

# SCIENTIFIC AMERICAN

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### A Chance for Inventors.

An admirable opportunity for inventors is afforded by the necessity of the government of India, which demands some economical substitute for the wooden telegraph poles that so quickly decay in that climate; and the matter is one of more than ordinary interest, because of the rapid extension of telegraph lines there and the great probability of their large and immediate increase.

Iron telegraph poles have, it is true, been substituted for wooden ones in a number of instances, but neither the cost nor style of them gives satisfaction; what is sought for is a cheap tapering post, light enough for convenient handling, and strong and durable enough to withstand the climatic changes of the country.

These conditions are not yet satisfactorily filled by any of the present designs, and it seems evident to us that they can be only by a machine made post. For a combination of lightness and strength with cheapness, perhaps nothing could excel a post made of strips of iron wound spirally, and well locked and riveted; we have seen straight pipes made in this manner by machines, both here and in England, but they have not been approved of for the purposes alluded to because of their shape.

And in England especially the iron ship building interest seeks for a machine made tapering iron tube for masts and spars, for the manufacture of them now involves too much

hand labor, and consequent expense, to satisfy the builders, and they are ready to welcome the invention that will fill their requisitions. Here, too, the demand would doubtless be great enough to well reward the inventor, while the lighter and smaller tapering tubes would meet with ready sale for flagstaves, fence posts, and numberless other purposes.

### THE DELAWARE SHIP CANAL.

The long talked of ship canal to connect Chesapeake Bay with Delaware Bay, and shorten the water route from Baltimore to New York and Europe some 225 miles, seems likely now to become a reality. The estimated cost of the canal—17 miles long, 100 feet wide, and 25 feet deep—is \$4,000,000; and the promoters claim that the present commerce of Baltimore would give to the canal an income of \$800,000 from the authorized rate of toll, 20 cents a ton. The canal is to follow the valley of the Sassafra, and be without locks. By means of it vessels will be enabled to make three voyages between New York and Baltimore in the time now required for two, and the route will be much safer.

### AMERICAN INVENTIONS IN BAVARIA.

We have received through the kindness of Mr. James M. Wilson, U. S. Consul at Nuremberg, a finely illustrated descriptive catalogue of the American tools and small me-

chanical devices on exhibition in the Industrial Museum of that city. The collection was made by the secretary of the institution, Dr. Seelhorst, who was one of the Royal Bavarian Jurors at the Centennial Exhibition. Impressed by the ingenuity and practical value of American inventions, Dr. Seelhorst not only collected a large number of the more portable specimens for the museum, but has since spent much time in pointing out to the manufacturers and artisans of Bavaria, in public lectures and otherwise, the special excellences of American products in this line. The catalogue gives with each figure the name of the inventor and the post office address of the American manufacturer.

### EDISON'S MEGAPHONE.

From the time of the first man until now, men have endeavored to circumvent nature so as to grasp that which the unaided faculties could never attain. We have telescopes for viewing remote objects, microscopes for making visible the minute, telephones for talking over immense distances, and now, at last, we have a megaphone, which is to the ear almost what the telescope is to the eye, or the telephone to the vocal organs.

The speaking trumpet, which, for two centuries at least, has been employed to direct sound so that it may be heard over a long distance, is much used at sea, and is often em-  
[Continued on page 114.]

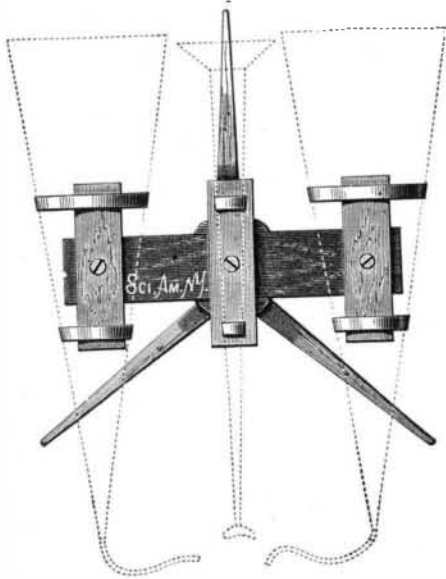


EDISON'S MEGAPHONE.

[Continued from first page.]

ployed on land to direct vocal sounds so that they may be heard above other sounds. It is tolerably certain that the speaking trumpet is of modern origin, and that it is the invention of Samuel Moreland, 1670.

Kircher, in his *Ars Magna et Umbra* and in his *Phonurgia*, mentions a kind of gigantic speaking trumpet, described



PLAN OF MEGAPHONE.

as the horn of Alexander. According to Kircher, this horn enabled Alexander the Great to call his soldiers from a distance of ten miles. The diameter of the ring must have been 8 feet, and Kircher conjectures that it was mounted on three poles.

Late in the last century Professor Huth, a German, made a model of the horn, and found that it served as a powerful speaking trumpet, but we are considerably in doubt as to the distance through which sounds can be projected through such an instrument.

The ear trumpet, which is the counterpart of the speaking trumpet, has been made in various forms during the last two centuries, but no form yet devised has any advantage over a plain conical tube with a bell-shaped or flaring mouth.

Common forms of ear trumpets are shown at 1, 2. The one at 3 is telescopic; 4 is provided with a diaphragm (shown in dotted lines), which renders the sound less confused, though it does not increase its strength; 5 is a shell having a mouth piece and ear tube; and 6 is a stethoscope. So much for the antecedents of the megaphone.

Professor Edison, in his researches on sound, has made many curious experiments, one of the most interesting of which is that of conversing through a distance of 1½ to 2 miles with no other apparatus than a few paper funnels. These funnels constitute the megaphone, an instrument wonderful both for its simplicity and effectiveness. In the plan view the details of construction are clearly shown, and our large engraving represents the instrument as it stands on the balcony of Professor Edison's laboratory. A mile and a half distant, at the spot indicated by the two birds, there is another instrument exactly like the one in the foreground.

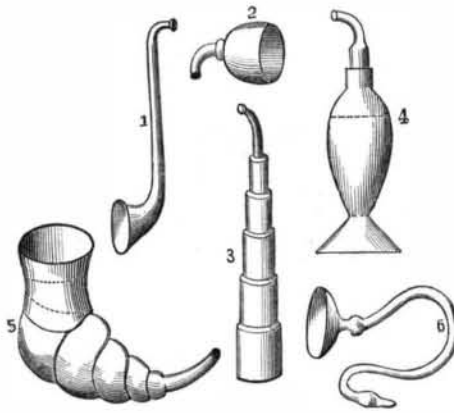
The two larger funnels are 6 feet 8 inches long, and 27½ inches in diameter at the larger end. These funnels are each provided with a flexible ear tube, the end of which is placed in the ear. The speaking trumpet in the middle does not differ materially from the ordinary ones. It is a little longer and has a larger bell mouth. With this instrument conversation can be readily carried on through a distance of 1½ to 2 miles. We have conversed and heard singing through the distance named, although both the singing and talking were in the ordinary tone of voice. A low whisper, uttered without using the speaking trumpet, is distinctly audible at a thousand feet, and walking through grass and weeds may be heard at a much greater distance

**American Horse Cars.**

A *World* reporter has obtained from the veteran street car builder, Mr. John Stephenson, of this city, a column of interesting facts concerning the origin and progress of street railroads and horse cars throughout the world. The first street car line, the Fourth Avenue, was opened in 1832, and the following year Mr. Stephenson took out his first patent for improvement in car building. No other roads were opened in New York until 1852, when the Second, Third, Sixth, and Eighth Avenue lines were inaugurated. In 1856-7, Boston and Philadelphia adopted street cars, and some years after the leading Canadian cities followed. In 1869 the first street car line outside of America was started by George Francis Train, at Birkenhead, England. The same year a road was built at Buenos Ayres, South America. About the time of the Vienna Exhibition, tramway lines were built at Brussels and Berlin. Very recently they have been adopted in Paris, in Russia, in South America, and almost everywhere in the large cities of the English colonies.

Mr. Stephenson's business is cosmopolitan in scope. He said: "Besides orders for various cities in the Union, we have orders in the shop now from London, Paris, Chorillos, Peru; Hamilton, London, and Toronto, Canada; Port Adelaide and Gawlertown, Australia; Kingston, Jamaica; Lima, Peru; City of Mexico; St. Petersburg, Russia; Wolverhampton, Swansea, Hull, and Liverpool, England; Jalapa, Mexico; Bahia, Brazil; Amsterdam, Holland; Wellington, New Zealand; Berlin, Germany; Rio Janeiro; Christiania, Norway; Hamburg, and many other places. We have an order for twenty-five cars for the North Metropolitan Tramway of London, the largest street railway corporation outside of the United States. There were nineteen competitors for the order."

In answer to the question, "How is it that you can compete with the foreign manufacturer in his own town?" Mr. Stephenson replied: "Shortly after the Hull road had been stocked by us, a Birmingham manufacturer accosted Alderman Bannister, of that city, and asked him why he sent the order for the cars to America. The Alderman replied that the town had patronized American industry because it was found that a better car could be procured for £35 less than the Birmingham man could furnish one for. Our cars weigh less by one half than those made in Germany, and the cars we furnished Glasgow are operated with a stable one third less than their own require. The nature of American woods has much to do with our success. The selection and preparation of material are no light job; the process of preparation requires three or four years. Our object is to obtain strength with lightness. The American irons are tougher than the English, and we can get the required strength with less weight than they can. We use white oak, white ash, poplar, basswood, hickory, beech, maple, and pine—woods all easily procurable by us, while the English are obliged to use principally teak imported from the West Indies. Teak is used largely in ship building, and is always in the English market. The English manufacturer does not seem to possess that quality of discriminating between the different kinds of woods, which long experience has given our firm. The selection of wood is a practical



EAR TRUMPETS.

science. Their ideas are heavier than ours, and because their woods are inferior they have been obliged to re-enforce with iron at the expense of lightness. Our raw material is abundant with us and is inexpensive. Then our labor-saving machinery is such that no small establishment can compete with us. We meet with considerable opposition abroad, and the press is used to raise a cry against any corporation sending money away from home, especially in the present

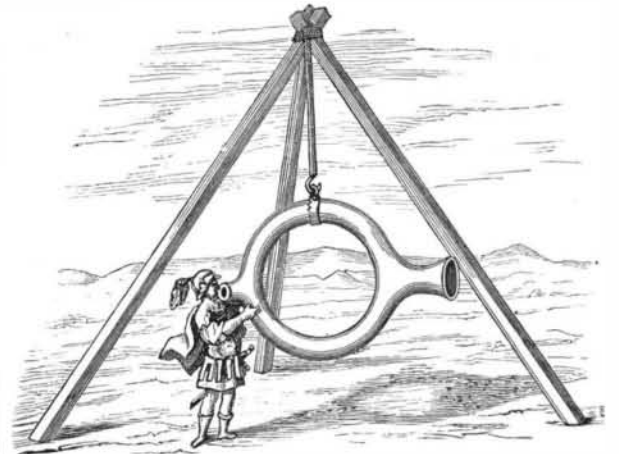


SPEAKING TRUMPET IN THE MERCHANT SERVICE.

hard times." The cost of a modern car, ready for use, was given as from \$1,000 to \$1,200.

**Proofs of Prosperity.**

With nations, as with individuals, increased income with diminished expenditures is the surest evidence of prosperity. Judged by this standard the United States have been more than ordinarily prosperous the past year. The following comparison of the exports and imports of the country for the year ending July 31, 1878, with those for the previous



THE HORN OF ALEXANDER.

year, are conclusive on this point. The figures are those of the Bureau of Statistics:

MERCHANDISE.			
	1877.	1878.	
Exports—Domestic	\$588,670,224	\$680,683,798	
Foreign	12,804,596	14,200,402	
Total	\$602,475,220	\$694,884,200	
Imports	451,323,126	437,051,533	
Excess of exports over imports	\$151,152,094	\$257,832,667	
GOLD AND SILVER (COIN AND BULLION).			
	1877.	1878.	
Exports—Domestic	\$43,134,738	\$27,054,985	
Foreign	13,027,499	6,678,240	
Total	\$56,162,237	\$33,733,225	
Imports	40,774,414	29,821,313	
Excess of exports over imports	\$15,387,823	\$3,911,912	
TOTAL MERCHANDISE AND SPECIE.			
	1877.	1878.	
Exports—Domestic	\$632,804,962	\$707,738,783	
Foreign	25,832,495	20,876,642	
Total	\$658,637,457	\$728,615,425	
Imports	492,097,540	466,872,846	
Excess of exports over imports	\$166,539,917	\$261,742,579	

Thus, in comparison with last year, the foreign trade of the country shows a gain for 1878 of nearly one hundred million dollars.

**FURTHER EVIDENCE OF ATLANTIS.**

In "Glimpses of Atlantis" (SCIENTIFIC AMERICAN, July 28, 1877), we reviewed at considerable length the evidence furnished by American geology and paleontology, and the deep sea explorations of recent years, touching the continent that formerly lay where the Atlantic now rolls. Another glimpse of that vanished land is furnished by the eocene deposits of England. In discussing the character and evident origin of those deposits (*Pop. Sci. Rev.*, July, 1878), the English geologist, M. J. Starkie Gardner, shows that throughout the whole eocene period a great river flowed from the westward, its estuary covering at first the southeastern and then the southern part of what is now England. The magnitude of this river, together with the multitude and variety of the flora and fauna brought down by it, and the former total severance of the North Sea from the Bay of Biscay, Mr. Gardner believes, reduce from theory to fact, and in the most positive manner, the assumption that a great extension of land then existed to the west of Cornwall. The extraordinary mingling of American, Asiatic, Australian, and African genera in all European floras of the tertiary periods shows no less conclusively that some communication existed between these several lands in former times.

After showing how this commingling would be made possible by the elevation of the "Dolphin" and "Challenger" ridges, as described in this paper a year ago, Mr. Gardner asserts that, without entering upon the discussion of probabilities, the fact remains that a great tract of land formerly existed where the sea is now, and that Cornwall, the Scilly and Channel Isles, Ireland, and Brittany are the remains of its elevated land. It must at least have been as large as France, Switzerland, and Germany, although unconnected with southern Europe. There is in addition, he adds, an ever increasing mass of botanical and zoological evidence showing that the Atlantic Isles formerly must have been portions of a great continent; and Wollaston, from a study of the insects of the Azores, Madeira, etc., quite recently has been able emphatically to reiterate this fact.

The final submergence of the land did not take place until miocene times, and was coincident with the elevation of the Alps.