

PORTO ARTIFICIAL DE PONTA DELGADA

NA ILHA DE SAN MIGUEL, AÇORES.

PORT ARTIFICIEL DE PONTA DELGADA

DANS L'ILE SAINT-MICHEL, AÇORES.

Les Açores, groupe d'îles dans l'océan Atlantique, appartenant au Portugal, par qui elles furent découvertes au quinzième siècle, sont généralement très-peu connues, quoiqu'elles occupent, sous le point de vue des intérêts de la navigation transatlantique, soit assez considérable.

Pour établir cette importance, il suffit de remarquer que les Açores, placés au milieu de l'Océan, à une distance presque égale de l'Europe, de l'Afrique, et de l'Amérique, se trouvent juste sur la route que les navires revenant en Europe doivent prendre inévitablement. En effet, depuis les découvertes de Colomb et de Gama, les Açores sont devenus un point de repère presque indispensable à tous les navigateurs, obligés de prendre la hauteur de ces îles, pour profiter des vents prédominants, et du grand courant, *Gulf stream*, qui favorisent leur prompt retour en Europe.

Il y a toutefois un revers à la médaille. Les navires de long cours, qui ont si souvent besoin de provisions et de réparations, évitent les Açores, où ils pourraient être abondamment approvisionnés, à cause des ouragans soudains et violents qu'on y rencontre, à partir de l'automne jusqu'au printemps. Les compagnies anglaises d'assurances maritimes sont si rigides sur ce point, qu'elles défendent absolument aux navires qu'elles assurent de relâcher aux Açores : c'est une de leurs clauses.

Après ces courtes observations, on comprendra de quelle utilité serait, pour toutes les nations maritimes, la construction dans les Açores d'un port artificiel, d'un accès facile et tout à fait sûr. Ce ne serait pas une entreprise commerciale, mais plutôt une œuvre humanitaire des plus louables.

Par les gravures que nous offrons, on verra que ce projet sera bientôt accompli. Dans l'île Saint-Michel, la principale, la plus riche et la plus commerciale des Açores, demeurant par 37° 45' 10" lat. N., et 28° 1' 45" long. O. de Paris, on a commencé un port artificiel réunissant toutes les conditions nécessaires et dont les travaux se trouvent déjà très-avancés.

Le but immédiat de cette construction, quoiqu'elle paraisse un peu trop considérable pour un si petit pays, a été de favoriser le commerce des oranges de Saint-Michel avec l'Angleterre, qui monte, tous les ans à 240,000 caisses (de 7 à 800 fruits) et dont l'exportation, s'opérant dans les mois d'hiver, souffrait de interruptions imposées par les mauvais temps, et des surcharges de frets, d'assurances, et d'autres frais exorbitants.

Du reste, ce n'est pas seulement le commerce des oranges qui a à bénéficier de cette amélioration. Saint-Michel exporte tous les ans de 130 à 140,000 hectolitres de blé, de maïs, de haricots, de fèves de maïs, etc.; on exporte du bétail, des cuirs, de la pozzolane, etc. On importe, surtout de l'Angleterre et du Portugal, des tissus de laine, de coton, de soie et de fil, des denrées coloniales, du sel, du fer et de la houille, des quincailleries, etc. Ce commerce emploie 500 bâtiments environ et représente, pour l'exportation, la valeur de 4 à 5 millions de francs, et pour l'importation la valeur de 3 à 4 millions. Ce mouvement explique la nécessité d'un port pour les besoins du commerce.

Mais dans l'avenir, quand il sera tout à fait terminé, et fréquenté par tous les navires qui pourront en avoir besoin, ce port doit acquiescer une grande importance : si nous réfléchissons que l'Angleterre seule emploie dans son commerce transatlantique plus de 8,000 navires d'un tonnage de près de 4,000,000 tonneaux, et qu'il est avéré qu'au moins 2 0/0, c'est-à-dire 160 bâtiments, souffrent de grosses avaries, dans un rayon de 10 degrés autour des Açores, on pourra se faire une idée de combien de malheurs et de pertes ce port pourra alléger les souffrances.

Un autre ordre d'avantages est réservé à cette construction. S'il devient, comme il en est question, la station d'un nouveau câble télégraphique transatlantique, que quelques compagnies américaines et anglaises projettent, le port de Saint-Michel sera une relâche très-utile aux bâtiments revenant en Europe, non-seulement pour refaire leurs provisions, mais surtout pour recevoir de l'Europe des instructions sur leur destination définitive. Et qui sait s'il ne s'y créera pas un entrepôt important ?

Une loi des Cortes portugaises, du 9 août 1860, autorise la construction de ce port, pour les frais duquel on a établi un impôt de 4 1/2 0/0 *ad valorem*, sur tous les articles importés et exportés de Saint-Michel, plus, 0 fr. 90 c. par caisse d'orange; on a en outre alloué dans le

même but une subvention de 10 0/0 sur le montant du revenu de la douane de Ponta Delgada.

La direction technique des travaux a été confiée à Sir John Rennie, ingénieur très-connu en Angleterre par la construction du brise-lame de Plymouth. L'administration et la comptabilité appartiennent à un comité, composé de six propriétaires et commerçants principaux, présidé par le Préfet.

Le plan du port, tracé par Jean Scott Tucker, et modifié par Sir J. Rennie, consiste dans un brise-lame qui s'étend en face de la ville de Ponta Delgada, sur une longueur de 3,500 pieds anglais, et formant un port large et profond, d'une entrée facile du côté de l'est et accessible par tous les temps aux navires. Un parapet de quelques mètres doit revêtir la partie supérieure du brise-lame, et un bassin doit être préparé pour mettre à sec les navires qui en auront besoin. L'ensemble de ces travaux complétera le port.

Le brise-lame est construit de grands blocs de basalte brut, de poids de 6 à 8 tonneaux qu'on amoncelle jusqu'à ce que le talus extérieur soit établi dans la proportion de 6 de base pour 1 de hauteur. Pour placer ces énormes pierres à leur place, on construit dans la mer, un échafaudage en bois, par tronçons de 25 pieds de longueur, sur lequel sont établis des rails qui se prolongent jusqu'aux carrières, situées à moins d'un mille de distance : quatre locomotives traînent un nombre considérable de wagons en fer, chargés de grosses pierres de basalte, viennent les unes après les autres déposer leur chargement dans le même endroit jusqu'à ce que le brise-lame ait atteint la hauteur convenable, et que le talus ait l'inclinaison requise. On prolonge alors l'échafaudage, à l'aide de gros madriers et de poutres qui descendent au fond de la mer, et la même opération se répète pour le déchargement des pierres.

On a observé que l'inclinaison voulue du talus n'est jamais obtenue que par le mouvement des lames dans le mauvais temps. Une fois cette pente acquise, la résistance du brise-lame est à toute épreuve. Des ateliers, dont la force motrice est la vapeur, ont été établis pour la fabrication et la réparation de toutes les pièces de locomotives, pour le sciage des gros madriers, etc. — On a même établi une fonderie en fer.

Les travaux préliminaires ont été longs, et n'ont permis de commencer le brise-lame que le 28 octobre 1862. C'est à cette date que les premiers wagons ont versé le basalte dans l'Océan. Depuis lors on n'a plus discontinué les travaux, qui sont poussés avec une grande activité. Pendant les premières années les progrès n'ont pas été rapides à cause du manque d'espace que présentaient encore les carrières, dans lesquelles on ne pouvait pas faire entrer tous les ouvriers dont on disposait.

A partir de 1864 le brise-lame fut assez avancé pour abriter quelques navires. Le steamer anglais *Vultur* en octobre 1864, et l'*Ephesus* en avril 1866, y ont opéré en peu de jours des réparations très-importantes, et qui leur ont permis de poursuivre leur route. La goélette anglaise *Forest Fairy* ayant perdu ses mâts, a profité de l'abri du port, le 15 novembre 1865 pour les rétablir. D'autres navires portugais et anglais ont aussi joui des avantages que cette construction offre déjà.

Au 31 décembre 1866 l'étendue du brise-lame était de 4,850 pieds. Dans cette partie on avait dépensé 655,824 tonneaux de pierre. La dépense jusqu'à ce même jour avait été de 4,244,844 francs.

Il faut remarquer que la plus grande partie de cette somme a été employée dans l'acquisition et le transport d'un matériel très-dispendieux, acheté en Angleterre dans les manufactures qui fournissent le matériel, employé par le gouvernement anglais, dans la construction du brise-lame de Holyhead; pour ce qui reste à construire, il y aura donc économie de temps et d'argent.

RENSEIGNEMENTS UTILES.

On trouve à Ponta Delgada, ville de 15,000 habitants, de grands ateliers pour la réparation des navires à voiles et à vapeur; un dépôt de charbon de terre; abondance de toutes provisions, à bon marché; excellente eau de source, et toutes autres ressources désirables.

Il y a des consultants et des vice-consuls de toutes les nations; parapet à vapeur mensuel pour Lisbonne, et plusieurs communications par jour, par bateaux à voiles, avec l'Angleterre, de novembre en avril. Les frais de port sont minimes; la route est accessible par tous les temps.

Les hôtels sont bien tenus; il y a un hôpital très-bon. Le climat est sain et très-teméré; le paysage excessivement pittoresque; et les eaux thermales de la charmante vallée de Furnas sont d'une efficacité prodigieuse dans un grand nombre de maladies.



MOYENS EMPLOYÉS POUR LA CONSTRUCTION DU BRISE-LAME.

PORTO ARTIFICIAL DE PONTA DELGADA

NA ILHA DE S. MIGUEL, AÇORES.

O archipelago dos Açores, situado no oceano Atlantico, e descoberto pelos Portuguezes no decimo quinto seculo, é em geral menos conhecido do que devera ser, se bem se considerar a sua real importancia, a influencia benéfica, que nas conveniencias da navegacao transatlantica pôde exercer.

Bastará, para avaliar esta importancia, ponderar que os Açores, quasi a igual distancia da Europa, Africa, e America, jazem collocados exactamente na altura que são obrigados a tomar os navios, que dos outros continentes regressão á Europa. Na verdade, desde os descobrimentos de Colombo e Vasco da Gama até ao dia de hoje, todos os navegantes reconhecerão a necessidade de virem demorar os Açores, para se ajustarem dos ventos predominantes, e do influxo da celebrada corrente do golpho do Mexico, que tão poderosamente lhes favorece a chegada á Europa.

Uma contradicção singular nos cumpre todavia notar aqui. Ao passo que os navios de longo curso, quando chegam á vista dos Açores, vem exantando de muitas provisões, e carecidos frequentemente de reparos, sendo-lhes facilmente, sem se desviarem da sua derrota, abastecerem-se ali de todo o preciso, é ficando, pelo contrario, evitado com terror estas paragens, temerosos dos subtos e violentos furacões, que ahí se levantão não raras, nos mezes de inverno. Temem tanto estes riscos as Companhias inglezas de seguros maritimos, que expressa, e absolutamente prohibem aos navios que asseguro, de tocarem nos Açores.

Estas rapidas reflexões demonstrarão a consideravel vantagem, que para todas as nações maritimas resultaria da construcção, nos Açores, de um porto artificial. de facil accessão, e inteiramente seguro. Tal construcção mal mereceria a denominação de empresa commercial; seria antes um dos mais dignos e louáveis commettimentos, em beneficio da humanidade!

As gravuras annexas mostrão que a falta, atégora sentida, d'esse porto, vae em breve desaparecer.

Na ilha de S. Miguel, a maior, mais rica, e commerciante dos Açores, situada em 37º 45', 10" lat. N., e 16º 33', 15" long. O. de Lisboa, constroese actualmente, e está mui adelantado, um porto artificial, a que não fallece nenhuma das desejáveis condicções.

O immediato fim d'esta grandiosa construcção, que talvez pareça disparatada para a pequena da terra, foi favorecer a consideravel exportação de laranjas, que em numero de 240,000 caixas, annualmente envia para Inglaterra a ilha de S. Miguel, exportação que de inverno soffria prejudiciaes demoras no seu embarque, alem de estar gravada com excessivos fretes, seguros e outras exorbitantes despesas, originadas da ruindade do porto.

Mas não era este commercio de laranjas o unico a lucrar com o melhoramento do porto. S. Miguel exporta, cada anno, 15,000 moios de trigo, milho, fava, feijão, etc.; couros, pozzolana, etc. E importa, mormente de Inglaterra e Portugal, tecidos de seda, linho, lã, e algodão, generos colonias, sal, ferro bruto e forjado, madeiras, carvão de pedra, quinquelherias, etc. O seu commercio occupa 500 navios, e representa para a exportação um valor approximado de 1,000 a 1,200 contos, e para a importação o valor de 700 a 800 contos.

Vê-se pois que o movimento proprio, e as necessidades do actual commercio reclamavam, e comportão a creação d'este notavel porto.

Quando porém, em poucos annos, o porto artificial de Ponta Delgada estiver terminado, e a elle affluirem, sem temor, os numerosos navios, que por estas alturas passão, faltos de victualhas, e necessitados de reparos — grande deve ser então a sua importancia. Poderemos de longe rastrear o que ella será, advertindo, que só por si a Inglaterra emprega no seu commercio transatlantico, para cima de 8,000 navios, de mais de 4,000,000 toneladas, e que é cousa averiguada soffrerem avarias grossas, ao menos 2 0/0, isto é 160 d'aquelles navios, na proximidade dos Açores, em distancia não superior a 10 graus, em torno das mesmas ilhas.

Que desastres, que privações, que soffrimentos, não poderá evitar aos navegantes desamparados este feliz asylo, aberto entre os procellosos mares do Oceano!

Um diverso genero de vantagens poderá ainda derivar-se d'esta construcção. Se a ilha de S. Miguel, em razão da sua importancia, fór, como parece que será, a estação escolhida para um dos novos cabos electricos transatlanticos, que diferentes Companhias anglo-americanas projectão estabelecer, tornar-se-ha o porto artificial de Ponta Delgada não escusa para muitos navios de volta á Europa, não tanto já com o fim de se abastecerem, como para ali receberem pelo telegrapho as ultimas instrucções sobre seu definitivo destino. Quem poderá affirmar que, com o correr dos annos, não venha a crear-se aqui um notavel entreposto?

Foi authorizada a construcção d'este porto, pela lei de 9 d'Agosto de 1860, que creou para seu custoeo o imposto de 200 reis sobre cada caixa de laranjas, e de 1 1/2 0/0 *ad valorem* sobre todos os outros generos exportados ou importados, e concedeo o subsidio de 10 por 0/0, sobre o rendimento da alandega de Ponta Delgada.

A direcção tecnica dos trabalhos foi dada a sir John Rennie, engenheiro assaz conhecido em Inglaterra pela construcção do *quebra-mar* de Plymouth.

A administração e contabilidade foram confiadas a uma junta, presidida pelo Governador civil, e composta de seis principaes proprietarios e commerciantes.

O plano do porto artificial, delineado por John Scott Tucker, e modificado por Sir J. Rennie, consiste n'um *quebra-mar*, que corre em frente da cidade de Ponta Delgada, no cumprimento de 3,350 pés ingleses, comprehendendo d'este modo uma ampla e profunda bacia, com uma espacosa entrada voltada ao nascente, por onde, com todo o tempo, poderão os navios facilmente entrar. Um parapeto de alguns metros de altura ha de coroar a parte superior do *quebra-mar*; e uma *doca quebra-mar*. O complexo de todos estes trabalhos constituirá o Porto artificial.

O *quebra-mar* é construido com grandes pedões de basalto, do péso de 6 a 8 toneladas, lançados a êmo uns sobre os outros, taes como sahem da pedreira, até subirem acima do mar á altura pedrosa, e formarem pelo lado exterior uma escarpa, na proporção de 6 de base para uma d'altura. Para se conduzirem estas enormes pedras, e se collocarem no seu logar, forma-se sobre o mar, na direcção d'este paredão, e aos lances de 25 pés, uma plataforma, ou andaimariz de grosso vigamento, sobre que se assentão raiz de ferro, em communicação com as pedreiras, que, na distancia de pouco menos de uma milha, fornecem a pedra. Quatro locomotivas, arrastando d'ali consideravel numero de *tracoms* de ferro, vem successivamente descarregar no mesmo sitio aquellas desmesuradas pedras, até o *quebra-mar* surgir á altura conveniente, e a escarpa se formar.

Obtido este resultado, prolonga-se a plataforma por meio de grossas travessas em fortes *pés-direitos*, que mergulhadores collocão no fundo do mar; e prosegue-se na operação de vasar no mar enormes pedras.

Quanto á formação da escarpa, não ha meio artificial e economico de lhe dar a precisa inclinação. Só o impulso e refluxo das vagas, na occasião de grandes marrezias, completa em poucos horas este trabalho. Mas uma vez adquirida assim a inclinação determinada, a escarpa resiste inabalável á maior furia das ondas.

Para auxiliar estes trabalhos foi mister estabelecer officinas, movidas a vapor, com todos os maquinismos necessarios para o prompto fabrico e concreto das diferentes peças das locomotivas ou dos *tracoms*, que se quebrassem; para a serragem dos mais grossos madeiros; e para outros importantes usos. Estabeleceo-se até uma pequena fundição de ferro, etc.

Os preliminares de todo o genero, indispensaveis para se começar a obra, foram longos, e só permitiram que em 28 de Outubro de 1862 se encettasse propriamente o trabalho do *quebra-mar*. Nesse dia, pela primeira vez, o basalto, invadindo o Oceano, e levantava em espadasas d'agua, e d'espuma! Desdentado nunca mais cessarão os trabalhos, que estão sendo agora proseguidos com toda a actividade. O progresso foi todavia lento nos primeiros annos, porque as pedreiras não offereciam a frente necessaria, para n'ellas trabalharem desembarcadamente quantos operarios havia disponiveis para este servico.

Desde o anno de 1864 adquiriu o *quebra-mar* sufficiente extensão e solidéz, para n'elle procurarem abrigo alguns navios. Em Outubro de 1864 a vapor *Vultur*, e em Abril de 1866 o vapor *Ephesus*, ambos em potesas dias fizeram concertos importantes, sem os quaes se não julgamos incapazes de navegar. Em 15 de Novembro de 1865 a escuna ingleza *Forest-Fairy* havendo desastoravado, recolheu-se ao abrigo do *quebra-mar*, aonde por novos mastros, e seguiu viagem para Inglaterra com o seu carregamento. Outros navios portuguezes e inglezes se tem logrado das commodidades, que já offerece este abrigo.

Em 31 de Dezembro de 1866 era o cumprimento do *quebra-mar* de 1,850 pés ingleses; em que se havia consumido 655,824 toneladas de pedra. A despeza, feita até ao mesmo dia, era de 950,844,430 reis.

Cumpre notar que a maxima parte d'esta despeza foi devida á acquisição e transporte de um material mui dispendioso, comprado em Inglaterra nas mesmas fabricas que fornecem o material aperfeiçoado, empregado pelo governo inglez no *quebra-mar* de Holyhead.

O resto da construcção deve por tanto gastar, relativamente á parte construida, menos tempo e menos dinheiro.

ESCLARECIMENTOS NECESSARIOS.

Em Ponta Delgada, cidade de 15,000 almas, ha officinas para o prompto reparo de navios a vapor e de vela; depositos de carvão de pedra; abundancia de provisões de toda a especie, baratas; excellente agua nativa; e todos os mais recursos, que se possão querer.

Ha consules e vice-consules de todas as nações; vapor mensal para Lisboa; muitas communicações diarias com a Inglaterra, por navios de vela, de Novembro até Abril. As despesas de porto são diminutas. A bacia é accessivel em todo o tempo.

As hospederias são bem servidas. Ha um grande e bello hospital. O clima é sadio e mui temperado; os campos são lindos, e as aguas thermaes do ameno valle das Furnas são de miraculosa efficacia em grande numero de enfermidades.

ARTIFICIAL PORT OF PONTA DELGADA

IN THE ISLAND OF St MICHAEL, AZORES.

The Azores, a group of islands, in the Atlantic ocean, belonging to the Portuguese, by which nation they were discovered in the middle of the fifteenth century, are generally but little known, although their importance, viewed in the interests of transatlantic navigation, is very considerable.

To prove their importance it will suffice to observe that the Azores, placed as they are in the middle of the Ocean, at an almost equal distance from Europe, Africa and America, lie exactly in the route which ships returning to Europe must inevitably take. In fact, ever since the discoveries of Columbus and Vasco da Gama, the Azores have become an almost indispensable touching point for all navigators obliged to take advantage of the latitude of these islands to profit by the predominant winds, and the great current of the Gulf stream, which favours their speedy return to Europe.

There are however always two sides to every question. Ships on a long voyage, which are so often in need of provisions and repairs, still avoid the Azores, where they could be amply supplied, by fear of the sudden and violent hurricanes which are met with from the end of the autumn till the spring. The English maritime Assurance Companies are so strict on this point that they positively forbid ships assured by them to touch at the Azores — this is one of their clauses. After these short observations it will be understood how useful to all maritime nations would be the construction of an artificial port at the Azores, giving an easy and certain access at all times. It would not only be a great commercial benefit, but also a most laudable act of humanity.

By the engravings which we give, it will be readily perceived that this plan will soon be carried out. In the island of St. Michael, the principal, richest and most commercial of all the Azores, lying in North latitude 37° 45' 40", and longitude 25° 41' 30" West from the meridian of Greenwich, has been commenced an artificial port combining all the necessary conditions, the works of which are already far advanced.

The actual design of this construction, although it appears rather too extensive for such a small country, is to facilitate the trade of St. Michael's oranges with England, which amounts every year to two hundred and forty thousand boxes (each containing from 7 to 800 oranges), and to exportation of which, lasting through the winter months, suffers interruption caused by bad weather, the overcharge of freights, of insurance, and other exorbitant charges.

But indeed it is not only the orange trade which benefit by this amelioration. St. Michael exports every year 45 thousand quarters of corn, maize, beans, haricots, etc., also cattle, skins, pozzolana, etc. The imports are, especially from England and Portugal, manufactures of wool, cotton, silk and thread, colonial produce, salt, iron, coal, timber and hardware. This trade employs about five hundred vessels, and represents for exportation to the extent of from L. sterl. 170,000 to L. st. 200,000, and importation from L. st. 425,000 to L. st. 445,000. This explains the necessity of a port for commercial purposes.

But in the future, when all the works are finished, and the port is frequented by all the ships which may need to do so, it will acquire great importance: if we reflect that England alone employs in her transatlantic commerce more than eight thousand ships, tonnage nearly four millions, and that it is affirmed that at least two per cent, that is to say one hundred and sixty ships suffer much damage in a radius of ten degrees around the Azores, one can form some idea how this port would lessen much misfortune, loss, and suffering, which is now sustained.

There is yet another advantage reserved for this construction; if it becomes, as there is an idea, a station for the new transatlantic telegraphic cable, as projected by some English and American companies, the port of St. Michael will be a most useful touching point for ships returning to Europe, not only for provisioning, but especially for receiving instructions from Europe as to their final destination. And who knows but that it may thus become an important entrepôt?

An act of the portuguese Cortes of the 9th August 1860 authorised the construction of this port, for defraying the expenses of which, they levied a tax of 1 1/2 per cent *ad valorem* upon all articles exported or imported, and moreover nine pence on every box of oranges. They also allowed for the same purpose a subvention of 10 per cent upon the revenue at the custom-house at Ponta Delgada.

The technical direction of the works has been confided to Sir John

Rennie, an engineer well known in England for the construction of the Plymouth breakwater. The direction and responsibility belong to a committee composed of six proprietors and principal merchants presided over by the Prefet.

The plan of the port, designed by John Scott Tucker, and modified by Sir John Rennie, consists of a breakwater stretching out in front of the town of Ponta Delgada to a length of 3,350 feet, forming a large and deep port with an easy entrance on the eastern side, and accessible to ships at all times of the year. A parapet of some yards in height composes the upper part of this breakwater, and a dry basin will be prepared, in which to place any ships that may have need of it. The whole of these works will complete the port.

The breakwater is constructed of large rough blocks of basalt weighing from 6 to 8 tons each, which are piled up until the slope is in the proportion of six to one in height. In order to place these enormous stones, there is constructed in the sea a wooden scaffolding, in parts twenty five feet in length at a time, upon which are placed rails which communicate with quarries, situated about a mile distant: four engines drawing a considerable number of iron trucks loaded with great masses of basalt come one after another, and deposit their burden in the same place until the breakwater has attained the proper height, and the slope the required inclination. The scaffolding is then prolonged by the aid of large poles, and of divers who descend to the bottom of the sea; and the same operation of depositing the stones is repeated.

It has been remarked that the desired inclination of the slope can only be obtained by the action of the waves in bad weather. When once this inclination is acquired, the resistance of the breakwater is fully proved.

Some workshops, the motive power of which is steam, have been erected for the manufacture and repairing of all the different parts of a locomotive, for the cutting of large beams, etc. An iron foundry has also been established.

The preliminary works having occupied a long time, did not permit the commencement of the breakwater until the 28th October 1862, on which day the first wagon deposited the basalt into the Ocean. Since that time the works have not been discontinued, and now progress with great activity. During the first few years the progress was not so rapid as could have been wished, on account of the want of space in the quarry to place as many workmen as were desired.

At the end of the year 1864 the breakwater was sufficiently advanced to harbour some few ships. The english steamer *Vultur* in October 1864, and the *Ephesus* in April 1866 obtained some very important repairs in a few days, which enabled them to continue their voyage. The english schooner *Forest Fairy* having lost her masts at the shelter of the port on the 15th November 1865 to re-establish them. Other portuguese and english vessels have also enjoyed the advantages which the port constructed already affords.

On the 31st December the length of the breakwater was one thousand eight hundred and fifty feet. In this part had been deposited six hundred and fifty five thousand eight hundred twenty four tons of stone. The expense up to that time has been L. st. 169,793.

It is necessary to observe that the greater part of this sum has been employed in obtaining and transporting a most expensive material, brought in England at the manufacturers which furnish the material for the English Government in the construction of the Holyhead breakwater; thus for what still remains for construction there will now be economy both of time and money.

USEFUL INFORMATION.

At Ponta Delgada, a city of 15,000 inhabitants, will be found some workshops for the speedy repair of sailing and steam vessels; — a depot for coals; with all kinds of provisions in abundance at a cheap rate; excellent spring water; and every other desirable convenience and accommodation.

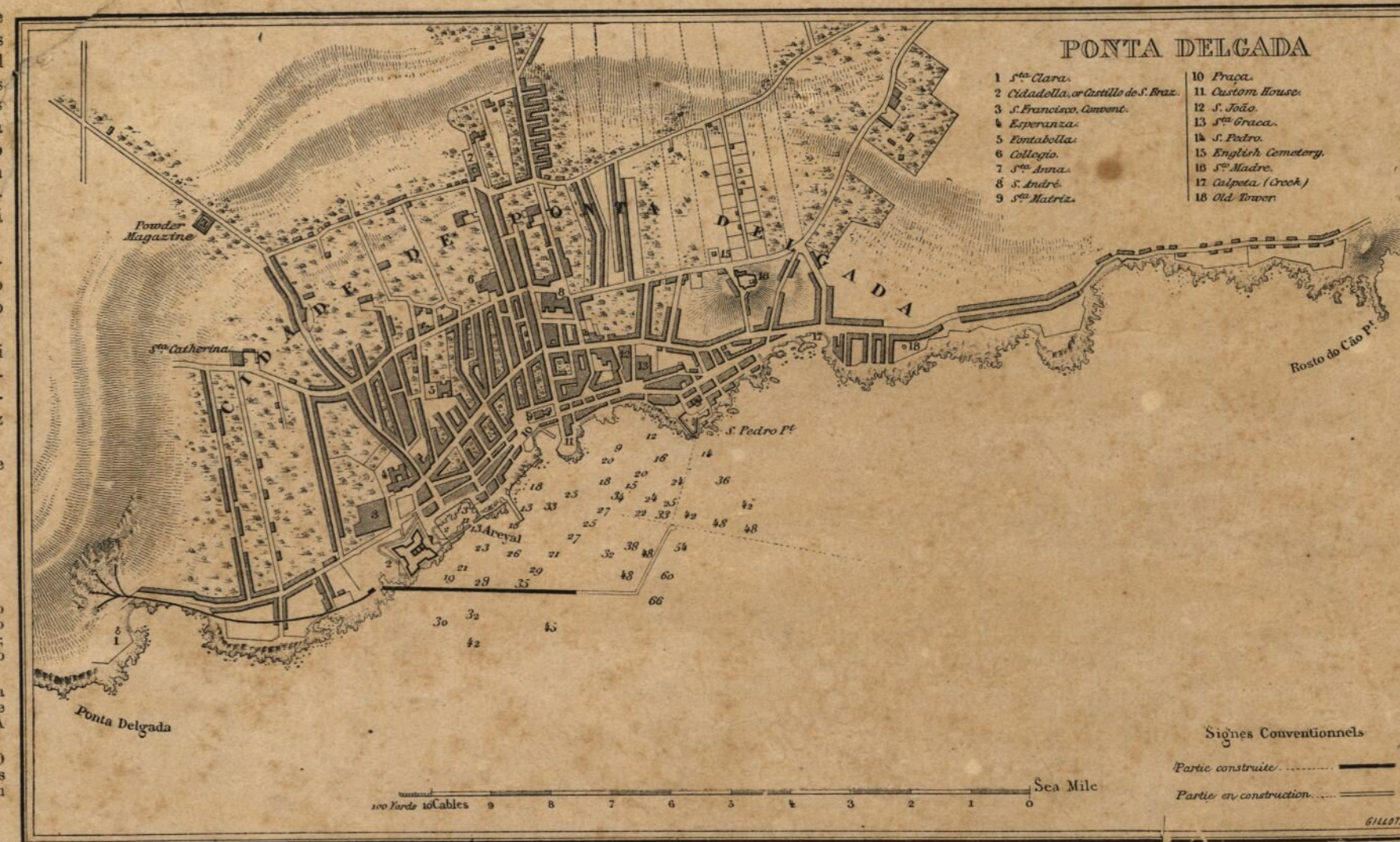
There are consuls and vice-consuls of all nations; a steamboat leaves for Lisbon every month; and there are several daily departures of sailing vessels for England, between the months of November and April. The charges for entering the port are small; the roadstead is accessible all seasons.

The hotels are under good management; there is also a large hospital with good medical attendance, etc.

The climate is very agreeable, temperate, and healthy; the surrounding country picturesque; and the thermal waters of the charming valley of Furnas are much celebrated for their curative efficacy in a great number of diseases.



Vue du brise-lame en construction en face de Ponta Delgada, prise le 16 décembre 1866.



PLAN DE PONTA DELGADA ET DU PORT ARTIFICIEL EN CONSTRUCTION.

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PORT OF PONTA DELGADA

ISLAND OF St MICHAEL, AZORES.

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Rennie, an engineer well known in England for the construction of the Plymouth breakwater. The direction and responsibility belong to a committee composed of six proprietors and principal merchants presided over by the Prefect.

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almost equal

The plan of the port, designed by John Scott Tucker, and modified by Sir John Rennie, consists of a breakwater stretching out in front of the town of Ponta Delgada, a length of 2,250 feet, forming a large

The plan of the port, designed by John Scott Tucker, and modified by Sir John Rennie, consists of a breakwater stretching out in front of the town of Ponta Delgada to a length of 3,350 feet, forming a large and deep port with an easy entrance on the eastern side, and accessible to ships at all times of the year. A parapet of some yards in height composes the upper part of this breakwater, and a dry basin will be prepared, in which to place any ships that may have need of it. The whole of these works will complete the port.

The breakwater is constructed of large rough bloks of basalt weighing from 6 to 8 tons each, which are piled up until the slope is in the proportion of six at the foundation to one in height. In order to place these enormous stones, there is constructed in the sea a wooden scaffolding, in parts twenty five feet in length at a time, upon which are placed rails which communicate with quarries, situated about a mile distant : four engines drawing a considerable number of iron trucks loaded with great masses of basalt come one after another, and deposit their burden in the same place until the breakwater has attained the proper height, and the slope the required inclination. The scaffolding is then prolonged by the aid of large poles, and of divers who descend to the bottom of the sea; and the same operation of depositing the stones is repeated.

It has been remarked that the desired inclination of the slope can only be obtained by the action of the waves in bad weather. When once this inclination is acquired, the resistance of the breakwater is fully proved.

Some workshops, the motive power of which is steam, have been erected for the manufacture and repairing of all the different parts of a locomotive, for the cutting of large beams, etc. An iron foundry has also been established.

The preliminary works having occupied a long time, did not permit the commencement of the breakwater until the 28th October 1862, on

has also been re-established.

The preliminary works having occupied a long time, did not permit the commencement of the breakwater until the 28th October 1862, on which day the first wagon deposited the basalt into the Ocean. Since that time the works have not been discontinued, and now progress with great activity. During the first few years the progress was not as rapid as could have been wished, on account of the want of space in the quarry to place as many workmen as were desired.

At the end of the year 1864 the breakwater was sufficiently advanced to harbour some few ships. The english steamer *Vulture* in October 1864, and the *Ephesus* in April 1866 obtained some very important repairs in a few days, which enabled them to continue their voyage. The english schooner *Forest Fairy* having lost her masts and rig, profited by the shelter of the port on the 15th November 1865 to re-establish them. Other portuguese and english vessels have also enjoyed the advantages which the port constructed already affords.

On the 31st December the length of the breakwater was one thousand eight hundred and fifty feet. In this part had been deposited six hundred and fifty five thousand eight hundred twenty four tons of stone. The expense up to that time has been L. st. 169,793.

It is necessary to observe that the greater part of this sum has been employed in obtaining and transporting a most expensive material, bought in England at the manufactories which furnish the material for the English Government in the construction of the Holyhead breakwater; thus for what still remains for construction there will now be economy both of time and money.

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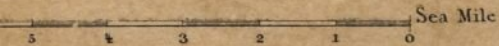
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S. Pedro P^o

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48 48



Signes Conventionnels

- Partie construite
- Partie en construction

GILLOT, G.

PORT ARTIFICIEL EN CONSTRUCTION.