Comparative Noise On Different Pavements.

It is a favorite statement of those who are opposed to the use of asphalt for pavements, that the noise of the horses' hoofs upon them is intolerable. This statement having been made quite frequently of late, a gentleman in Philadelphia recently undertook to ascertain the facts in the case.

The method employed was to observe the noise from the hoofs as a horse passed from the asphalt to the granite, or the reverse. This was easily done at points where the asphalt ended and the granite began, especially if a car track passed along the street. It was also, at such points, easy to note the sound made by saddle horses as they went from one pavement to the other. In the case of horses attached to wagons, those only could be observed when the wheels were in the car tracks, and the noise from them was thus practically obliterated.

Observations carried on at intervals covering some three or four weeks developed the fact that the noise made by the hoofs of horses is practically the same on granite and asphalt. It is, if anything, a little sharper on the granite, the asphalt seeming to have a slightly subduing effect on the impact of the shoe.

It is found that on both granite and cobble stone pavements the noise of the wagon entirely drowns the noise of the horses' feet, a quick ear being required to detect the sound of the shoes. The sound of the wagon is, as nearly as one can guess, ninety per cent of all the noise coming from rough pavements. The state of the case then is about this: When we have taken away ninety per cent of the noise, what remains causes greater complaint than the whole. For the noise of the wheels and rattle of the wagon is actually extinguished on the asphalt, leaving only that of the hoofs.

It would appear self-evident to persons who were disinterested that this was the case. Yet arguments against asphalt are so difficult to obtain, that anything is seized upon for the purpose and urged to the utmost. One opponent of asphalt gravely wrote a few weeks since that cyclists were suffering from a dryness of the throat, caused entirely by riding over asphalt.

The arguments against asphalt on account of the noise which horses make upon it and the smoothness of it in wet weather, are arguments against the horse rather than against the pavement. It is quite within the mechanical possibilities of the age for us to give up using horses in our large cities and substitute traction engines and horseless vehicles for them. The smooth asphalt gives the mechanical carriage every advantage, and if our horsemen carry these arguments too far, they may find that they have proved too much, and people will say: If our pavements are not good enough for your horse, your horse must go. Strange things have happened within the last decade, and may be expected again.

An International Exhibition at Canea.

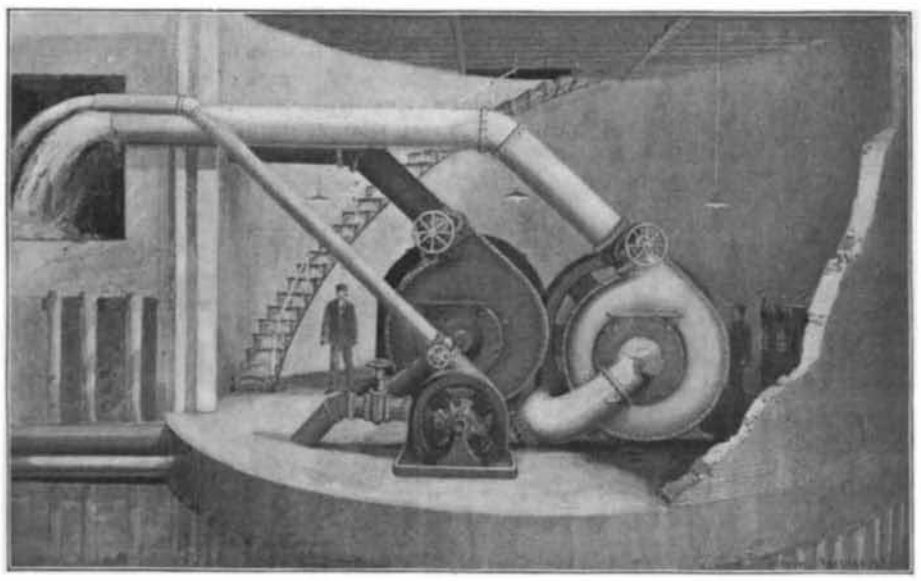
An International Exhibition under the auspices of Prince George, of Greece, will be held at Canea, on the Island of Crete, during the present year. The inhabitants of the island are exerting themselves to make the Exposition a complete success. Foreign consuls have recommended to their governments that everything be done to further this exhibition. Crete now affords an excellent market for many lines of goods. There will be an excellent passenger service to and from the island. The Exposition will be opened on April 11, and will be closed on May 7.

IT is a curious fact that workers in vanilla factories are affected with headache, lassitude, muscular pains, skin diseases, etc. Some of the workers had to give up their employment.

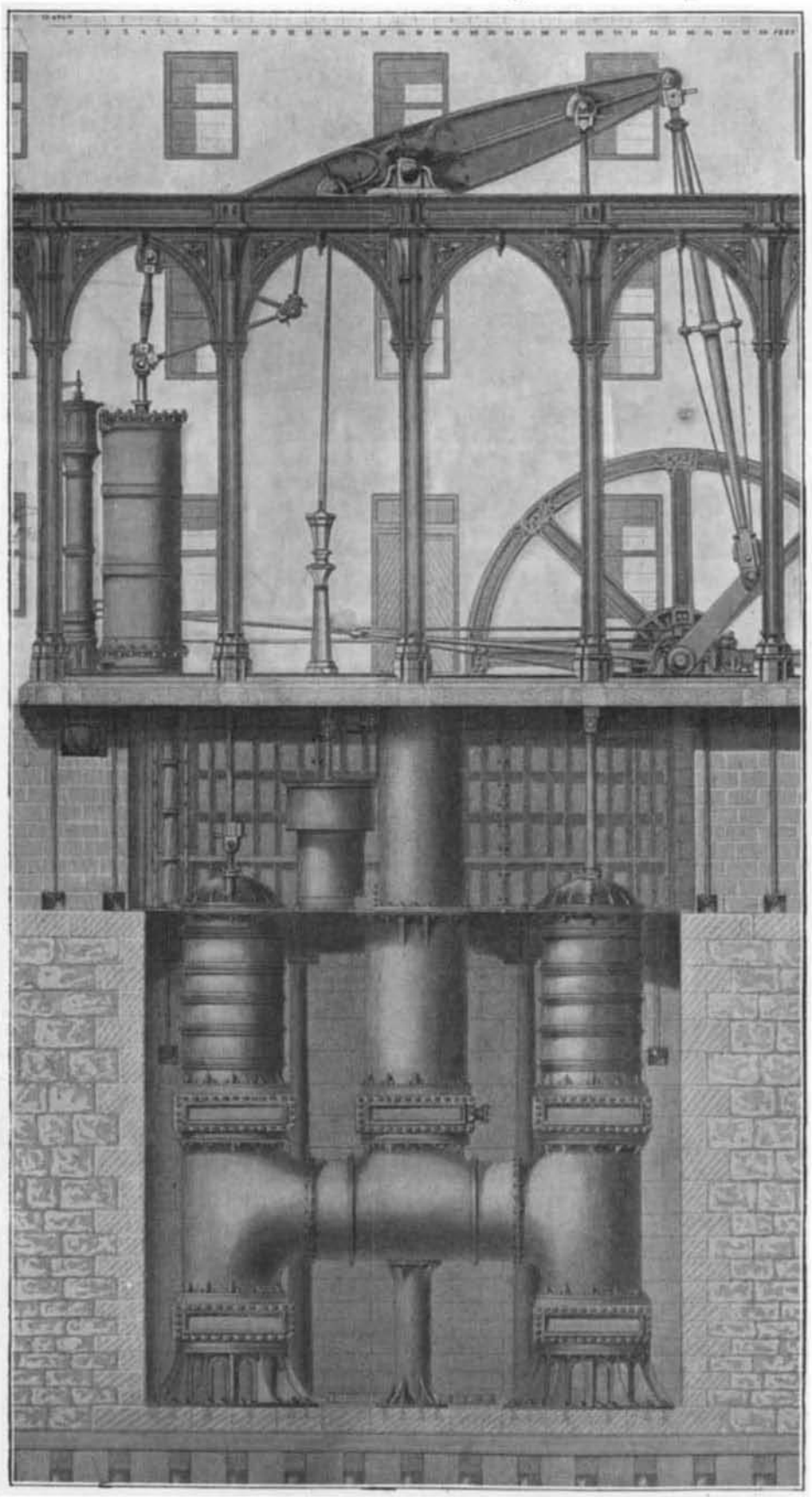
THE OLD AND NEW PUMPING ENGINES OF DRY DOCK No. 1, BROOKLYN NAVY YARD.

The reconstruction of the pumping plant of Dry Dock No. 1, which will shortly take place at the Brooklyn Navy Yard, will afford a striking evidence of the advance which has been made during the past half century in the construction and economy of operation of pumping machinery.

Our larger engraving is a side elevation of the original condensing, double-acting, beam engine and pumps, which were erected in 1851; while the smaller engraving, which is drawn to the same scale, represents the new electric pumping plant which it is proposed to erect in its place. The drawings being made to the same scale, the contrast between the elaborate and cumbersome design of the old, walking-beam engine, and the compact arrangement of the electrically-driven centrifugal pumps, is evident at a glance, particularly when it is stated that the pumping capacity of the smaller is nearly three times as great as that of the larger plant.



*Proposed Electric Pumping Plant—Capacity, 60,000 Gallons per Minute.



Old Pumping Plant of Dry Dock No. 1, Brooklyn Navy Yard, Installed 1851—Capacity, 22,000 Gallons per Minute.

* The two Drawings are reproduced on the same scale.

HALF A CENTURY'S DEVELOPMENT IN PUMPING MACHINERY.

At the same time we must be careful, in our modern self-sufficieney, lest we claim more credit than is warranted by the enormous advantage accruing from over half a century's experience in the construction and handling of pumping machinery; and it is questionable in view of our end-of-the-century advantages, whether the magnificent old engine which may still be seen in its spacious engine house at the Navy Yard, is not even more creditable to its designers than its up-to-date successor. In the description of the plant written by Mr. Charles B. Stuart, Engineer-in-Chief of the United States Navy, it is stated that at the time the plans were matured and adopted it was deemed important by the engineer in charge, Mr. McAlpine "that the machinery for exhausting the water from the dock should be of the most perfect kind and of great power and capacity also." This gentleman put in plans and specifications which after discussion by a special board, were adopted with some modifications.

The engine stands in a lofty room which is about 54 feet square. The frame consists of an entablature of cast iron, supported on double lines of Gothic columns and arches, which extend from end to end of the engine room. To modern eyes, the effect of the Gothic columns and arches, is exceedingly ecclesiastical and strongly suggestive of the nave of a cathedral. Howbeit these Gothic ormentations, incongruous as they look to-day, were fashionable half a century ago, and they were characteristic of the stately steamboat engines, after the pattern of which we are told the engine is largely modeled. Our illustration is reproduced from a beautiful steel engraving in a volume by Chief Engineer Stuart, on the "Naval Dry Docks of the United States." The author draws attention to the fact that it "shows very beautifully the style of ornamentation that has been given to the whole work, care having been taken to have all the parts in keeping with each other."

Coming now to details, the cylinder is 50 inches in diameter by 12 feet stroke; the walking beam is of cast iron and measures 31 feet between the end centers and weighs over 15 tons. The piston rod is attached to the beam by the old parallel motion, first designed by the celebrated Watts. The main pump and the air pump rods are connected to the walking beam by double rods and links, while the air pump cross-head works in slides attached to the columns of the engine frame. The engine has a trussed connecting rod the tension rods of which are adjustable by screws and nuts. The cast iron balance wheel is 24 feet in diameter and the crank and shaft are of wrought iron. The engine is provided with an independent adjustable extension gear, which is so arranged that as the load upon the engine is increased by the lowering of the water in the dock, an increased amount of steam is admitted to the cylinder. This is effected by means of a cam wheel on the main shaft, against which a cam roller, connected with the expansion valve stems is made to revolve, and along which it can be made to travel at any speed desired. A curious feature of the construction

of the engine was the use of eight 1½-inch iron rods extending from the engine frame to the rear of the large granite chimney "to secure as far as possible the frame from longitudinal motion or vibration, to steady the engine, and relieve the walls of the building."

The latter object was assisted by placing two inches of India rubber between the masonry and the iron entablature and pilasters, and also by placing India rubber washers between the bolt-heads and the exterior parts of the walls. No feed pumps were attached to the engines, the boilers being fed from the rainwater system beneath them by direct acting steam pumps built by Worthington & Baker. The steam was supplied by three boilers 26 feet in length, 7 feet in diameter in the waist, of the single return drop flue type.

In the well, below the foundation plate of the engines were two lifting pumps, each 36 inches in diameter with an 8-foot stroke. In addition to the usual suction valve near the bottom of the pump chamber, there are two suction valves placed near the bottom of the suction pipes. The valve seats are of a composition metal. The suction pipes connect with an air chamber, placed centrally between the pumps, which reaches to the bottom of the engine bedplate. The total weight of the metal in the engine is 267 tons and the total cost of the engine was $90,241.29.

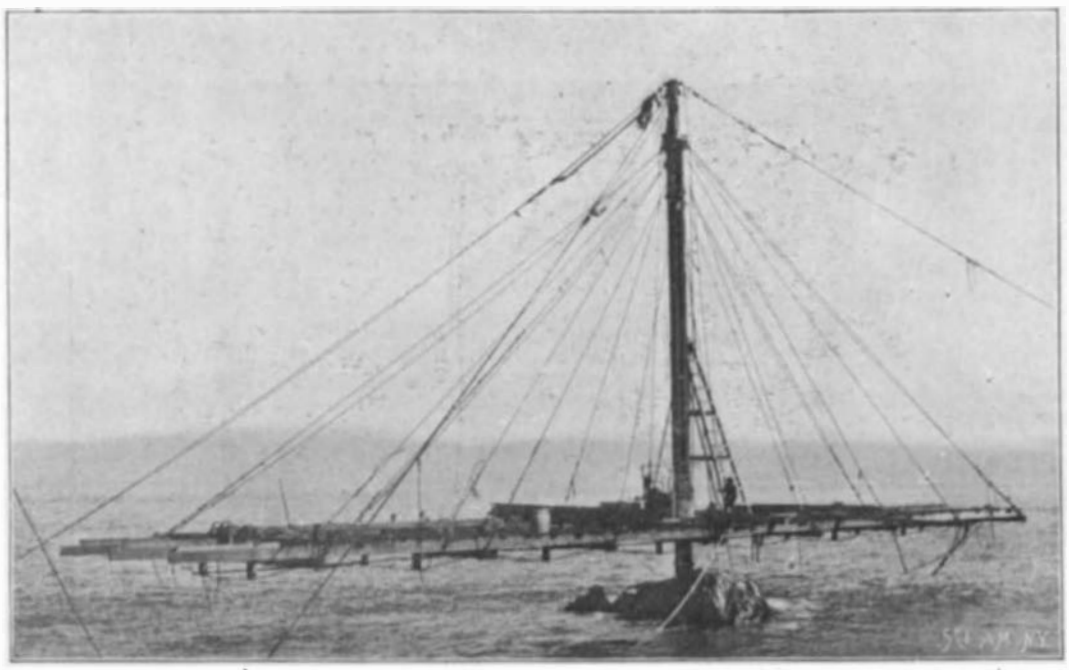
The new pumping plant, as planned by Capt. P. C. Asserson, Civil Engineer, of the Brooklyn Navy Yard, will be placed in a circular sunken chamber below the surface of the ground. It will consist of two 30-inch direct-connected, electrically driven centrifugal pumps, with a combined capacity of 60,000 gallons per minute. There will also be a 12-inch electrically driven centrifugal drainage pump as shown in the drawing. The ceiling of the subterranean engine room will consist of I-beams covered with 6 inches of concrete and one inch of cosmocrete. The cosmocrete finish will be at the general grade of the Navy Yard, and entrance will be had to the pumps by means of a hatch opening onto a spiral stairway.

REMOVING OBSTRUCTIONS IN SAN FRANCISCO BAY.

Removal of some of the most important of the obstructions to navigation which exist in the harbor of San Francisco has been undertaken by the government and is now under way. The present movement contemplates obliteration of Arch and Shag Rocks and two of the neighboring shoals comprising altogether some fifty thousand square yards of soft conglomerate rock. The obstructions referred to lie to the northwest of Alcatraz Island, dividing the channel between it and Angel Island in two and forming dangerous currents in a portion of the bay right in the path of the most largely frequented route of passenger and freight traffic. The work will not be completed under two years, but when finished, will remove obstructions which have caused numerous wrecks and the loss of many lives.

Work has begun on Shag Rock, which at high tide lifts its dangerous summit only a few feet above the water. The shoal surrounding it is oblong in shape and, generally speaking, about 180 feet in diameter. The purpose is to level the rock so as to secure a mean depth of 30 feet at low water.

A mast composed of 12×12 scantling, 24 inches square and 68 feet high, has been raised on the top of the rock and secured by guys anchored to the floor of the bay. Suspended from the mast is a platform 30 feet wide and 180 feet in length which is arranged to turn in all directions. On this the steam drills are operated, driven from an engine occupying a barge alongside. The drill is driven somewhat below the depth contemplated and into the holes are placed sticks of dynamite which are exploded, a few at a time, and thus the rock is destroyed in small sections, the débris being dredged up from the bottom and deposited in the deeper portions of the bay. The platform is above the reach of the highest tide, and work can go on without interruption during even moderate storms. The amount of rock to be removed at this point is 3,799 yards. The work is under charge of Major W. H. Henry, Chief of the River and Harbor Improvements of the United States Corps of Engineers.

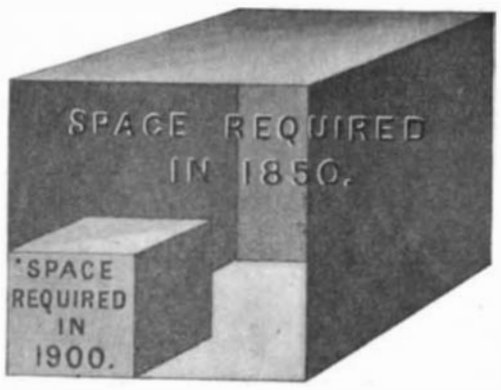


REMOVAL OF SHAG ROCK, SAN FRANCISCO HARBOR.

A LINE of automobile tourists' coaches is to be run in the Irish Lake district. The route is 55 miles long, and with the present horse traction the journey has to be spread over two days. The roads are very good, but there are two mountain passes which will try the hill-climbing qualities of the motors. If they prove successful all the horse coaches will be abandoned.

Clothing the Arid Regions with Vegetation.

The great arid and semi-arid regions west of the Mississippi are unable to sustain large flocks or herds because of conditions which prevent vegetation from producing reliable food crops. In the great Death Valley Desert the average rainfall is so small that most of our cultivated plants are withered up, and throughout large parts of the semi-arid regions this same lack of sufficient rain makes the life of farm crops at least very precarious and uncertain. Another drawback is that the alkali soil contains so much carbonate of soda that few plants can live and thrive in the land. Our common barley will live in soil that contains 25,000 pounds of alkali salts to the acre; but on a good deal of the land there are 30,000 and more pounds to the



COMPARISON SHOWING RELATIVE AMOUNT OF SPACE REQUIRED BY PUMPING PLANT OF THE SAME CAPACITY IN 1850 AND 1900.

acre, at which point barley withers up and dies. Even alfalfa, which generally does well in alkaline soils, will not flourish in some of the vast areas in the Rocky Mountain and Pacific Coast regions where the soil is intensely alkaline.

The agricultural experiment stations of the West have been experimenting for years with different plants which will thrive in these arid regions sufficiently to furnish food to cattle. The plants suited to such places have to live in a climate where there is very little rainfall, and in a poor soil, with a large percentage of alkali salts mixed with it. After years of tests with hundreds of grasses and plants the Australian salt bushes have given the best results and seem to promise wonderful changes in clothing the deserts with vegetation.

These Australian plants or salt bushes belong to the same class or family as the common pig weed of our gardens and roadsides, which is now looked upon by farmers as a great nuisance, although it was first introduced into this country as a great boon to the farmers. There are several members of this family which possess remarkable resisting powers to alkali in the soil and also to droughts. Experiments have been made with a great number, and the species that has given the most satisfaction is Atriplex semibaccata; but the California Experiment Station has also distributed for general use another trailing species. A. leptocarpa, and two shrubby species. Atriplex halimoides and A. vescicaria. These four species of Australian salt bushes have been found to possess the qualities which are needed for the dry, arid, alkali regions of the West.

In Australia these salt bushes are found in the regions of dry, hot summers with the annual rainfalls limited almost entirely to the winters. The difficulty of making plants thrive in such lands is well known to botanists, and the few vegetable growths that do flourish are usually devoid of any nourishing qualities as food for animals or human beings. The salt bushes are exceptions. They have fattening qualities for animals that is remarkable, and experiments have shown that they are equal pound for pound to alfalfas the great feeding plant of the West.

The Australian salt bushes are capable of flourishing on poor soils where most other plants do not succeed, and they will live in soils that contain as high as 50,000 to 70,000 pounds of alkali salts to the acre. Instances are on record where they have grown in soil impregnated at the rate of 75,000 pounds of alkali to the acre. On the "black-alkali" soil of the upper San Joaquin Valley, in California, the Atriplex semibaccata was tested successfully, although no other useful plant could ever be made to flourish there. In fact many of the species of salt bush failed to give a good crop on this land until the above species was tested.

Experiments have been made with the Australian salt bushes since 1881 in this country for the purpose of adapting them to the great arid plains. The well-known economic botanist, Baron Von Mueller, first sent the seeds of the Australian salt bushes to California in that year, and they were planted at the Berkeley station and several sub-stations throughout the State. For some time little progress was obtained, and the plants were not accorded the popularity their merits deserved. This was largely because the right species had not been discovered. The Atriplex semibaccata is a smaller plant than many of the others, and is a trailing rather than an upright growing species; but it has many advantages over all the others. When once established in any soil it covers the surface with vegetation, which remains green until heavy frosts, making a steady growth all the time. It is a perennial, and the roots are not killed by the frost, but sprout up again the following spring. It grows in strong alkali soil where other plants will not live, and in soils so poor that most vegetation dies for the lack of nourishment, and even in lands where there is a stiff hardpan and very little summer rain. All these points tend to make the plant the most valuable to farmers and cattle raisers in the Far West that has been discovered in the past quarter of a century. It will bring into profitable grazing use thousands of acres of arid land that has heretofore been worthless.

The salt bush will supply excellent and abundant food for hogs, sheep, cattle, and horses. Throughout the long dry summer season, it grows steadily and keeps green and succulent, from two to four crops in one season can be harvested from it. No matter how slight the rainfall may be the plant seems to thrive and produce its abundant crops. Where the alkali and poverty of the soil are very decided, the plant does not give its highest results, but even in its modified growth the crops it produces are sufficient to support a large number of cattle. From two to four cuttings of good hay make the average yield to-day in the arid regions where the salt bush has been established, and farmers in the arid regions are planting the crop as fast as they can secure sufficient seed.

The Tulare Experiment Station has distributed in the last few years about 5,000 pounds of seed. In a few years the wide distribution of the plants should enable the farmers to produce all the seed they will need, and the plants will then become established over a wider range of territory. The fattening and health-giving qualities of the salt bush especially recommend it to the growers of cattle and sheep in the great Western deserts and plains. The sheep not only like the vegetation as a food, but it is said that the animals brought up on it produce a wool of superior quality, with a fiber unusually strong, glossy, and even. It is claimed by some that the fine quality of the best Australian wool is due to the salt bush as a daily food. In this respect, however, some species of the plants are far better than others, and it remains yet for the experiment station to ascertain which one will affect the wool the most favorably. G. E. W.

Immigration in 1899.

The total arrivals for the year ending June 30, 1899, were 311,715, an increase of 82,416 or 36 per cent. Of the total arrivals Europe furnished 297,349; Asia 8,972; Africa 51. In all other countries, 5,343. There were 195,277 males and 116,438 females. According to age, 43,983 were under fourteen years; 248,187 were from fourteen to forty-five and 19,545 were forty-five years or older. As to illiteracy, 60,446 could neither read nor write, and 1,022 could read, but were unable to write. The total amount of money which they exhibited to the officers was $5,414,462; 174,618 had less than $30 each.