pense will be less; the annual cost (including interest on debt) will be reduced; the supply will be more regular and reliable throughout the town, including the highest ground; it will; not be subjected to as much danger of being cut off by casualties, it will make every hydrant a powerful fire engine, which can be used to put out fires more successfully than by the movable engines which must be used in connection with gravitation works. Under the Holly system there are increased barriers against large conflagrations, and protection against large and fearful losses.

We are informed that underwriters recognize the introduction of this improved method of fire suppression as a reason for reduction in insurance rates.

imitators; but the courts have recently, after a long and sharply contested suit, rendered a decision in Mr. Holly's favor, sustaining the broad claim of a new and improved method of supplying cities with water.

The Holly system of water supply and fire protection is in use in 69 of the principal cities and villages in the United States. For further information address the Holly Manufacturing Co., Lockport, N. Y.

STEAM ON COMMON ROADS,

Two years ago the Legislature of Wisconsin offered a prize of \$10,000 for a successful road motor, propelled by steam or otherwise, to be used as a substitute for draught cattle on common roads, and for ordinary agricultural work, as in plowing, thrashing, etc. The text of the law was printed in the Scientific American for January 29, 1876. The test of success was to be the performance of a journey of at least two hundred miles on the common roads of the State at an average rate of five miles an hour, working time. It was also stipulated that the machine should be so constructed as to run in the ordinary wagon track, to be able to run backward and turn out of the road for the passage of other vehicles, and to be able to overcome a grade of at least two hundred feet to the mile. A board of three Commissioners, including Mr. G. M. Marshall, the member to whom the passage of the law was chiefly due, was appointed by the Governor to witness the prescribed test, and such others as they might suggest.

The effect of the law has clearly been to stimulate in a marked degree the inventors of the State, seeing that at a competitive trial appointed for July 15 two Wisconsin machines were entered, and others from Milwaukee and Madison had been offered, but failed to appear at the advertised time for starting.

The competing machines were the "Oshkosh," invented by Schomer & Farrand, of Oshkosh, and the "Green Bay," owned by the Cowles Brothers, of East Green Bay. The latter proved the more speedy for short distances, but broke down so often that it was practically out of the race. The "Oshkosh" made the trip from Fort Howard to Madison-201 miles—in 33h. 27m., thus beating the prescribed time over 61/2 hours. Over the sand hills between Waupun and Watertown the machine is said to have traversed 32 miles in a little over four hours. Another quick run was made between Watertown and Fort Atkinson, 21 miles, in two hours and ten minutes. Most of the distance traveled is said to have been through heavy sand and gravel. The engineers report no breakages on the trip, no scaring of teams, and not a bridge plank disturbed. Throughout the trip the machine hauled a wagon weighing 3,500 lbs. While on exhibition at Oshkosh this load was increased by about five i tons of green lumber. The machine alone weighs 4,800 lbs., with water and fuel 6,600 lbs. At Fort Atkinson a plowing trial was had, the details of which have not come

The advantages to be gained by the adaptation of steam to ordinary road traction are enormous, and the behavior of the "Oshkosh" shows that practical success in this direction is not far off. The wisdom of the Wisconsin Legislature in offering the bounty needs no better demonstration. The result is pretty sure to be one, perhaps several, practical motors, which must add greatly to the industrial power and the sure of the sure of the industrial power and the sure of the great that the sure of the industrial power and the sure of the great that the sure of the great that the sure of the wealth not only of Wisconsin, but of the world.

The Commissioners report that the "Oshkosh" not only made the prescribed trip of 200 miles within the time allowed, but also hauled loads, plowed, and otherwise accomplished in a successful manner every test mentioned in the law or suggested by the Commission. They are not satisfied, however, that the machine is, in the spirit of the law, "a cheap and practical substitute for the use of horses and other animals on the highways and farms." They find it unquestionably of great advantage in plowing, thrashing, and heavy hauling from farm to farm, and on the highways, but it costs \$1,000, and requires a daily expenditure of from \$2 to \$6 to run it. Consequently the Commissioners decline to give it the prize offered by the Legislature, though they propose that the Legislature shall make a proper award for what has already been accomplished. Seeing that nearly three years remain before the time of the legislative offer expires, there would seem to be still a sufficient opportunity for inventors to win the prize, and, as a matter of course, the larger fortune which surely awaits the creator of a practical motor for common roads.

THE 28th Annual Exhibition of the Maryland Institute. for the Promotion of the Mechanic Arts will open on Wednesday, October 2, at Baltimore, and continue for five weeks. For particulars see advertisement in another column.

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Contents.

(Illustrated articles are marked with an asterisk.)

"Adiabatic 'curve [29] 107 "Antrum " 104	Inventors, where they live	9
"Antrum" 104	Ireland, labor in	106
Astronomical notes 106	Ireland, labor in Iron, effect of sal soda on [27]	107
Baking powder [6] 107	Iron for countershafts [24]	107
Bect. the 99	Labor in Ireland	106
Bridge over the Douro river* 103	Labor in Ireland Locomotive wheels [12]	107
Coffee, how prepared [6] 107	Lyre bird, the*	103
Corn plow and marker 99	Machinery, labor-saving	97
Cotton, American in China 98	maps, photographic	103
Cotton spooling machine* 98	Mechanism, musical	100
Disinfectant, new 104	Metal for fusible plugs [13]	107
Earthquakes and eruptions 166	Mining machine. Lechne 's*	102
Eclipse of the sun 96	Perch, consumptive. Pipe joints, steam [25]	108
Eclipse of July 29, Lockyer's rep. 101	Pipe joints, steam [25]	107
Eclipse observations 101		104
Electro-magnets 104	Printing from glassnegatives	101
Engine, inverted cylinder [20] 107	Pumping engine, new* 95,	. 90
Engine, water propelled [15] 107	Regions, undeveloped	
Exhibition. American Institute. 103	Reads, steam on common	
Famine in Northern China 101	Rubber bands [32]	107
Fences, etc., wash for [5] 107	Rust, to remove from swords [10]	107
Gas, hydrogen and oxygen [1] 107	Safe. burglar alarm*	_99
Gas, hydrogen, lifting power [4] 107	Saw mill, size of main wheel [21]	107
Gas, water	Scales, center of gravity [26]	107
Glass for microscopes, etc. [1] 107	Shafting cup, tin*	100
Glass, gilding on 104	Steamboat time [18]	107
Glove, a new working*	Steam, condensation of [11]	100
Gravity battery [3]	Sun, eclipse of the Teaching, true idea of	90
Heating by steam, public 98	Teaching, true idea of	104
Ices and ice creams 101	Tools and implements	90
India rubber, manufacture of ., id5	Turkey, partition of	07
Indicator, electrical* 100	Vision, Helmholtz's theory of	101
Indigo, artificial	Walnut bark, extract of [30]	100
Induction coil [19]	Water [4]	107
Industrial prospect, the 102	Water, filtering [31]	107
Invention, discouragement of 97	Waterproofing goods [28]	100
Inventions, new agricultural 104	Water, walking under	
Inventions, new engineering 106 Inventions, new mechanical 98	Wheat, India as a producer of	
	Work, not so many out of	91
Inventions, new miscellaneous 99		
		

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 187, For the Week ending August 17, 1878.

mensions of the gun.—Strange's Tricycle, 2 figures.—Soluble Tannates of Soda.

TECHNOLOGY.—Street Cleaning of Paris. A paper read before the Civil Engineers' Club of the Northwest. Personnel; material and disinfectants; sweeping of public ways; sweeping machines; removal of all kinds of refuse, and ice and snow; street sprinkling; total annual cost.—Sewerage of Paris.—Manufacture of Peat Charcoal, 2 figures.—Improved Brick Machine, 1 engraving.—Rickman's Improved Gas Glass Furnace, 4 figures.—Gas Governors, 4 figures.—Transmitting Gas, 1 figure.—Improved Rollers for Grinding Cards. By R. J. Edwards & Co. 1 figure.

Austro-Huugarian High Grinding. The Buda-Pesth mills. The universal introduction of relier mills. Smooth vs. grooved rollers. Proceedian rollers. The chief advantage of roller mills. Different construction. The requesing roller. Improvement in color. Centrifugal silk dr. ssing iosebhius.—J. & T. Boyd's Doubling Winding Machines, 1 figure.—Machine for Flocking Yarn, 1 gure—Revolving Box for Looms, 2 figures.—Jute, 1 figure. Cultivation. Tests of quality.—Frectof Dampness. To distinguish fute from hemp and flax.—Bleaching of Woolen Goods, 1 figure.—Treatment of Wool on the Skin. New process, yielding wool of superior quality.—"Weighting."

I. FRENCH INTERNATIONAL EXPOSITION OF 1873.—Examples of Architecture. The Statue of Architecture. By JULIUS MONTEVERDE, 1 illustration.—Entrance to the Fine Art Gallery, 1 illustration.—English Half Timbered House, 1 illustration.—Anthracite Coal in France. Its introduction the result of the Exhibition.

V. ARCHITECTURE AND RULLDING.—Fireproof Construction. A paper read before the American Institute of Architecture by New Scuring.

paper read before the American Institute of Architects, by F. Schu-Mann, C.E.

V. CHEMISTRY AND METALLURGY —Proceedings of the Chemical Society, London. Action of the coppor-zinc couple. Alkaloids of the negatives. Alkaloids of the veratrums. Action of hydrochloric acid upon chemical compounds. Action of sales on sales. New test for giverine. Ammonium tri-lodide,—The Application of Organic Acids to the Determination of Minerals.

VI. ELECTRICITY, LIGHT, HEAT, ETC.—The Phonoscope and the Phoneidoscope. 5 fgurcs.—A New Mercury Telephone.—The Microphone. By W. J. LANGASTER, F. R.S. Directions for constructing a simple Microphone, with suggestions and 3 gures.—Reynier's Electric Lamp. A new Lamp acting by incandescence. Cost and working.—Compound Colors. Color Blindness.

VII. MEDICINE AND HYGIENE.—Histology and the Cellular Theory. By Dr. EDWARD FOURNIE. A deplorable mania. Looking to Germany as the source of all light and knowledge. Examination of Germany's claims in microscopy. De Mirbel, Turpin, Raspail, Duvernois Coste, and others, and the History of the Cell Theory.—A Case of Hydrophobia, with Recovery. By JAMES NICHOLIS, M. D. F.R. S. Symptems and treatment for thirteen days, with cure.—The Chelmsford Case of Hydrophobia. Remarks on the foregoing case, with proofs of the actual presence of Hydrophobia.

THE ECLIPSE OF THE SUN, JULY 29, 1878.

In accordance with previous calculations the moon occupied such a position, on the above date, between the sun and the earth, as to throw its shadow upon the latter, causing a total eclipse of the sun's light throughout a long stretch in this country and a partial eclipse elsewhere. The path of the total eclipse here was 116 miles wide and about 2,000 miles in length, beginning at the northwest corner of Idaho and extending through parts of Montana, Wyoming, Colorado, Kansas, New Mexico, Indian Territory, Texas, and Louisiana.

Favorable weather prevailed all along the line of totality, except to a limited extent in Texas, and all the parties of observation report excellent results. East of the Mississippi no observations of value were made, the sun being obscured by clouds.

From Rawlins, Wyoming Territory, Professor Henry Draper reported four splendid photographs of the corona. Two, taken with his large diffraction grating, show the corona to have a continuous spectrum; thus indicating that the light of the corona is derived by reflection from the sun, and is not that of an ignited gas. The photograph of the corona taken with the large equatorial is described as very sharp and full of detail. Edison's tasimeter distinctly showed the heat of the corona, but was too sensitively adjusted. The observations made with it demonstrated that the heat of the corona is much greater than that of the fixed stars, but exact measurements were impossible, the heat throwing the light ray entirely off the galvanometer scale. Professor Barker's observations showed no bright lines in either the inner or the outer corona. The green line could not be detected, nor were any protuberances seen. The Fraunhofer lines were observed by both Dr. Draper and Professor Barker, and their observations were confirmed by those of Professor Morton. The last named described the corona as brilliantly white, with a marked prolongation of bright rays in a direction diagonal to the horizon. His observations proved the light of the corona to be radially polarized. He saw no protuberances.

At Separation, Wyoming, Professors Lockyer, Newcomb, and Watson obtained equally good results. Professor Lockyer observed the eclipse with a small Rutherfurd grating in front of an ordinary camera. His observations confirm those of Dr. Draper. The corona was much less bright than during the eclipse observed in India, and new phenomena were consequently visible. Professor Newcomb thinks that he detected a new fixed star in the vicinity of the sun, but further researches will be needed to confirm the observation. Professor Watson is quite positive that he saw an inter-Mercurial planet-possibly the much-disputed Vulcan-about 2½° from the sun, appearing like a star of 4½ magnitude.

From Pike's Peak, Colorado, Professor Langley reported successful observations by Gen. Meyer and the Washington and Pittsburg party. The corona was elongated, twelve diameters of the sun on one side and three on the other. It resembled the zodiacal light. At Denver, Professor Young discovered no ultra red or ultra violet lines. At the moment of totality the Fraunhofer lines were beautifully reversed, confirming observations made in Siam. Both of the H lines were reversed. Very bright lines were seen near B. confirming Poyson's observations. Professor Young also saw as bright lines F and 1474 Kirchhoff. Professor Colbert's observations tended to show the moon's path to lie further to the southward than is indicated by the lunar tables, or else that the estimate of the moon's diameter is too large; perhaps both. Measurements made by Mr. Easterday indicated that the corona extended fully 700,000 miles outward from the sun. The chromosphere was distinctly seen by Professor Hough, indicating a thickness of some 2,000 miles. No prominent protuberances were seen.

The Naval Observatory party at Creston, W. T., were quite successful. Professor Harkness, assisted by Lieut. Sturdy, searched for ultra violet lines, using a Rutherfurd diffraction grating, but found none. With the equatorial camera, Messrs. Clarke and Skinner obtained six good photographs, and Prof. Robinson four with a polariscopic camera.

At Santa Fé, New Mexico, Professor Rock, astronomer of the Wheeler Survey, assisted by Signal Observer Frost, made successful observations of contact, and obtained a valuable series of meteorological observations

At Fort Worth, Texas, the four contacts were observed under the most favorable conditions. Five photographs were taken during totality, two of them polariscopic. The results confirm those of Professors Young and Harkness. The reversal of the Fraunhofer lines was observed, and line 1474 was measured. Three large pearl-white prominences were seen.

At West Las Animas, Colorado, only a few small prominences were seen. The contacts were later than the Amer-ARCHITECTURE AND BUILDING.—Fireproof Construction. A ican ephemeris prediction, and the duration shorter. Ob-paper read before the American Institute of Architects, by F. Schu-servations of the corona were numerous and successful. At servations of the corona were numerous and successful. At other points less important observations were made. The reports concerning the effect of the darkness on the lower orders of creation are very conflicting. The darkness was marked, but not intense.

Altogether the results obtained by the various parties of observation are such as to promise great additions to our knowledge of the sun, as soon as they can be properly worked out.

A paste formed by mixing powdered glass with a concentrated solution of silicate of soda makes an excellent acid proof cement.