rangement and shipment of this exhibit, which has just been perfected was in charge of Dr. W. H. Evans, of the Office of Experiment Stations, at Washington, who also supervised the preparation of the charts and photographs exhibit, and will go to Paris to install the exhibit.

At their recent meeting in Minneapolis, in 1897, the Association of American Agricultural Colleges and Experiment Stations, adopted a resolution in favor of a co-operative experiment station exhibit at the Paris Exposition. A committee was placed in charge of the matter and the stations were invited to contribute materials and charts illustrating special features of their work and results, original pieces of apparatus, models, designs, etc. As prepared, this material was shipped to Dr. True, Director of the Office of Experiment Stations, in Washington, who made a collection of photographs and publications of the stations, a monograph on the experiment station enterprise of this country, and looked after the temporary installation of the exhibit and its final shipment.

This commendably comprehensive exhibit contains the following, among other features:

A photograph exhibit of about 750 selected pictures of station buildings, grounds, laboratories, apparatus, experimental plants, herds, and other features, and a collection of photographs of the station directors and staff members, mounted in groups on sheets of heavy card board, 22 by 28 inches, is displayed in portfolios of twenty-four each.

A series of root cages from the North Dakota station, shows the formation of the roots of maize, wheat, flax, and brome grass; models of sweet potatoes, peppers, apples, and plums exhibited by the Iowa and Minnesota stations illustrate varietal differences; and an exhibit of salt bush from the California station show species of proved value for strongly alkaline soils. Electrical devices for determining the salt content, temperature, and moisture content, and a series of samples illustrating the typical agricultural soils of the United States, represent the work of the Division of Soils of the United States Department of Agriculture. The California station sent six typical soils of that State, and specimens showing the results of mechanical analyses of each type of soil, and Hilgards' soil elutriator for mechanical analysis.

Animal and vegetable fats, chemically pure proteids separated from the seeds of various plants, a collection of one hundred weed seeds, an insect cabinet, a gas desiccator for drying hydrogen gas used in moisture determination, models of round and stave silos an apparatus for the rapid cooling of wines, a pressure apparatus for experiments with solution under very high pressure, a model of the Atwater-Rosa respiration calorimeter and a full-sized bomb calorimeter are included in the exhibit.

California furnishes an olive exhibit, of fifty samples of olive oils and over two hundred samples of olive pits used in the classification of varieties of olives; and Alabama sends a collection of mounted specimens of cotton of seventy-two selected and cross-bred varieties.

Original apparatus for investigations in vegetable physiology are shown, including an auxanometer for experimental work on the rate of plant growth; an apparatus for determining the rate of transpiration of plants, from the West Virginia station; and a centrifuge, used to study the effect of gravity and centrifugal force upon germinating seeds, from the Indiana station.

A principal exhibit is that of the dairy industry, including cheese models from the New York State station, showing the effect of the fat content of the milk on the size of cheese produced; a collection of forty-eight cultures of dairy bacteria, from Connecticut; the original Babcock milk tester, two more modern forms of the apparatus for hand and power operation, with a complete collection of the apparatus used in the Babcock test. The Scovell milk-sampling tube, Wisconsin curd test, Marshall rennet test, acid bottles, and other minor apparatus are also included.

Irrigation, a subject to which this country has given much profitable attention, is represented by an exhibit of apparatus and models, containing a hydrophore to determine the amount of silt carried by water; a nilometer, used to measure the amount of water passing through streams, flumes, and ditches; a current meter, water register, etc.

The enormous literature of the experiment station work, greater in extent than that of all other countries combined, is represented by a large number of charts and enlarged pictures showing the result of experiment station work on a wide range of subjects, a complete set of bound bulletins and reports numbering several hundred volumes, and many miscellaneous publications of the stations, together with over one hundred books on agricultural subjects written by station officers.

Even far away Hawaii comes in for its share of the honors, with an exhibit of samples of rocks, lavas, lava products, soils, varieties of sugar cane, and samples of agricultural products, such as coffee, rice, and sugar. In the breadth of its conception and its complete setting forth of the marvelous results attained in this country in one decade this exhibit is destined to be a revelation to students and economists from other lands.

AN ADMIRALTY BOARD FOR THE NAVY.

It is announced that in a few days there will be promulgated an order, signed by Secretary Long, which will create a board of officers of high rank, corresponding to the General Staff or Admiralty Board of European naval powers, with Admiral Dewey at its head. It is stated that this board will constitute a permanent strategic committee, whose duty it will be to maintain the navy at a high standard of efficiency, to arrange for home defence, and for the operation of our fleets, and in times of war to advise the government as to the proper strategy to be employed. The General Staff is to consist of six ex-officio members, all of them naval officers. At the head of it will be the Admiral of the navy. It will also include the Chief of the Bureau of Navigation, the Chief Intelligence Officer of the navy and his principal assistant, and the President of the War College and his principal assistant; the three other members are to be officers of the grade of a commander or higher.

The General Staff must meet in Washington once a month, and twice in the year it must be in session for at least a week. It will be kept fully informed as to naval matters abroad, and it will be concerned with the considerations of plans to be carried out in the event of war with certain foreign nations. The General Staff is also expected to advise the Secretary of the Navy in matters pertaining to our naval establishment. While it will not supersede the Board of Construction, it will act in general along parallel lines and will consider and advise upon subjects dealt with by that Board. Our readers will see in the organization of the General Staff, the perpetuation in many respects of the functions of the Naval Ward Board of the late Spanish-American war. That, however, was a temporary organization; whereas the General Staff, by reason of its perfect familiarity with and study of possible problems which would arise in a naval war, would be in every way better furnished for the emergency than its predecessor.

THE NEW NAVAL PROGRAMME.

The most satisfactory feature in the naval programme agreed upon by the House Committee on Naval Affairs, is that the secretary is authorized to contract for armor plate at $545 a ton, for the purpose of completing the ships, the construction of which has been delayed by the unfortunate armor plate controversy. The amount required is 7,400 tons. It is very gratifying to see that there was a majority in the committee which was in agreement with the government experts in believing that it would be foolish policy for the government to undertake the construction of an armor plant, whose cost would not be less than $5,000,000. It was urged by these gentlemen that unless provision were made for supplying armor to the ships which are now awaiting it, it would be foolish to enter upon the construction of new ships, as an unarmored battleship was for purposes of active service worse than useless.

The committee is in favor of the construction of two new battleships and three armored cruisers of about the same size as those authorized in the naval programme of last year, and three protected cruisers. The battleships will be 13,000 to 14,000 tons and the armored cruisers about 1,000 tons less in displacement. The designs, as far as they were made known last year, appeared to be admirable in every respect, and our only regret is that the new programme does not call for twice as many of these ships as have been recommended. Of protected cruisers we can only say that we sincerely hope they will not be a repetition of the very inferior design represented by the "Denver" class. Sixteen-knot unarmored vessels may commend themselves as a profit-earning contract to the contractor, but for the practical purposes of a modern navy they will prove to be of very limited value.

The question of sheathing the new ships is left to the discretion of the Secretary of the Navy, and the important question of the construction of ships in the Government navy yards to which we made lengthy references in our last issue, was passed over. As the law requires the letting of contracts for new vessels to the lowest bidder, the matter as far as the House Committee on Naval Affairs is concerned, stands where it was. It will be necessary for the Secretary of the Navy to obtain specific authority before he can authorize a warship's construction in our navy yards. It will be remembered that the department was in favor of the construction of several gunboats, but owing largely to the recommendations of Admiral Dewey, who is opposed to the construction of gunboats and in favor of the construction of more battleships, the committee compromised the matter by reporting in favor of the battleships, as stated above, although more vessels of that type have not been recommended by the Department.

TONING LANTERN SLIDES AND BROMIDE PRINTS BY FERROCYANIDE OF COPPER.

Although the colors, various shades of black, produced by the ordinary development of lantern slides and bromide prints are so far satisfactory, it is apt to become monotonous when any considerable number is exhibited; and hence the desire, by some method of toning, to secure various shades of other and especially warmer colors.

Success in this direction has generally come through the use of some of the rarer metals, gold platinum iridium, uranium etc., although there always seems to have been a feeling that copper, itself one of the colored metals, should lend itself to a cheaper and probably better method than either of them.

It was easy enough to make the insoluble ferricyanide of copper, but the problem was to find a solvent by which it could be made and kept in solution so that the silver of the image could reduce it to an insoluble ferrocyanide, the coloring body, without at the same time staining the paper or acting on the gelatine.

And this has at last been accomplished. Mr. W. B. Ferguson, an accomplished chemist as well as a Q. C., after several years' experimenting, found the desired solvent in neutral potassic citrate, neutral citrate of potass, and at a recent meeting of the Royal Photographic Society, traced the devious paths through which he had been led to the desirable result; giving practical illustration of the ease by which prints could be toned to various colors from deep black to bright cherry red, the only modification being the time they were left in the solution; and showing lantern slides in all these colors. Through these paths it is needless to follow him, but it may be said at once that the discussion that followed showed that in the opinion of those present the method was the best, as it certainly is the cheapest that had yet been proposed.

The material, potassium citrate, copper sulphate, and potassium ferricyanide, is first made up into ten per cent solutions in which state they will keep indefintely, but should not be mixed until they are about to be used. The following is the formula, and the solutions must be mixed in the order prescribed:

Copper sulphate (10 per cent solution)	75 c.c.m.
Potassium citrate (neutral)	570 c.c.m.
Potassium ferricyanide	66 c.c.m.

Parts may be substituted for cubic centimeters by those who may not have metric measures, and if half drachms are taken for parts the result will be very close to the quantity prescribed.

To those having a doubt as to how best to set about making ten per cent solutions it will be sufficient to say, that as the dealers ounce contains 437·5 grains, all that is necessary to make that quantity into a ten per cent solution is to mark a bottle at the point reached by nine ounces and fifty minims of water, put the ounce into the bottle and fill with water to that point. Each measured minim of such a solution will contain one grain of the substance in solution. With liquids instead of solids, the bottle should be marked at the ten-ounce point, a measured ounce placed in the bottle and the bottle filled up to the mark with water.

In toning with this solution of cupric ferricyanide in potassium citrate, the soluble ferri salt is supposed to be by the action of silver of the image reduced to the insoluble ferro, which is deposited in situ; and being a bright red, the various shades of color arise from the black of the original image showing less and less through that red until it ceases to show at all. The method of toning is simplicity itself, all that is necessary being to place the developed fixed and washed slide or print in the solution and when the desired color has been reached, to wash in a few changes of water. After use the solution is thrown away.

DEATH OF A NOTED INVENTOR.

James G. Smith one of the pioneers of the telegraph died on March 13. He is best known for his invention in conjunction with Joseph B. Stearns of the duplex system of telegraphy. He was one of the first telegraph operators to receive by sound. He was born in New Hampshire in 1836. He served his apprenticeship under Joseph B. Stearns, and while in the office at Durham N. H., he took off by sound a three thousand word foreign news despatch for one of the local newspapers; this feat brought him considerable fame. He started working the first repeaters in Utica, Cleveland, Louisville, and Pittsburg and during the Civil War was in charge of all dispatches going between New York and the South, and was virtually a government official. During the draft riots when his own telegraph lines were torn down, Mr. Smith was sent out with a force of picked men to keep the lines clear so that communication with Boston would not be cut off. He was connected with a large number of various telegraph companies and the duplex system which he invented in collaboration with Mr. Stearns was used on the line between Boston and New York, the company being known as the Franklin Company. Since 1885, Mr. Smith turned his attention to telephones entirely and the last days of his life were spent in working up patents and inventions in telephones.