

mental trees and shrubbery. It is embellished by statues, and is lighted at night by posts, the top of each being a mass of small incandescent lights, for the arc light is banished from the grounds except for illuminating outskirts of the reservation, the result being there are no excessively bright points to strike and offend the eye. The Grand Canal, which is over a mile in length, extends around the central group of large buildings, and is shown in several of our engravings. The outer bank of the Canal and the banks of the lagoons are sodded and set with trees and flowers, producing vistas of great beauty. The canals are crossed by many bridges, and statues, groups of statuary and fountains are distributed with a lavish hand. The buildings with their polychromatic decoration compose admirably with the water, bridges, statuary, trees and flowers.

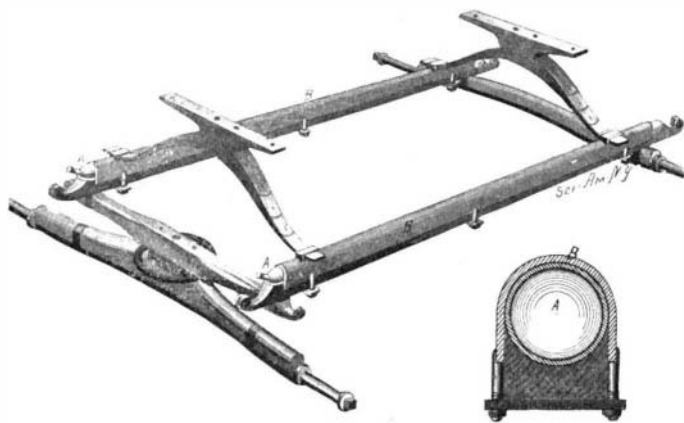
Even the attractions of the Midway in many cases fit in admirably with the architecture of the buildings. This is especially the case with "Venice in America," which is composed of a number of replicas of Venetian palaces, shops, bridges and canals, and gondolas, with real gondoliers, can be engaged to make the circuit of the Canal. The "Topsy-Turvy House" is one of the oddest attractions on the grounds. It represents a house standing on its roof. The visitor enters through the roof and after going up or rather down several flights of stairs, he reaches the cellar, which is converted into a roof garden. Even the flower-pots on the balcony are upside-down. One of the most interesting exhibits is the 12-inch breech-loading rifle on a disappearing carriage, which is in the rear of the Government Building. The government exhibit, as a whole, is remarkable for its completeness, and the visitors are sure to appreciate this fine example of American ordnance manufacture.

A PNEUMATIC SPRING FOR VEHICLES.

The shocks to which a vehicle is subjected as it travels over an uneven road are absorbed in a novel way in an invention patented by William W. Humphreys, of Sheffield, Ill.

The two parallel reach-bars, connecting the front and rear axles, are concaved to receive two long pneumatic cushions, A, each closed at one end and provided with an air-valve at the other end. Curved saddle-plates, B, are carried by the cushion-springs to support the vehicle-body, and are prevented from being accidentally displaced by means of bolts.

When the cushions are inflated, the jolting of the vehicle is so thoroughly absorbed, that only a gentle rocking motion is felt by the occupants. Automobiles



PNEUMATIC CUSHION FOR VEHICLES.

and two-wheeled vehicles can also be fitted with the pneumatic cushion.

Document 384 of the Fifty-sixth Congress.

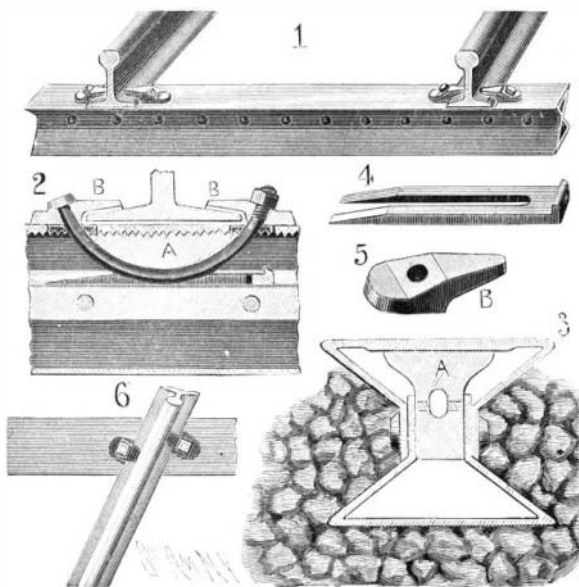
We have received Document No. 384 of the Second Session of the Fifty-sixth Congress, dealing with the damage to property at Pomeroy, Ohio. The Secretary of War states that he has the honor to transmit a letter from the Chief of Engineers, U. S. A., submitting certain facts relative to the claim of Mrs. B. N. Reuter, amounting to \$1, for damages to a window and curtain in her residence, caused by a fragment of rock thrown by a blast by government employes while removing rock from the river bed and banks of the Ohio River, at Pomeroy, Ohio. The Chief Engineer considers that damages inflicted by the torts of the government officers or agents are in the nature of unliquidated damages which no executive officer has authority to settle. He therefore recommended that Congress be asked to insert the following amount in the next general efficiency bill:

POMEROY, OHIO, November 5, 1900.	
U. S. Government to Mrs. B. N. Reuter, Dr.	
To one 14 x 32 double-strength glass.....	\$.50
Glazing same25
One curtain damaged25
Total	\$1.00

The estimated number of telephone exchange connections in the United States is 1,825,000,000 annually.

A NEW METAL RAILWAY TIE.

Perhaps no railway appliance contains so much promise for the future as the metallic tie; for the time will soon come when our fast-disappearing forests must necessitate the abandonment of the wooden sleeper for the more durable and stronger metal tie. The illustration which we present herewith pictures one of the latest attempts which have been made to provide a metal tie which will answer the needs of the modern railway. The inventor of the tie is Mr. Chester Rabert, Coalburg, W. Va. Fig. 1 is a general view of the tie; Fig. 2 is an enlarged sectional view; Fig. 3 is an enlarged cross



A NEW METAL RAILWAY TIE.

section of the tie; Fig. 4 shows a split-wedge employed; Fig. 5 represents a novel washer serving to hold the rail in place; and Fig. 6 shows a method of securing the rail at any angle and at any point on the tie.

The tie is composed of interlocking upper and lower sheet-metal sections. The sections are so bent that the general outline of the tie in cross section, as shown in Fig. 3, shows a wide flat base and top, sharply re-entrant sides and corresponding vertical parallel side portions. Interposed between the side portions is a reinforcing block of metal, extending the entire length of the tie. The vertical portions and the block are firmly bolted or riveted together. By reason of the peculiar hollow form this construction combines great strength and lightness. Downward strains upon the upper section of the tie are concentrated upon the reinforcing block.

Each rail, as shown in Fig. 2, is secured to the tie by a curved bolt extending through openings in the top of the tie and seated in a saddle, A (Fig. 2); the ends of the bolt pass through washers, B, overlapping and securing the base of the rail. The rail is seated upon a piece of hard felt or other sound-deadening material. As shown in Fig. 5 the washers have a circular body portion designed to rest upon the upper face of the tie, and an extended lug or projection overlapping the edge of the rail-base. The under surface of each washer is cut away beneath the lug portion to form a shoulder or abutment bearing against the edge of the rail-base.

The curved bolt connecting the washers is seated in a groove formed in the under surface of the saddle, A, and in a recess extending throughout the entire length of the reinforcing-block. The saddle, A, and the lower opposing face of the top of the tie are both toothed, so that a firm interlocking connection is provided to prevent longitudinal movement of the saddle. A split-wedge of the form shown in Fig. 4 is used to straddle the bolt and to pass between the central reinforcing-block and the saddle.

As shown in Fig. 5, the rail may cross the tie and be secured to it at any angle and at any point. It is necessary merely to make two openings in the top of the tie at the proper point for the passage of the curved bolt—a construction clearly serviceable for sidings and switches.

By reason of the serrated connection of the saddle and tie the rails may be transversely adjusted to the proper gage while the parts are loose. Upon tightening the bolt the saddle and rail are positively locked against movement transversely to the rail. This done, the wedge shown in Fig. 4 is driven home. It will be seen that Mr. Rabert has invented a metallic tie which combines with the lightness of a tubular structure, unusual stiffness, and provides an unyielding bearing at the point of greatest stress. The track gage can be simply and accurately adjusted by means which obviate the spreading of the rails and yet permit readjustment without removing the rails.

Alcohol Motors.

In an address recently made by M. Oelers, a prominent engineer, before the German Distillers' Association upon the subject of alcohol motors, he brings out the following figures to show the cost per horse power hour for motors using gasoline, petroleum, illuminating gas, or alcohol, the figures being an average for several motors of each type, of the systems most used in Germany. According to these data, the gasoline motor consumes 0.77 pound per horse power hour, representing a cost of \$0.031; a motor using ordinary petroleum, 0.88 pound, or \$0.025; an average gas motor costs \$0.021 per horse power hour; the alcohol motor uses 0.98 pound, or \$0.026. The conclusions brought out by M. Oelers are that the alcohol motor runs at a less cost than the gasoline motor, at about the same cost as the petroleum motor, but at a somewhat greater cost than the gas motor. He concludes that alcohol will no doubt render great services in agriculture for engines and tractors, as well as for automobiles.

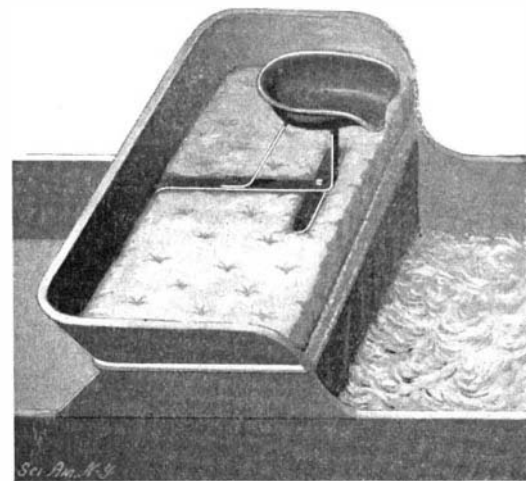
Education of German Children in Foreign Countries.

Consul Hill, of Amsterdam, March 19, 1901, reports that, in a recent German appropriation bill, provision has been made for subventions for 125 schools for the German education of German children in foreign countries. For a school at Constantinople, \$7,140 is allowed; for three schools at Buenos Ayres, \$4,284; for one at Galatz, \$2,665; and \$2,380 for a high burghal school and \$238 for a deacon school at Antwerp. A high school for girls at Brussels also receives \$2,380. Four schools at Bucharest together receive \$2,380. A school at Pretoria is granted \$1,428 and one at Johannesburg, \$2,522.80. There are 29 German schools in Brazil, 12 in China, 12 in the British colonies, 12 in Roumania, 11 in Egypt, etc.

A SUPPLEMENTAL SEAT FOR VEHICLES.

Among the patents lately issued in the United States is a third seat for two-seated vehicles, the invention of Nelson Marsh, of Barnardston, Mass. The seat is bolted to a detachable skeleton-frame constructed with a horizontal part resting on the seat-cushion. A downwardly-extending hook part receives the rear end of the cushion. A firm support is provided by a cross-bar resting on the cushion.

As shown in our illustration, the supplemental seat is placed in the middle of the main seat in an ele-



A DETACHABLE THIRD SEAT FOR VEHICLES.

vated position so that it will interfere but little with the occupants of the main seat.

The Current Supplement.

The current SUPPLEMENT, No. 1327, might be called a Pan-American number, as the Buffalo Fair occupies a considerable portion of the paper, and is illustrated by nine engravings showing many of the principal buildings and the remarkable decorative sculpture. The article was prepared after a recent visit to Buffalo by one of our staff especially for this purpose. "Signaling to Mars" is by Sir Robert Ball. "Syntonic Wireless Telegraphy" is a resumé of Marconi's recent lecture on the subject. "The Distribution and Conversion of Received Currents" is by Henry Gordon Stott, and is accompanied by eleven engravings. "The Citizen: His Schools, His Industries, His Life," is by Prof. R. H. Thurston. "Blackfoot Amusements" is by John McLean.

Contents.

(Illustrated articles are marked with an asterisk.)

Air compression, hydraulic sys-tem of	354	Guns, comparative efficiency of ..	354
Alcohol motors.....	362	London's congested traffic.....	355
Arc whistling.....	358	"Ohio," launch of "Attleship" ..	353, 359
Automobile electric.....	357	Pan-American exposition.....	360
Automobile news.....	358	Penells in Germany.....	358
Cocoa, cultivation of.....	340	Philippines, suggestions from the	358
Copper mining in America.....	356	Science notes.....	359
Document 384.....	362	Seat for vehicles.....	362
Education of German children.....	362	Spring for vehicles, pneumatic.....	362
Engineering notes.....	358	Supplement, current.....	362
Exposition, Pan-American.....	361	Telegraphy, wireless.....	354
Flring machine.....	357	Tin-foil industry, growth of the ..	354
Great Lakes, Canadian route from.....	354	Traffic, congested, London's.....	355