

most advantages, or whether a combination of the advantages peculiar to several of them may not furnish the best government model.

BREECH-LOADING ARMS.

Under the appropriations heretofore made by Congress to encourage experiments in breech-loading arms, very important results have been arrived at. The ingenuity and invention displayed upon the subject are truly surprising, and it is risking little to say that the arm has been nearly if not entirely perfected by several of these plans. These arms commend themselves very strongly by their great range and accuracy at long distances; for the rapidity with which they can be fired, and their exemption from injury by exposure to long continued rains. With the best breech-loading arm, one skillful man would be equal to two, probably three, armed with the ordinary muzzle-loading gun. True policy requires that steps should be taken to introduce these arms gradually into our service, and to this end preparations ought to be made for their manufacture in the public arsenals.

CAMELS AS "SHIPS OF THE DESERT."

The experiments thus far made (and they are pretty full) demonstrate that camels constitute a most useful and economical means of transportation for men and supplies, throughout the great deserts and barren regions of our interior. A camel will go safely with its burden over ground so rough and precipitous that a mule will scarcely pass over it unladen without assistance. They require no forage but what they gather in the most sterile and barren parts of our continent, and for many days together live conveniently without water. An abundant supply of these animals would, beyond all doubt, enable our army to give greater and prompter protection to our frontiers, and to all our interoceanic routes, than three times their cost expended in any other way. As a measure of economy and efficiency, I cannot too strongly recommend the purchase of a full supply to the favorable consideration of Congress.

MILITARY SIGNALS.

Assistant-surgeon Albert J. Myer, of the medical corps of the army, having submitted to this department a system of military signals for the purpose of communicating intelligence or orders between distant points of land, a board was convened in March last to examine into its merits. The board reported favorably to the adoption of this plan for the uses of the army. A series of experiments with the field signals, instituted under special instructions from this department, have developed results which promise to be of value to the service. With an equipment simple, strong, weighing but sixteen pounds, and so compact as to be readily carried from place to place by a soldier mounted or on foot, which requires for its use but a single man, communication has been kept up and messages transmitted by day, and at night, a distance of fifteen miles. Messages have been sent five miles without any apparatus specially provided for the purpose.

For the distances at which communication by signals would be needed for military uses, the plan appears to be ready and reliable. The trials in progress give reason to believe that by the use of such signals there may be secured to the service a mode of communication more easy, safe and available than any hitherto known.

FORTIFICATIONS AND GAS-LIGHT THEREFOR.

I regard the statistics of the combined naval and military operations of the French in the recent Italian war as indications of the correctness of my estimate of our danger from such attacks, and as warranting the renewal of my recommendation to Congress to take steps toward carrying out the plan sketched in my last report for the defense of New York, in particular, from such attempts. The appended memoir on "American Fortification," prepared at my instance by Lieut. Morton, of the engineer corps, explains the details of the plan in question, with the aid of an accurate topographical map. It also contains an analysis of the general subject of coast defense, which I deem worthy of your notice.

It is eminently desirable that our completed permanent forts should be lit with gas, and I recommend that a small appropriation be made to introduce it into the most important ones without delay. By that improvement the risk would be diminished of accidental fires breaking out in the officers' quarters or the barracks, now to be apprehended from the vicinity of the magazines. The introduction proposed may also be recommended on the

ground of economy. The post of West Point has been lighted in this manner with satisfactory results.

EXPLORATIONS—ARTESIAN WELLS.

A second expedition was sent into the Territory of Nebraska to explore certain tributaries of the Yellow Stone, the sources of that river, and of the Missouri. A portion of its labors has been accomplished, and the operations will be resumed in the ensuing spring.

A large amount of geographical and scientific information has been added, at small cost, through the labors of the different field parties, to our knowledge of the resources of the regions west of the Mississippi. Considerable tracts of country yet remain unknown, and the economy of continuing these explorations is evident when it is considered that they may open the country to travel, develop its mineral and agricultural wealth, shorten and afford new information concerning emigrant routes, and designate those portions of the wild territory that are susceptible of settlement.

I would respectfully invite your attention to the report of Lieut. Michler, who, under assignment of the War Department, was engaged upon the survey of an interoceanic ship canal near the Isthmus of Darien, via the Atrato and Truando rivers. Since his return from the scene of his field operations, considerable progress has been made in the reduction of observations and preparing the maps, until the want of means compelled him to suspend progress and discharge the computers and draughtsmen. The valuable information procured by Lieut. Michler should not be left in its unfinished condition in the archives of the bureau, to prevent which a small appropriation will be required.

The wagon road upon the thirty-fifth parallel, reaching from Fort Smith, Arkansas, to the Colorado of the West, is completed as far as the appropriation would do it. It is now sufficient for any travel of troops, military supplies or immigrants. This route abounds in grass and water, offering very great advantages at this time for travel, which will be still further enhanced when the posts contemplated shall have been added to those already on the line.

The experiment of sinking artesian wells upon public lands has been further prosecuted, but still without attaining the desired results, and the appropriation for the object having become exhausted, it was directed that the work should be suspended. The details of the experiments are set forth in the accompanying reports. It may be considered now as demonstrated that to bring water from subterranean streams, to overflow the surfaces of the great western plains, is, for any reasonable amount of expenditure, impracticable.

REPORT OF THE SECRETARY OF THE TREASURY.

It is a very curious circumstance that, in this long and elaborate report, there is no clear statement of the total receipts and expenditures for the year, or of the amount of the public debt. There are, however, data from which the first of these important facts may be obtained, and we have taken the trouble to put them together for the convenience of our readers.

The revenue of the government for the year ending June 30, 1859, was—

Customs	\$19,565,684 38
Public Lands	1,736,687 60
Miscellaneous	2,082,589 30
Total	\$23,384,961 28

The expenditures for the same period were—

Civil foreign intercourse and miscellaneous	\$23,635,820 91
Interior Department (Indians and pensions)	4,753,973 60
War Department	23,243,823 38
Navy Department	11,722,012 21
Total	\$63,355,630 10

Years Deficit \$12,941,155 12

There are a number of figures given in regard to the public debt, but in such a manner that we are unable to understand them with certainty; and we accordingly await the receipt of the schedule which presents a full statement of all the items and the amount, before attempting to give our readers the simple truth in regard to this important matter. The fact that the national debt—whatever its amount—was increased during the last fiscal year more than \$12,000,000, in a time of profound peace, is disgraceful to the government, and induces us to respond heartily to the recommendation of the President, that some efficient means should be adopted to stop this ruinous practice of borrowing. We do not want to see the capital of the country—even now

insufficient for the demands of business—absorbed in the maelstrom of an ever-growing public debt, and the industry of our people saddled with the support of a host of idle fund-holders, such as those under which the nations of Europe are staggering. The total imports for the year were \$338,768,130, whilst the exports for the same period were \$356,789,462.

REPORT OF THE POSTMASTER-GENERAL.

From the able report of Postmaster-general Holt, we learn that the expenses of the department for the year ending June 30, 1859, were \$14,964,493 33, while the revenue amounted to \$7,968,484 07; showing an excess of expenditures over receipts of \$6,996,009 26. This enormous annual deficit Mr. Holt proposes to reduce in accordance with the following plans and estimates:—

Retrenchments already adopted, mostly in the subsidies to steamships	\$1,530,221 00
Abolition of the franking privilege	1,800,000 00
Reduction in the exorbitant pay of railroads	1,084,558 00
Overland mails to California and Utah	1,229,756 36
Total	\$5,653,535 36

The last item—the overland mails—the Postmaster-general proposes that the government should pay from the Treasury, as they have been established for purposes of state policy, and yield no revenue to speak of. The remaining deficit of \$1,342,473 90, Mr. Holt thinks would be overcome in a few years by the increase of receipts, and by the adoption of still further practicable curtailments; and thus this great and important department of the government might be restored to the independent, self-sustaining position which it always occupied until within a few years. We cordially endorse the recommendation of these reforms.

THE LIME LIGHT AT THE LONDON CRYSTAL PALACE.

"The gas monopoly of the day is becoming so obnoxious that the introduction of any improvement in artificial light that can break in upon the present system will be sure to meet with public encouragement. This is very likely to be brought about by the Lime Light Company, whose brilliant light was exhibited at the Crystal Palace, a few evenings ago, before a large company of professional gentlemen. The power of this lime light is immensely in advance of the gas, which presents a very dull and miserable effect in contrast. The present Trinity House lamp, assisted by the most powerful reflectors, transmits light to about twenty miles, while the lime light, under similar circumstances, can be seen at a distance of ninety-five miles. On the evening in question one of these lights was placed in the Crystal Palace, at the end of the long transept, and emitted a light so intense as to illumine the whole length of the building, so that the smallest print could be read with the greatest ease at the extreme end. The great advantages of this light over the electric and other lights are its volume and continuity, as well as its economy, being the cheapest of any known light. It is admirably adapted for coast lights, for which we now pay £353,000 a year, one-half of which may be saved by the lime light."

[A correspondent sends us the above which he says he cut from an English paper; and asks us how the light is produced. The lime light—calcium light—Drummond light—as it has been variously named, is produced by the burning of a bit of lime in the flame of the compound blow-pipe. It has been known many years, and various efforts have been made to turn it to a practical use, but without success. One of the difficulties has been the delicacy of the manipulations required to keep up the supply of gases. The compound blow-pipe consists of two reservoirs, one of pure oxygen and one of pure hydrogen, with a small pipe leading from each so as to bring the gases together just before they issue from the jet. In volume twice as many gallons of hydrogen are required as of oxygen, though as oxygen is sixteen times heavier than hydrogen, the weight of the oxygen consumed is eight times that of the hydrogen. The result of the combustion is pure water. The compound blow-pipe was invented by Dr. Hare, of Philadelphia, and it produces the most intense artificial heat known. If the lime light will succeed anywhere, the Crystal Palace at Sydenham is just the place for it, as a large quantity of light is required, and a chemist competent to perform the necessary delicate manipulations may be profitably employed.—Eds.]