

SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO., - - Editors and Proprietors

Published Weekly at

No. 361 Broadway, New York

TERMS TO SUBSCRIBERS

One copy, one year for the United States, Canada, or Mexico, \$3.00
 One copy, one year, to any foreign country, postage prepaid, £0 10s. 5d. 4.00

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845).....\$3.00 a year
 Scientific American Supplement (Established 1876)..... 3.00
 Scientific American Building Monthly (Established 1885)..... 2.50
 Scientific American Export Edition (Established 1878)..... 3.00

The combined subscription rates and rates to foreign countries will be furnished upon application.
 Remit by postal or express money order, or by bank draft or check.
 MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, JANUARY 28, 1905.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are sharp, the articles short, and the facts authentic, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

OUR ASSETS AT PANAMA.

The present Chief Engineer of the Panama Canal, speaking recently of our acquisition of the holdings of the French company, gave it as his opinion that "the trade was certainly a good one"; and in proof of this he briefly enumerated some of the leading elements embraced in the transaction. In the first place, we are now in possession of a strip of land 10 miles wide and 47 miles long; we hold the franchise; we have 99 per cent of the stock of the Panama Railroad, including the Panama Steamship Line; all the elaborate and very valuable results of the surveys of the French engineers, and the vast amount of excavation done during a period of twenty-four years; the machinery and supplies, for which \$29,000,000 was paid in cash, not a little of which machinery can still be used; about 3,500 ten-yard steel dump cars, of which 2,500 are serviceable; and between two and three hundred locomotives, which, according to the Chief Engineer, are "a great deal better than the average locomotive that an ordinary railroad contractor uses." Furthermore, Mr. Wallace says that we have steel enough for 150 to 200 miles of construction track, and considerable heavy excavating machinery, which has been kept under cover, and is in very good condition. The "trade" was certainly an exceedingly good one.

ASPHALT FLOORING AT SUBWAY STATIONS.

More considerations of decency, to say nothing of health, should prompt the subway officials to lay down a concrete or asphalt surface above the roadbed at the Subway stations. At present, the broken stone ballast is made the recipient of cigarette and cigar stumps, being in fact nothing more than a magnified cuspidor, with all the unfragrant surroundings associated with that receptacle. The Subway officials, of course, will claim that if a certain section of the traveling public would practise good manners, the broken-stone ballast would be kept just as clean as any other; but unfortunately the nuisance is still in our midst, and we have to accept the situation and make provision to meet it. There is no objection whatever to the use of stone ballast between the stations, where there is no opportunity for the accumulation of refuse; but the stretch of track extending the full length of the platforms and a few yards beyond should certainly be covered with a smooth layer of asphalt or cement, with proper connection to the drains, so that the whole could be regularly flushed with water. The Board of Health has already made this recommendation, and it is backed by the hearty indorsement of every decent-minded resident of this city.

HISTORY REPEATS ITSELF.

The proposal that the city should erect a moving stairway at Thirty-fourth Street and Broadway, to accommodate the crowd of foot passengers at this dangerous crossing, is not so altogether original a proposition as the sponsors of the scheme might suppose. As far back as the year 1867, a similar congestion prompted the erection of a bridge across the intersection of Broadway and Fulton Street. The bridge was illustrated at the time in this journal. That, however, was long before the day of escalators and moving sidewalks, and those who wished to dodge the risks of crossing Broadway at grade, had to pay the penalty of a climb over a steep stairway. Hence the Fulton Street passenger bridge was foredoomed to failure. The practicability of the moving stairway has been proved by several years of successful work, and we can see no reason why the proposed Thirty-fourth Street bridge should not be a thorough success, especially if it were built of the width and with the running speed that would be demanded by the impatient foot passenger traffic at this point. There are other

congested and dangerous crossings in the city where the system might be applied to good effect. Of course, a subway would be preferable to an overhead structure; but subway space must be left inviolate for the possible needs of our rapid-transit extensions. Furthermore, by carrying the structure, whose weight would not be a serious problem, upon a pair of light arched trusses, it could be rendered architecturally pleasing.

WARFARE BY TELEGRAPH.

In the course of a paper read by Gen. Greely recently before the Military Service Institution, the speaker paid high tribute to the skill with which the Japanese have made use of the field telegraph and the balloon, two means of communication and observation which they have applied with a success that hitherto has been unsurpassed in warfare. The General brought out the interesting point that in the recent great flanking movement at Liaoyang, Gen. Kuroki was not once under fire, and this in spite of the great range of modern field pieces. So perfect, indeed, were his telegraph lines that only once, and that for a very short time, was connection with headquarters lost. The author of the paper, who is the chief signal officer of the United States army, quoted approvingly one of the correspondents, who said that the clicking of the telegraph instruments at headquarters meant more to the Japanese general than the sound of the guns.

THE FIFTH ANNUAL AUTOMOBILE SHOW.

In the number and quality of its exhibits, the Fifth Annual Automobile Show at Madison Square Garden, New York, is unquestionably a great advance upon any that has preceded it. The applications for space were so numerous this year that the foreign machines were obliged to seek another home. Nevertheless, the Garden is filled to overflowing, there being no less than three hundred machines on exhibition; and as the average price will probably range from \$1,600 to \$1,700, the total cost of this really wonderful display must be something over half a million dollars.

Undoubtedly the first impression left by a general survey of the exhibit is that the industry has settled down to the production of a certain limited number of standard types. In this respect the present show is in marked contrast to those of four or five years ago, when a large proportion of the work done by our manufacturers was experimental, and was prompted by the desire to strike out on original lines, and get away from the designs which had already become standard among the foreign builders. Although the best American machines of to-day conform broadly in design and workmanship to the European models, our builders have left their stamp upon the industry in more than one direction; notably in the production of light touring cars and runabouts, driven either by steam or by air-cooled gasoline motors.

It is gratifying to notice the general refinement of design and workmanship that characterizes the whole of the exhibits. There are some machines shown that are undoubtedly equal to the best of the French and German cars. Moreover, the industry has now assumed such proportions that the steel makers find it worth their while to manufacture special grades of steel, on specifications furnished by the automobile builders. This has resulted in a great improvement in the reliability of frames, crankshafts, and transmission gears, and all parts that are subject to the extremely severe stresses peculiar to the automobile.

Perhaps it is safe to say that the greatest improvement has taken place in the engine, the advance being in the direction of reliability and ease of operation. For the larger cars, the four-cylinder engine is used almost exclusively. The experience of the past year has shown that the use of four cylinders does not, as was feared, complicate the engine, nor introduce any added difficulty of operation. The parts can be made lighter, and the distribution of the stresses on four cranks has shown to good effect in reducing the number of broken shafts. At the same time, the opposed two-cylinder horizontal engine seems to hold its own in the American machines of moderate size and power. Another characteristic development is the air-cooled motor, which has been found to give such excellent satisfaction that it is being made in units of considerable horse-power. A beautifully designed and finished three-cylinder compound engine of American manufacture was exhibited, which has two high-pressure cylinders placed on either side of a low-pressure cylinder, the high-pressure cranks being placed at 190 degrees to the low-pressure crank. The maker claims that the exhaust has been thereby reduced from a pressure of 60 to 80 pounds to the low figure, for a gas engine, of 10 pounds. Several ingenious improvements are shown in the control of the automobile, and particularly of the engine. Attention is being given to the control of the mixture rather than of the spark, the means of manipulation being so arranged on the steering wheel that the driver can change the speed of the car without having recourse to the transmission-gear lever. The automatic float-feed carbureter seems to be

preferred, and mechanically-operated valves are universal. Practically all of the American cars use the jump-spark ignition. A few make use of the magneto, although this device is not so common on American as it is on foreign machines. Water-cooled cylinders, honeycomb radiators, in which the draft is assisted by a fan, and forced circulation of the water, is the most usual combination on the larger cars, as is also forced lubrication from a pump which, together with the water pump, is driven from a countershaft geared to the crankshaft. Mention should be made of an ingenious arrangement shown on one engine, in which the exhaust valves are placed in domes above the cylinders, and the valves and cylinders are cooled by means of a down draft of air from a blower.

In this year's exhibition tubular framing is conspicuous by its absence, and the pressed-steel frame has taken full possession of the field in all except some of the smaller cars. The advantage of the pressed-steel frame is that it lends itself to the irregular shapes and sections that are demanded by the peculiar strains to which the automobile frame is subjected. There is a tendency to a more extended use of ball bearings, and some excellent designs with a new system of separators are exhibited. The bevel drive has almost exclusive control of the field except in some of the heavier and higher-powered machines, and some of the lighter cars, on which the chain drive is still shown. The sliding transmission gear, inclosed in a dust-proof aluminium case, is also coming into more extensive use, and the excellence of the material and the careful gear cutting have enabled the manufacturer to make this part of the machine thoroughly reliable. The bicycle wheel has disappeared with the bicycle tubing in automobile construction. Wheels are now generally of the artillery type and, because of their strength, form one of the most reliable elements in the machine. There is nothing strikingly new in tires, unless it be a new non-skidding type referred to last week, in which the tire proper is covered with a leather sheet vulcanized on, carrying on its tread another thickness of leather, which is thoroughly armored with studs or plates of hard steel. These tires have given excellent results, both in protection to the inner rubber tire, and as a preventive of skidding on wet asphalt or greasy roads. Mention should also be made of an improved tire, in which parallel threads, imbedded in rubber, take the place of the usual woven fabric. Each thread is thus practically incased in a rubber sheath, which serves to protect it from moisture and abrasion, and prevents the flow of air along the fabric, should the tire be punctured and the air tube leak. There is also less tendency for the tire to heat as the result of internal friction of the fabric.

The improvement of the automobile that is most conspicuous to the eye is in the bodies, which are, many of them, really magnificent specimens of the coach builder's art. This result is explained largely by the fact that the automobile business has reached a stage at which the coach builders have found it worth while to devote their time to the design and construction of convenient and handsome car bodies. Generally speaking, there is a reaction from the over-elaborate curves of some of the earlier machines, and a disposition to make use of straighter lines and simpler forms. The cylindrical and semi-cylindrical design of bonnet, which is becoming popular, has also added greatly to the appearance of the cars. The obvious advantage of providing protection from the weather is bringing in a general adoption of canopy and Limousine tops. Some of the closed carriages are beautiful and luxurious specimens of carriage upholstery.

In the important matter of price, it is evident that the great reduction which many people expected to take place when the trade had grown to its present proportions is not to take place, at least for the present. As a rule, the purchasers who can afford to buy an automobile of any kind, big or little, realize that in the present state of the art, a lower price would mean the incorporation of cheaper materials and less careful workmanship, which is the very last thing an intelligent purchaser desires.

After a long search over the wilds of Dartmoor, a monolith—12 feet long, 4 feet wide, 2 feet 6 inches in thickness, and weighing six tons—which has defied the effacing fingers of time and tempest, has been found to stand at the head of Sir H. M. Stanley's grave at Pirbright. Lady Stanley desired to obtain a stone "fashioned by the ages, tempered and colored by time, and untouched by man." Such a stone was discovered on a farm, lying recumbent on the borders of a natural roadway. Three of its faces had been exposed for uncounted generations. The difficulties of its removal from Devonshire were considerable, but they were eventually overcome, and it now stands in the quiet village churchyard, a fitting tribute to the memory of the great explorer. The inscription bears not only the name so familiar to Englishmen, but the words "Bula Matari" ("the Rock-Breaker") indicate the title he bore in Darkest Africa.