SCIENTIFIC NEWS.

COCKROACHES IN THE CARBONIFEROUS OF CAPE BRETON.— In the *Canadian Naturalist* (Vol. VII., No. 5) Mr. Scudder describes two new species, having two wings, described by R Brown. He has given them the names of *Blattina Bretonensis* and *B. Heeri*. They are in a duskish shale, and are associated with leaves of Sphenophyllum and fern.

MARINE CHAMPLAIN DEPOSITS ON LANDS NORTH OF LAKE SUPERIOR.—Dr. Dawson, in his annual address before the Natural History Society of Montreal, says that Professor Bell, in the "Report of the Canadian Geological Survey for 1870-71," states the occurrence of marine shells, similar to those of the Champlain deposits in the vicinity of Montreal, at a height of 547 feet above the sea. Dr. Dawson also remarks that in the hills behind Murray Bay and Les Eboulements, he has observed these shells at a height of at least 600 feet; and also that Mr. Kennedy has recently found marine shell deposits of the same era on Montreal Mountain, at a height of 534 feet above the sea.

PAINTING ON ZINC WITHOUT PAINT.—M. Puscher, of Nuremberg, has lately invented a simple process for colouring sheet zinc, based on the employment of acetate of lead. On applying this substance, mixed with a minimum preparation, a reddish brown tinge is obtained. The cupola of the synagogue at Nuremberg was thus coloured as an experiment over a year ago, and, to all appearance, is yet unaffected by the weather. By adding other bases, lighter or darker tints of grey and yellow may be obtained, giving the zinc work the appearance of carved stone. With a solution of chlorate of copper the preparation turns the sheets of zinc black.

ANOTHER tunnel under the Alps is proposed: it will pass under the St. Bernard and be 20,000 ft. in length. The novel feature of this undertaking is that under the summit, the tunnel will be widened out to make a station, and a shaft will be cut, up which passengers will be taken to a hotel on the top of the mountain.

A CORRESPONDENT of the Albany *Argus*, who evidently knows whereof he writes is imparting valuable information on transportation. He says :—" A few years ago a Canadian ship builder remarked that 'a rule of thumb law' was that to obtain the cheapest transportation, the vessel should have as many tons carrying capacity as her destined voyage had miles. The distance between Chicago and Buffalo is a thousand miles, and by this rule the cheapest transportation, would be in vessels of a thousand tons. In arranging the size of the new enlarged Welland Canal it was adapted for vessels of twelve or fifteen hundred tons, which would be the number of miles to Oswego or Kingston, showing that the Dominion engineers have followed that rule : " The ocean ships, he says, are constructed on that rule.

A NEW compass has been invented in France by M. Duchemin, the magnetic force of which resides, not in a bar or needle, as in the ordinary instrument, but in a flat steel ring, magnetised, with its poles at two opposite extremities of the same diameter. This ring, supported upon an aluminium traverse, pivoted on agate at its centre, has attached to it the ordinary compass card, and acts promptly and efficiently. The author claims for it the following advantages:—(1) A magnetic power, double that of a needle whose length is that of the diameter of the ring; (2) two neutral points instead of one, as in the needle; whence it happens that none of the magnetism escapes, and that strong sparks like those from the Holtz machine do not derange the poles; (3) a better and more prompt performance of the compass, the card seeming to float, as it were, in a liquid; (4) a large increase in the sensitiveness of the instrument; (5) the ability to regulate the magnetic intensity of the ring, and thus to compensate for local causes. This is effected by means of a second magnetised steel ring, smaller than, and inside of, the first, the position of which—and therefore its neutralising action-may be easily adjusted. Under the direction of the Minister of the Marine, a trial trip of the new compass was made on the steamboat Faon with very satisfactory results. M. Duchemin now proposes, as an improvement, the use of a set of such rings, forming a spherical or spheroidal system of still greater magnetic power.

RAILWAY MATTERS.

AN old copy of the English *Quarterly Review* of the year 1819 contains an account of a scheme for a railroad, on which it is proposed to make carriages run twice as fast as stage coaches. The editor evidently failed to appreciate the idea, or to believe in its possibility, for he comments upon it thus wise :—" We are not partisans of the fantastic projects relative to established institutions, and we cannot but laugh at an idea so impracticable as that of a road of iron upon which travel may be conducted by steam. Can anything be more utterly absurd or more laughable than a steam-propelled wagon movving twice as fast as our mail coaches? It is much more possible to travel from Woolwich to the arsenal by the aid of a Congreve rocket."

PAPER CAR-WHEELS.—An American paper says that the Connecticut River Railroad Company is about introducing, for trial, a set of paper car-wheels under the forward truck of one of its engines. These wheels are manufactured by bringing a pressure of 350 tons upon sheets of common straw-paper, which forces them into a compact mass, which is then turned perfectly round and the axle forced into a hole in the centre, this requiring a pressure of 25 tons weight. The tire is of steel, and has a one-quarter inch bevel upon its inner edge, thus allowing the paper filling to be forced in, 250 tons pressure being required in the process. Two iron plates, one upon each side of the paper, are bolted together, which prevents the possibility of the fillings coming out. The tire rests upon the paper only, and partakes of its elasticity in consequence.

A SAFETY CAR SHOE.—A car shoe has been invented by Mr. Stillson, of Minneapolis, Minnesota, which is designed to prevent cars from leaving the track. It consists of a clamp-like arrangement, which is affixed between the wheels of each truck. This runs about two inches above the rail, and if anything happens to throw the wheels from the track the clamp at once grasps the rail, holds the car on the track and brings the train to a halt very quickly. During one of the experiments, in a curve of the road, on a down grade, a rail was removed from the track. The car having the shoe on was started down the grade, its speed being not less than thirty miles an hour. On reaching the gap the wheels jumped the track, the car settled down upon the shoe, which at once grasped the rail that had not been removed, held the car in an upright position on the track, and finally brought it to a standstill in a distance of 250 feet. At a second trial, with a speed of fifteen miles an hour, the same result was accomplished, the car being brought to a halt in 30 feet.

DE NEGRI AND HERRMANN'S ENGINE.

We illustrate on page 288 from Engineering a new style of horizontal Engine, which was recently exhibited in England. It is of 8 horse power nominal, and, beside being well designed is well made, and works very smoothly. The leading feature of novelty in the engine is undoubtedly the very ingenious automatically variable expansion gear, which is the invention of Mr. C. De Negri. With this gear, as the governor balls are extended or contracted, the steam is cut off at any earlier or later stage in the stroke, so that the engine is controlled without the use of a throttle valve, although the load may vary considerably.

It will be seen from the engraving, which shows at Fig. 1 an elevation, and at Fig. 2 a plan of the engine, that there is only one eccentric, eccentric rod and valve rod. These actuate the principal valve in the ordinary way, the back valve being entirely worked from the principal one, in which the two steam ports are carried through, so that in the two extreme positions of the back valve on the principal one, when one induction port is open the other is shut; the exhaust being controlled entirely by the principal valve.

The manner in which the back valve is worked by the principal valve is as follows: There is a flat disc piece with a recess cut out of its circumference, so that it somewhat resembles a cam. The bottom of the recess is struck from the centre of the disc piece, with a radius as much less than the radius of the disc piece itself, as the required play of the back valve on the front one. Rollers are fixed in the back valve, so that the disc piece, when revolving, works against, and fits between them, at any point in its revolution. The disc piece revolves as many times to