron frame supporting a circular table, and on it is mounted the great piece of glass which is to form the mirror. The grinding apparatus consisted of a bronze disk charged with a polishing material, usually emery, and supported by a saddle running on two slides fixed to upright portions of the frame. The adjustment was effected by means of comparators reading to 1-1000 of a millimeter. The mirror, which is completed, is said to be an excellent one.

The Current Supplement.

The current SUPPLEMENT, No. 1234, is of more than usual interest. A most valuable article on "New Researches on the Pantheon so called of Agrippa" is accompanied by superb illustrations, showing the exterior and interior, ground plans, and details of the construction. "The Flora of the Alps" is an article by Prof. Alfred W. Bennett. The series of articles which we have been publishing on "Elevators," by Mr. Charles R. Pratt, is concluded in this issue. The usual "Trade Suggestions from United States Consuls" are given, as well as the usual notes. "Germany's New Possessions in the South Sea" is accompanied by ten illustrations. "The Trans-Siberian Railroad," by Henry Michelsen, Secretary of the National Irrigation Congress, is published in full in the SUPPLEMENT and gives those of our readers who are interested in this subject an opportunity to gain more information concerning the wonderful engineering enterprise which forms the subject of our first page engravings. "The Management of Electric Vehicles," by George T. Hanchett, is a timely one, and also the article on the phaetons which were exhibited at the Automobile Club Exhibition at Paris is accompanied by eleven illustrations. "The Climate of the Hawaiian Islands" is an article by Albert B. Lyon, M. D., and "An Anglo-Saxon 'Story of the Heavens,'" by E. Walter Maunder.

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