THE SCIENTIFIC AMERICAN FOR 1881.

A new year—the thirty-seventh since the publication of the SCIENTIFIC AMERICAN began—will be entered upon with our next issue.

It is gratifying to believe that, during all these years of varying national prosperity, there was never one that opened with broader or more substantial grounds for expecting the largest measure of national well-being—the largest activity in all the useful arts, under the most favorable conditions for success—than are promised for the year about to begin.

Never in their history have the United States presented so cheerful and hopeful an aspect; and in common with all other worthy American institutions the SCIENTIFIC AMERICAN enjoys a bountiful share of the general prosperity. Manufacturers, merchants, farmers, artisans—indeed all classes of men to whom this paper is addressed, are busily employed and are making money; and the number who regularly look to its pages for information, suggestion, or entertainment, is larger than ever before. With such abundant and hearty support, the proprietors can confidently pursue their set policy of striving continually to increase the usefulness of the paper to its readers and advertisers. Having no rivals in this field the only competition they can enjoy is in a constant endeavor to surpass their own best achievements. Whoever will take the trouble to compare this volume just finished with any that has preceded it, cannot fail to be impressed with the manifest fact that the publishers' policy has not been altogether fruitless of results calculated to make the SCIENTIFIC AMERICAN increasingly worthy of the popular favor bestowed upon it.

The SCIENTIFIC AMERICAN SUPPLEMENT will continue to put within easy reach of American readers the best contributions to the practical literature of the sciences and industrial arts that the public journals afford, besides a large amount of original matter of special value to scientific and practical men. As heretofore, a full table of contents of each issue of the SUPPLEMENT will be printed in the corresponding issue of this paper, in which every reader of the SCIENTIFIC AMERICAN is kept informed of all important papers bearing on the subjects or industries he is specially interested in, should he not feel able to subscribe to both papers. Scarcely a week passes in which the SUPPLEMENT does not contain special articles worth more than the year's subscription to readers interested in the subjects treated. The ample pages of the SUPPLEMENT enable us to present full details pertaining to topics discussed with working drawings where such illustrations are useful.

SITE OF THE NEW YORK FAIR OF 1883.

The Executive Committee of the World's Fair of 1883 have at length agreed upon Inwood as a site. The tract selected lies in the extreme northern part of New York city, eleven miles from the City Hall, and has a mile frontage on Broadway or King's Bridge Road, and a mile frontage on Harlem River. It contains 250 acres, the free use of which the owners have offered to give to the Commission for the purposes of the Fair. The ground is already served with gas and Croton water, and is level or gently undulating. The water along the Harlem front is from 18 to 40 feet deep at low tide. There is also an admirable water front along the Hudson river, which is separated from the Fair site by a ridge, in which is a convenient depression for a railway for passengers and freight. The least distance to the Hudson, where abundant docking privilege has been secured, is 1,400 feet, and the exhibits from foreign ports can be landed at Inwood pier, within half a mile of the grounds. The only objection to the site is its distance from the lower part of the city. The means of access to it, however, are the best. Its drives are parkroads. The old track of the Hudson River Railroad passes one side, the new track lies just across the Harlem. It is nearer than any other site proposed to all the other railroads tributary to New York except the Long Island Railroad. The Western lines terminating at Jersey city can deliver their passengers at the grounds by means of ferryboats. All the elevated roads can readily be called into requisition in carrying passengers, and the facilities for water transit and the accommodation of shipping are abundant. The ground is ample, naturally drained, and well suited to the needs of the fair; and the location is one of the most beautiful in New York. It has many historic associations, the site being bounded on the east by Harlem River and heights, on the south by Fort George, formerly Fort Clear View; on the southwest and west by Forts Washington, Nelson, and Tryon, and on the north by Inwood Hill.

COMPRESSED AIR AS A MOTIVE POWER.

It is very well known that in the matter of the consumption of fuel, the most economical steam locomotive compares very unfavorably with first-class stationary engines, the difference being so great as to admit of allowing a large margin for loss in applying the power of stationary engines to the propulsion of trains.

The use of electricity for this purpose has its advocates, and wire rope transmission is believed by some to meet the requirements for short lines, but among the various practicable methods of applying power from a fixed source to the propulsion of trains, nothing has been developed thus far that promises better than compressed air. It is cleanly, safe, and free from the many objections raised against steam, and seems in every way adapted to railway purposes, especially on short routes and for underground roads.

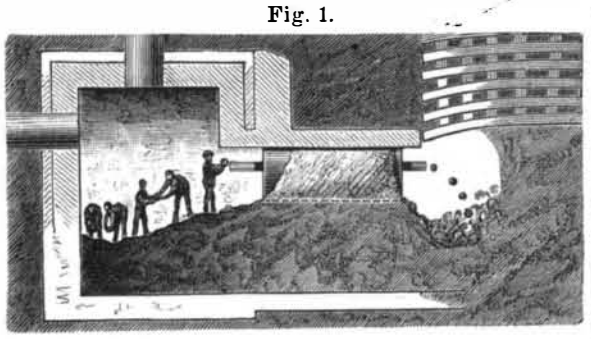
A new method of using compressed air, and a novel locomotive for carrying out the method, is being introduced by Mr. R. Ten Broeck, who is located at the Windsor Hotel, in this city. The new system is the invention of a well-known English engineer, who has studied the capabilities of compressed air as a motive agent, and has devised machinery for utilizing it to the best advantage.

PROGRESS OF THE HUDSON RIVER TUNNEL.

The crib-work of the river bulk-head, which has been the source of so much delay in the prosecution of the tunnel under the Hudson River, is again giving trouble.

As a matter of prudence the work on the north tunnel, which was in no way injured by the influx of water, has been suspended until the south tunnel can be carried past the crib-work. This tunnel had been driven as far as the inner edge of the crib-work when the fatal break occurred; and when the water had been pumped out after the sinking of the caisson and the work of tunneling began again, it

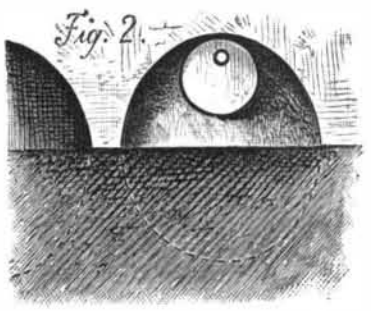
Fig. 1.



was discovered that the inrush of water through the loosely constructed crib-work had not only washed out much of the earth which had filled the spaces between the timber and stones, but had excavated the large hole shown in our engraving. Two serious hinderances were thus placed in the way of the work: the absence of support for the timbers of the crib on their original inclination caused them to drop below the upper line of the tunnel, necessitating their removal before the tunnel shield could be pushed forward, and the washing away of the protecting silt allowed the water to flow in, and the compressed air of the tunnel to escape.

The cavity was discovered by sounding. Instead of clearing out the original tunnel at once, a small pilot tunnel, six feet in diameter, was first driven through the washed-in silt almost to the cavity. Then a six inch tube was thrust through the remaining wall of silt, and an attempt was made to pass through the tube a sufficient quantity of mud-balls to fill the opening. It was thought that this had been accomplished, and the mud wall was removed only to discover a leak through the crib that defied the usual means of stoppage by the use of bags of bran and the like. At this stage of the work the recent serious inflow of water occurred, compelling a change in the plan of procedure.

Fig. 2.



The new plan involves the construction of a movable bulkhead fitting the pilot tunnel like a piston. This is to be driven forward by means of a jack-screw, placed as shown in our engraving, until the inner edge of the crib-work is reached. Meantime through a 3½ inch tube piercing the piston bulkhead, balls of mud are to be forced by the pressure of the air, until the opening under the crib is completely filled. When this has been done, the work of excavation can be narrowed to a small area, the obstructing timbers removed in detail, and any considerable leakage prevented by pushing forward foot by foot the iron shield of the tunnel. The troublesome cribwork being safely passed, and the second tunnel-heading fairly under the river, the work on both tunnels can go on unhindered.

THE SPREAD OF DIPHTHERIA.

The unusually large number of fatal cases of diphtheria, now occurring in this city and Brooklyn, and in many in rural districts as well as in our larger towns, call for especial care and intelligence in preventing the generation and spreading of this terrible disease. The following statement of the symptoms of the disease, and the precautions to be taken where it prevails, is being distributed by the Health Department of this city. Everybody should read it and attend to its warnings.

Cleanliness in and around the dwelling, and pure air in living and sleeping rooms, are of the utmost importance where any contagious disease is prevailing, as cleanliness tends both to prevent and mitigate it. Every kind and source of filth around and in the house should be thoroughly removed; cellars and foul areas should be cleaned and disinfected; drains should be put in perfect repair; dirty walls and ceilings should be lime-washed, and every occupied room should be thoroughly ventilated. Apartments which have been occupied by persons sick with diphtheria should be cleansed with disinfectants, ceilings lime-washed, and wood work painted; the carpets, bed clothing, upholstered furniture, etc., exposed many days to fresh air and the sunlight (all articles which may be boiled or subjected to high degrees of heat should be thus disinfected); such rooms should be exposed to currents of fresh air for at least one week before reoccupation.

When diphtheria is prevailing, no child should be allowed to kiss strange children nor those suffering from sore throat (the disgusting custom of compelling children to kiss every visitor is a well-contrived method of propagating other grave diseases than diphtheria); nor should it sleep with nor be confined to rooms occupied by or use articles, as toys, taken in the mouth, handkerchiefs, etc., belonging to children having sore throat, croup, or catarrh. If the weather is cold, the child should be warmly clad with flannels.

When diphtheria is in the house or in the family, the well, children should be scrupulously kept apart from the sick in dry, well-aired rooms, and every possible source of infection through the air, by personal contact with the sick, and by articles used about them or in their rooms, should be rigidly guarded. Every attack of sore throat, cough, and catarrh should be at once attended to; the feeble should have invigorating food and treatment.

The sick should be rigidly isolated in well-aired (the air being entirely changed at least hourly), sunlighted rooms, the outflow of air being, as far as possible, through the external windows by depressing the upper and elevating the lower sash, or a chimney heated by a fire in an open fireplace; all discharges from the mouth and nose should be received into vessels containing disinfectants, as solutions of carbolic acid or sulphate of zinc; or upon cloths, which are immediately burned, or if not burned, thoroughly boiled or placed under a disinfecting fluid.

PETROLEUM FOR HARBOR DEFENSE.

A correspondent in York, Pa., Mr. D. K. Naell, suggests the use of burning petroleum for repelling hostile fleets from harbors like those of Baltimore, Philadelphia, and New York. A hundred thousand barrels of oil poured upon an out-flowing tide would cover a large area of water, and when set on fire would sweep a fleet with a torrent of destruction that nothing could resist. When a stream of burning oil ran down the Allegheny River last winter the flames sometimes leaped up nearly a hundred feet, and threw out lateral tongues of fire terrible to see. Such flames around an iron-clad fleet would asphyxiate all on board.

Another plan would be to link together long lines or rafts of oil barrels and send them against the fleet by small swift steam launches that could be steered by electricity from the shore. The barrels could be exploded and the oil fired by the same agency at the proper moment; and, if necessary, line after line of the fire rafts could be drifted or driven against the enemy until every vessel was destroyed. Such an application of floating fire might also be used to protect a system of torpedoes in a ship channel, by making it impossible to operate any counter system for exploding or removing the torpedoes by men in small boats.

Obviously this plan would not do to rely upon generally; though in certain emergencies it might be resorted to with terrible effect.

A Cup of Tea.

In a recent lecture by Mr. G. R. Tweedie, F.C.S., London, on "A Cup of Tea," the speaker divided his subject into four sections—the tea, the water, the milk, and the sugar. The lecturer first drew attention to tea drinking with everyday life, and showed that the principal components of tea were theine and the essential oil of tannin, which latter possessed astringent properties. He informed the audience that the best time to take tea was about three hours after dinner or any other heavy meal, and deprecated in the strongest terms the excess to which tea drinking is carried by some people, asserting that such a practice induced a nervous disorganization and impeded digestion. He showed that the sole difference between black and green tea was one of preparation, and that both kinds could be obtained from the leaves of the same plant. After asserting that the adulteration of tea had very much decreased of late years, which the tea drinking public will be glad to know, the lecturer proceeded to treat of the various kinds of shrubs grown in different parts of the world and the countries where the different kinds of teas were consumed, the lecturer came to the consideration of the milk, its value as a nutritive agent, and referring to its adulteration he made the astounding assertion that in London alone every year no less than £70,000 was spent on water which was sold as milk. Passing on to regard the sugar, the lecturer denied the common error that sugar was injurious to the teeth, bringing forward as an example the negroes of Jamaica, who, he said, though they were the greatest eaters of sugar in the world, were proverbial for their beautiful teeth.