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OUR EXPORTS AND THE TRADEMARK.

The most significant and prophetic fact in the history of commerce at the close of the nineteenth century is the phenomenal increase of the export trade of the United States. Measured by the rate of growth of the exports of other countries, it has no parallel. Time was (and that but a few years ago) when we depended almost entirely upon European factories for certain lines of merchandise, which to-day we not only make for ourselves, but sell abroad in large and ever-increasing quantities. It is unnecessary to repeat the statistics of our success; its reality, and its recognition by the nations of the Old World, are proved by the use of the term "American invasion," which originated in Europe and has been voluntarily accepted as best expressing, from a foreign point of view, the gravity of the commercial situation.

Although the success of this "invasion" is due primarily to the low cost of our manufactures, and this, in turn, to improved machinery and methods, our goods are forcing their way into European markets largely an account of certain national characteristics in the way of convenience, handiness, lightness, neat appearance and all-round simplicity. These characteristics are summed up in the European mind under the term "American;" and the purchaser over there has come to recognize the fact that whether the subject of his purchase be a carpet-sweeper or a machine-tool, the fact that it is "American" guarantees its possession of certain qualities that are dear to the heart of the user.

What is true of the national is true of the individual export, and it is evident that if we are to reap the full benefits of a reputation so distinctive and valuable, an effort should be made to protect this reputation against every form of fraudulent imitation. That the successful inroads of American trade will lead to strenuous efforts at imitation goes without saying, and unless our commercial houses make haste to protect their goods by registering trademarks in those countries in which they are establishing a market, they will find that these very trademarks have been already appropriated as a defensive measure by their foreign competitors.

It is a fact, too little understood and appreciated by our commercial houses, that in many foreign countries the exclusive right to use a trademark is granted to anyone who may apply for it, irrespective of the question as to whether he is the first user. Thus, if a United States firm is making large sales, say of an Anchor brand of flour, in Germany, there is nothing to prevent a German citizen from registering that very trademark for flour, and using it on his own barrels, to the exclusion of the actual American product under that particular mark.

In urging our manufacturers to secure trademark protection at a time when they are so successfully establishing themselves abroad, we would speak a word of caution against the practice of registering trademarks in the name of a foreign agent. While this is done to simplify matters in bringing suit against infringers, it is liable to place the manufacturer in a difficult position in case of disagreement with the agent, who, holding the trademark in his own name, is legally entitled to the use of it should he be disposed to open in business on his own account. Although this is an extreme case, and probably would not often occur, we mention it as one among several reasons which render it advisable for a manufacturer to secure the important trademark privileges in his own name.

MASONRY AND TIMBER DRY DOCKS.

If we are quick to learn the lessons of the past, there will be no more timber dry docks built in this country, at least for the uses of the navy. Between a masonry and a timber structure the advantages urged in favor of the latter are, or rather have been, rapidity of construction and small first cost. To these considerations alone is due the fact that so many of these objectionable structures are to be found in our navy yards. The objections to the timber dry dock are many and serious, and do not diminish with the lapse of time. On the other hand, the advantages are by no means so great to-day as they were forty or fifty years ago. Up to a recent date it has been customary for the advocates of timber structures to quote the cost of the stone docks at Mare Island and New York, in contrast with the relatively low cost of timber docks. Those two docks cost respectively $2,000,000 and $2,750,000, whereas timber docks have been built for about $600,000. As a matter of fact, however, the New York and Mare Island docks were built by the government by day labor, and we all know that work of this kind has never been conspicuous for its economy. The contracts for the two new stone docks to be built at Boston and Portsmouth were let at $1,013,400 and $1,089,000, respectively, although these will be larger and more important structures. The reduction of the cost as compared with the older structures is over 50 per cent. At the same time it must be remembered that the contract price for two new timber docks to be built at League Island and Mare Island was respectively $729,000 and $782,600; from which comparison we see that all the advantages of a masonry structure may be gained at an increase in cost of from 25 per cent to 30 per cent. The question arises as to whether this increased cost is not completely offset by the greater durability of the masonry structure. Experience proves beyond all question that it is; for the history of timber docks in the navy has been a history of failure. Not only have they been a source of constant anxiety to the officials in charge, but they have been frightfully extravagant in the cost of repairs and renewals. Moreover, on more than one occasion the failure of the wooden docks has brought the ships of the navy within measurable distance of disaster.

The chief drawbacks to the timber structure are that it is liable to rapid and hidden decay, and that seepage of water from the outside channel, or the existence of concealed springs at the back of the dock, may at any time wreck it by bursting in the sides. A notable instance of this was the failure of the two timber dry docks at the New York navy yard, Brooklyn. The big dock, known as No. 3, commenced to leak immediately after it was completed, and repairs were necessitated which lasted for eighteen months and involved an expenditure of $170 000. The timber dry dock No. 2 of the same navy yard was wrecked during a heavy rain storm in July last, when the hydrostatic pressure due to accumulation of water behind the altars was sufficient to burst in the side of dock. In this case a structure which originally cost $500,000 has so completely failed within nine years of the date of completion as to necessitate the expenditure of 60 per cent of its first cost to put it again in a serviceable condition. The timber dock completed at League Island, Philadelphia, in 1891, is already so far decayed that shores of timber have had to be placed at certain points which showed signs of weakness, to prevent collapse, and when the dock was uncovered for repairs, it was found that the tops of the piles were in some places entirely rotted away. The timber dry dock at Port Royal station, which was finished just before the Spanish war, is reported by Admiral Endicott as having experienced a series of accidents in the way of failure of portions of the structure, and, indeed, it is in such a perilous condition that $500,000 is recommended by the Admiral for its immediate rebuilding.

In view of these facts we trust that Congress will disregard the solicitations of the interested parties who may desire to see timber dry dock construction continued in the navy, and that they will heartily support the recommendation of Admiral Endicott, the Chief of the Bureau of Yards and Docks, that stone be substituted for timber in constructing the two docks which are about to be started at the League Island and Mare Island yards. The subsequent repairs to timber docks, as we have seen, bring the ultimate cost far beyond that of a reliable and durable stone structure, and on the question of facility of erection it is enough to say that the contractors for the new masonry docks at League Island and Mare Island undertake to build them in the same time that is allowed for the construction of the two timber docks at those yards.

REMARKABLE FRENCH RAILWAY EXPRESS SERVICE.

In the last issue of the SCIENTIFIC AMERICAN we gave a somewhat elaborate comparison of the great railway systems of the world, based on the length of the track and the magnitude of the equipment and freight and passenger traffic. In this comparison we took no account of speed, which, of course, as a modifying factor should exert a powerful influence in determining the question of relative excellence. The French railroad system, which in point of size and importance ranks about fourth among those of the world, stands easily at the head of the list in respect of the number and speed of its express passenger trains. A recent tabulation of these trains shows that Le Chemin de Fer du Nord operates no less than forty-five trains a day with an average running speed, including stops, of from fifty to sixty miles an hour. Of these, eleven have a speed of fifty miles an hour, nine of about fifty-one miles an hour, eleven about fifty-two miles an hour, three of about fifty-three miles an hour, ten of from fifty-four to fifty-seven miles an hour, and one train has a timed running speed of sixty and a half miles an hour. It will be evident to anyone who is acquainted with the subject of high speed travel that these are extraordinary results; and while this country and Great Britain have a few trains of from fifty to fifty-four miles an hour speed, and the United States runs two summer trains at rate of about sixty miles an hour, such speeds are not characteristic of the whole of the express service. Mr. Charles Rous-Marten, who is the best known expert abroad on the question of express trains and their performance, states from personal knowledge that the trains are not by any means mere racing outfits, but weigh from 150 to, in some cases, as high as 300 tons. The hauling is done by a new type of four-cylinder compound engine, designed by Messrs. De Glehn and Bousquet. We hope to illustrate these engines at an early date, and at the same time give some further data concerning the grades, consumption of fuel, and other particulars showing the true merit of the performance. As compared with the speed of the average express trains of this country, these results are certainly a great advance. Of course, it would be possible for us to run trains at the same speed and in the same number, but it would necessitate one of two things—either we should have to build engines of even greater power than the powerful types which we have atwork (which is scarcely possible), or else it would be necessary to split the trains in two, using two engines where we now use one, which is practically the method adopted on the Continental roads.

THE POSSIBILITIES OF DEEP MINING IN THE TRANSVAAL.

In a paper recently read before the South African Association of Engineers by Mr. John Yates, who has been for many years identified as an engineer with mining on the Rand, the possibilities were discussed of mining of much deeper levels than any that have been hitherto reached. It seems that at present there are what are known as the outcrop mines and the first and second deep levels, while work has been commenced on other shafts which are expected to reach gold-bearing veins at a depth of from 4,000 to 5,000 feet. Mr. Yates is of the opinion that in the future, when it comes to mining at lower depths than 5,000 feet, the best method would be to run from the lowest existing levels down to the underlying reefs by means of inclines, rather than by sinking vertical shafts. It is assumed by the writer that the limit of depth at which mining operations can be carried on will be 12,000 feet, and he bases this estimate upon the fact that the increase of temperature, which in the Rand mines is at the rate of 1° for every 205 feet, would bring the temperature at a 12,000-foot level up to 100° F. or more; at which it is considered that miners would be unable to perform effective work.

This rate of increase of temperature is estimated from observations taken in various bore holes which have been put down in the Rand mines, and the maximum temperature for the greater depth is based on the assumption that the increase would be in a steady ratio. In commenting upon Mr. Yates' paper, The Mining and Engineering Journal draws attention to the fact that this rate of increase is much greater than that which is experienced in our deep Michigan copper mines, and raises the question whether sufficient allowance has been made for the lowering of the temperature which would follow the opening of the workings and would undoubtedly be produced by proper ventilation of the lower levels. We think that the exception is certainly well taken, for it would be possible with our modern improved machinery for ventilation to carry to these lower levels sufficient cool air to very materially modify their temperature, although we think the suggestion offered that liquid air could be used to advantage is based upon an over-sanguine estimate of the practical value of this means of refrigeration. There is a general consensus of opinion among geologists and mining engineers as to the extent and richness of the "banket" beds of the Witwatersrand, and unless they are mistaken, the opening up of the lower beds, even at depths of from 12,000 to 15,000 feet, would be a profitable undertaking in spite of the enormous amount of capital that would be sunk in reaching them. It is estimated, however, that these lower workings must be richer than they have yet proved to be, if they are to justify the enormous amount of capital which would be involved in sinking to such great depths.

RECOVERY OF SUBMERGED LAND IN HOLLAND.

The unconquerable persistence of the Dutch race is very much in the public eye just now. Alike in peace and war the inhabitants of the Netherlands have shown their ability to pursue a project with that tireless patience which, other things being equal, is certain to bring success. The struggle between the people of the Netherlands and the encroachments of the waters of the Zuyder Zee is a thrilling story, and the fight evidently

is not over yet. The land that has been recovered has been held, and now a further and determined effort is being made to recover the submerged territory, which hundreds of years ago was included within the coast line of the Netherlands. The present attempt does not contemplate the recovery of the whole of the Zuyder Zee, but if the plans do not miscarry, it is certain that nearly 800 square miles of land will be reclaimed within the next third of a century at an estimated expenditure of $48,000 000.

The scheme contemplates the construction of a huge dike across the Zuyder Zee, the location of which will be determined by the favorable conjunction of shallow water and adjacent islands. Nine years out of the thirty-three which is the estimated time for the construction of the whole scheme will be occupied merely in the construction of this dike, whose total estimated cost will be $17,000,000. When the dike is completed, the herculean task of pumping dry the huge lake thus formed will commence, and considerations of economy will lead to its being carried on by means of the typical Dutch windmills which form such a picturesque feature of a Holland landscape. Although the work of drainage is to extend over a quarter of a century, the returns on the enormous expenditure of the capital will commence simultaneously with the pumping, and as it is estimated that the drained land, on account of its extreme richness, will have a market price of $300 an acre, it can be seen that this great undertaking is likely to become a paying investment long before it is finally completed.

AMERICAN APPLES AT HOME AND ABROAD.

Since the West and Northwest entered extensively into apple-growing, the so-called "off years" in this crop no longer affect the markets as they did fifteen and twenty years ago. One season of great scarcity then, with extremely high prices, would often be followed by a year of superabundance, when the markets would be glutted with apples, which were difficult to dispose of at any price. The thousands of acres of apple orchards in the great West prevent an old-fashioned famine in apples, and the improved methods of exporting the fruit, and the numerous factories which make cheap jellies and preserves, tend to distribute the abundant crops so well that unprofitable prices do not rule in the markets in good seasons.

The present harvesting season of the apples is now in progress, and the official reports indicate an "off-season," which ten years ago would mean an apple scarcity this winter that would make the fruit an expensive article of diet. But prices will advance only a trifle over those of last season. The factories will consume fewer marketable apples, and depend more upon the apple waste, such as cores and peelings, for their supply. These jelly factories in good seasons buy apples on the trees, but in years like the present they can make their apple sirup-jelly from the waste of the canning factories. There are some 130 factories in the country engaged in canning this fruit and making cheap jellies and sirups. In the aggregate they have an annual capacity of over 200,000,000 jars of jelly alone. The jellies made from the apple waste are almost as good and wholesome as those manufactured from the whole apples. The cores and peelings, and small, inferior apples are ground up and the juice extracted from them. This juice or sirup becomes the foundation of the cheap jellies, and not chemical compounds as some suppose.

The West has become such an important factor in the apple problem that it is estimated that these comparatively new orchards could supply all the apparent needs of the markets if half the trees in the country failed to produce anything. At first the sudden flood of this fruit from Kansas, Missouri, Nebraska, Michigan, and other Western States completely demoralized the Eastern markets, reaching a climax in 1896, when apples in New England were offered on the trees at 15 cents a barrel and hand-picked Baldwins delivered on the cars at 40 cents a barrel. The orchards in the West were planted in 30, 50, and 100 acres, and in order to prevent growers from going into bankruptcy a great flood of the apples was rushed to Europe. The exports of our apples have consequently grown to phenomenal proportions, and without this demand the crop would prove a financial failure every season.

Liverpool is by far the greatest distributing point for American apples, and as high as 100,000 barrels of our apples have been sold there in one week, and at remunerative prices. London, Glasgow and Hull also receive immense cargoes of American apples, and absorb on an average from 20,000 to 30,000 barrels a week during the season. The apples are sold in Liverpool by the auction system. A large room is provided for the buyers and the auctioneer. In the center of this room there is a portable platform or a freight elevator, where samples of the lots to be disposed of are exhibited. An auctioneer who has a line to dispose of has forty minutes at his disposal, and if his goods are not all sold in that time he must temporarily stand aside to make room for another salesman. Monday, Wednesday, and Friday are the auction days, and a single auctioneer may dispose of 10,000 to 15,000 barrels in a day. The apples are catalogued, and those brands which have a reputation for honesty and good packing frequently sell without sampling. One barrel from every lot of twenty is opened on the portable platform and the contents dumped into baskets, and another barrel is simply opened on the face end From an examination of these two samples the buyer judges the lot of twenty, and makes his purchase accordingly. Only tight barrels are delivered to him; "slack" barrels, where the apples rattle, are rejected. These latter sell separately, and usually from 50 to 75 cents a barrel less. When a purchaser's bid is accepted he can take his twenty barrels, or as many more of the same brand as he desires, at the same price. The apples are delivered to the purchaser direct from the steamer's dock, which saves the cost of double cartage.

Ocean rates for apples of course vary, but they usually run from 40 to 65 cents per barrel. The charges in Liverpool for dockage, insurance, advertising, sampling, town dues, and for labor of handling, amount to about seven pence English money, and the auctioneer's commission for selling is 5 per cent. The cost of getting the apples to the steamer on this side varies likewise according to the distance they have to be shipped. Picking apples in the East costs from 12 to 20 cents per barrel, according to the skill of the pickers and the amount of apples to handle. Special pickers have in recent years entered the field to contract for whole orchards, and they do the work so much better that the loss to the farmer is greatly reduced. Carelessly picked and packed apples usually yield little profit to the producers. New apple barrels cost about 17 cents, which must be added to the cost of harvesting; and sorting, heading and getting to railroad shipping points, about 8 cents more. Thus a barrel of apples costs the farmer from 40 to 46 cents before the transportation charges to the city are made. These latter cannot be estimated, on account of the differences in the distance from the markets. The cost of delivering a barrel of apples from a town in Kansas to New York is very much higher than the Hudson River growers have to pay when they send their fruit down by boat.

Our yellow Newtown or Newtown Pippin is probably the greatest favorite in England, and it often sells for two or three times as much as any other apple. This variety was introduced in London by Benjamin Franklin in 1758, and has been a prime favorite ever since. Next to this the red varieties are chiefly in demand. The Baldwin is a good apple for export, for its high color pleases the English, and it has good shipping qualities. More apples of the Ben Davis variety are grown to-day than any other, because in the West it does better than almost any other type of this fruit. It is a good keeper and shipper, and sells faily well abroad. In the East this variety does not do as well as in the West. The Rhode Island Greening, Northern Spy, and Winesap are other great favorites at home and abroad, and they are raised in large quantities in this country and Canada. G. E. W.

THE TRUE INVENTOR OF THE TELEGRAPH.

BY HEILEMAN WILSON.

At the close of this century, when the seeming perfection of the wireless telegraph excites the wonder and admiration of the world, it is interesting to look back and note the first steps toward telegraphy, and also to learn of the first true inventor of the electric telegraph. In rude forms, even among the most savage nations, there has always existed some system of communicating intelligence by signals, which during the daylight might be of almost any type, though at night luminous ones of necessity had to be used; but neither of these signals was visible in fogs, and so for days there could be no communication at all. This interruption happened most notably at the time of the battle of Waterloo, in consequence of a fog coming on during the transmission of a message from the seat of war to the admiral commanding at Plymouth. The words which reached the admiral were: "Wellington defeated;" this much of the message reached the admiral in the morning, and was the cause of great anxiety until a clear afternoon revealed the cheering words, "the enemy."

The electric telegraph, like everything else of permanent value, has been a growth, and the first step toward it was made something over a hundred and fifty years ago, in both France and England, when an electric shock was made to successfully pass through an iron wire a distance of six thousand feet in less than a quarter of a second; this was the French experiment. In England it was attempted on an even greater scale, for not only was the electric current transmitted a distance of two miles, but it was proved beyond the possibility of doubt that electricity passed instantaneously. The philosophers who made the discovery seem to have been satisfied with the result attained, for they attempted no application of the valuable fact, and it was reserved for a Scotchman living at Renfrew to suggest that messages might be sent by electricity along wires passing from one place to another. This—as it was then considered—remarkable idea was submitted in the form of an article to The Scots Magazine, Glasgow, 1753. The article bore the initials "C. M.," and this is the only name we shall ever have for the first inventor of the electric telegraph.

The plan of "C. M." was to have a set of wires, equal in number to the letters of the alphabet, stretched horizontally and parallel between two given points, and each of them about an inch from the one next to it. At the end of every twenty yards the wires were to be fixed on glass to some firm body to prevent them from touching the earth and also from breaking by their own weight. The battery—or the electric gun barrel as it was then called—was to be placed at right angles with the ends of the wires and about an inch below them. It was now necessary to contrive some scheme for forwarding messages, and for this purpose the plan of "C. M." was to suspend a ball from every wire, and about the sixth of an inch below the balls were to be placed bits of paper, each in its order bearing a letter of the alphabet. These bits of paper, or some other light substance that would be easily attracted, were to rise to the electric balls, and were so contrived as to resume their proper place when dropped.

All this being done, "C. M." proposed to converse with his distant friend in this manner: Having set the electrical machine going, let it be supposed he wished to open the conversation with the word *when;* then with a piece of glass or some other non-conducting substance, he would strike the wire, *W*, so as to bring it into contact with the battery, then strike the remaining letters of the word in the same way; almost instantly the correspondent at the other end of the line would observe the several letters rise in order to the electrified balls at his end of the wires; as each letter rose, it was to be written down on a piece of paper. But in the event this method should prove tiresome, "C. M." suggested that instead of the balls, a set of bells equal in number to the characters of the alphabet and decreasing in size from the bell, *A*, to the bell, *Z*, might be suspended from the roof, and from the horizontal wires there was to be another set of wires reaching to the several bells. Then the man who began the conversation was to bring the wire in contact with the battery, and the electrical spark, working on bells of different size, would inform the correspondent by the sound what bells, or wires, had been touched. Of course, to understand the language of these chimes, without writing down each letter, required some practice.

In all his plans it was evident that "C. M." had not heard of the experiments and discoveries in the transmission of electricity in England, for he seemed to fear that the force of the electric current would diminish, as, so far as he appears to have known, it had never passed further than thirty or forty yards, or at all events it might be drained off by the surrounding air. To prevent this last interference he invented a scheme of insulation, which was simply to cover each wire with jeweler's cement.

Here then we have an electric telegraph nearly a hundred and fifty years old, and although exceedingly crude when compared with the many improvements of the present day, yet, since it could swiftly and accurately convey intelligence, it must be admitted that "C. M." was the true inventor of the electric telegraph, and that every step made since that time, however wise and valuable, can be viewed in no other light than an improvement on the idea of an unknown man. It is singular that the ingenious inventor should not have found some way of diminishing the number of wires; but he does not seem to have had any idea that his invention would be adopted, and so he probably contented himself with a general view of the principle.

VOLTA'S VISIT TO PARIS.

M. Mascart, who was one of the delegates sent by France to the Volta Centenary at Como, delivered an address on that occasion which is of interest as recording the visit made to Paris by Volta in the early part of the century. The proceedings of the Academie des Sciences for the year 1802 show that Volta repeated his experiments before the physical section of that body and was awarded a gold medal in consequence. It was after these experiments, which naturally excited great interest among the scientists of the time, that the Academy, upon the suggestion of Napoleon, founded an annual prize of 3,000 francs to be awarded for electrical researches. Besides this, Napoleon, at that time First Consul, had the sum of 6,000 francs awarded to the savant. Some time after, he wrote from Italy to the Minister of the Interior, saying, "I wish to make an award of 60,000 francs to any person who by his experiments or discoveries will make a step in the electrical science comparable to those made by Franklin and Volta." Subsequent history shows that the Academy prize of 3,000 francs was awarded to Sir Humphry Davy, Gay-Lussac and two others. The prize founded by Napoleon was not given under the first empire. Napoleon III. re-established it, and the republic continued the tradition. Under the name of the Volta prize it was awarded to Ruhmkorff, Graham Bell and Gramme.