THE ORDNANCE DEPARTMENT.

BY MAJOR C. E. DUTTON, ORDNANCE DEPT., U. S. A.

The Ordnance Department was organized as a distinct branch of our military establishment by an act of Congress approved May 14, 1812. The duty of providing military stores for the army and militia had devolved prior to that time upon a purveyor of public supplies acting under the direction of the Secretary of War. Everything except small arms was purchased, mainly by contract, and the Secretary personally supervised the contracts. The examination of accounts now performed in the staff bureau was made in the office of an accountant of the War Department. The duties of supplying ordnance material vested in the Secretary himself. When an addition of 6000 men was made to the army in 1808 these duties became excessive and burdensome to the Secretary, but no relief was granted until the war with Great Britain was impending, when bills were passed establishing a Quartermaster and an Ordnance Department. An act of May 14, 1812, provided for a Commissary General of Ordnance, an assistant commissary general, four deputy commissaries, and as many assistant deputy commissaries as the President might think necessary not exceeding eight.

An act approved February 5, 1815, "For the better regulation of the Ordnance Department," provided a body of officers, consisting of one colonel, one lieutenant colonel, two majors, ten captains, and ten of each of first, second and third lieutenants. As this act, so far as relates to the Department itself, independently of its personnel, is regarded as its organic law, and, with only minor modifications by more recent acts, is still in force, it may be well to indicate briefly its most important features. It authorized the chief officer of the new department, "under the direction of the Secretary for the Department of War," to enlist artisans and laborers; to direct the inspection and proof of all cannon and small arms; to direct the construction of gun carriages, equipments, implements, and ammunition; to make estimates and contracts for, and purchases of ordnance supplies and stores, and to issue them to the army; to exact from armories and arsenals quarterly returns of property and to receive from all responsible officers reports of damages to ordnance material; to establish ordnance depots; to prepare regulations for the government of the Ordnance Department and forms of returns and reports. The public armories and arsenals were placed under his direction, and the duty of arming and equipping the militia from the permanent appropriation of $200,000 per annum provided by the law of April 23, 1808, devolved upon the new department.

The colonel and chief of the new corps was Decius Wadsworth and the lieutenant colonel was George Bomford, both officers of ability and distinction. Little is known of the state of this service in the six years following the war with England beyond what appears in the routine records. These records suffice to show that great improvements were effected in modes of administration and a system introduced for securing promptness, efficiency, economy and responsibility to a degree which was before unknown and which in its main features has lasted down to the present time. Whoever reads the Ordnance regulations of 1818 will be surprised to see how little rather than how much they differ from those now in force.

In the reduction of the army in 1821, the Ordnance Corps ceased to exist, the majority of its officers being re-commissioned in the artillery. But the Ordnance Department remained. Its duties were performed by officers detailed from the artillery. Bomford, who had been the lieutenant colonel of the corps and was made lieutenant colonel of the 1st Artillery, became the head of the Department. The law provided for four supernumerary captains of artillery who should be available for ordnance duty, and these were so assigned. Their details were practically permanent, though not necessarily so; their continuance depending upon the pleasure of the Secretary of War. All other officers whose services might be required were to be detailed for the term of one year from the artillery.

Whatever may be the merits, under favorable conditions, of an ordnance service performed by officers detailed from the line, it is now apparent that they could not be realized under the law of 1821. The periods of detail were much too short to enable them to become proficient, and the little experience they might have gained was lost to the Ordnance service by the return of the officers to their regiments. Then, as now, the duties required men of special and long experience, and once secured they could not be easily spared. The service degenerated, and after the retirement of Mr. Calhoun in 1825 his successors urged with increasing pressure the reestablishment of the Ordnance Corps. In 1832 Congress yielded and passed the bill. It provides for one colonel, one lieutenant colonel, two majors and ten captains, to be selected from the artillery. Bomford was made chief of the corps. He was a man of vigor and great intelligence, a capable organizer and well qualified to renovate and build up an important administrative bureau. He brought to his new office certain qualifications which are most essential to it; above all, the faculty of impressing himself strongly upon public men in Congress and at the head of administrations. His social standing and connections were eminent; his address impressive, yet pleasing. His official papers in particular were models of reserve force, lucid argument, and fluent style. The personnel of the new corps was carefully selected. All of them had excellent records. Three of them, Lieut. Colonel George Talcott, Major H. K. Craig, and Captain R. L. Baker, had been supernumerary captains of artillery during the consolidation period, serving

continuously in the Ordnance. One name, however, was conspicuous by its absence. Captain William Wade, who had been one of the supernumerary captains, had served as an Ordnance officer since 1812, and with conspicuous merit. In the natural course of appointments it was expected that he would be made the second major; but the place was given to Captain and Brevet Lieutenant Colonel William J. Worth. Wade, though offered a captaincy, considered himself overslaughed, and resigned from the army.* If he was wronged, he secured a noble revenge. For the time came when the department was in urgent need of just such services as Wade was, of all men, most capable of rendering. He gave them loyally, with lasting honor to himself, and with great advantage to the government. Among the captains, the first place in respect to ability must be conceded to Alfred Mordecai. He rose rapidly by force of merit to a fame less brilliant, but not less solid than Rodman's. His memory is entitled in a peculiar degree to the care of army historians, for his work was such as appeals to technical and professional men rather than to the multitude. His contributions came, not in the shape of a few large nuggets, but in a steady stream of gold dust sustained for many years and far outweighing the nuggets in the end. The value of his work consisted in its accuracy, its systematic character, and its immediate utility, and still more in the subtle, potent way in which the spirit of it pervaded almost insensibly the entire corps.

Mordecai was not the only one whose merit was greater than his popular fame. Of some of them I knew too little to speak, and all had gone from the corps when I entered it. But I well remember the accounts of them given by those who had served under them and whose own conduct was the best illustration of the discipline and training they had learned to emulate. Their abilities were chiefly executive. They may perhaps be gauged by the generally admitted fact that the armories and principal arsenals became the model workshops of the country.

The field open to the new corps was a broad one. The stagnation of the preceding decade had pervaded the entire army, and most of all the Ordnance service. It had caused, not indeed retrogression, but a lack of progress. The Indian wars of the thirties once more awakened the interest of Congress in the army and the army's interest in itself. The equipment of the new regiment of dragoons, the renovation of the field-guns and their mounting, the improvement of cast iron with a view to heavier calibres in the fortresses, the important changes in their carriages, experiments with breech-loading small arms, all engaged attention. Although progress was made, the full fruition of that progress did not become manifest until ten to sixteen years later, for the problems were difficult and the general state of the arts and sciences was not at that time such as to render a very rapid progress possible.

By an act approved July 5, 1838, the President was authorized to add to the Ordnance Department two majors and to transfer to it from the artillery ten first lieutenants and ten second lieutenants. A supplementary act approved two days later, July 7, 1838,

limited the number of lieutenants to be transferred to twelve. Among the new names of the corps we find those of Captains Maynadier and Thornton and Lieutenants Whitely, John F. Lee, Hagner, Wainwright, and Dyer, all of whom rose to distinction in after years. Worth was appointed colonel of the 8th Infantry, Ripley was promoted be major, and Lomax was transferred and reappointed major from the artillery. In 1841 were added the names of Gorgas and Rodman, in 1842 those of Laidley and Benton.

The decade from 1840 to 1850 was a most creditable one. The proportion of very able men in the corps was such as could be equalled by very few organizations in any army. In 1841 the Ordnance Board was established,—a feature of the department which still exists, though its functions are in a large measure superseded by the Board of Ordnance and Fortification. It has been a very serviceable institution. It has always been composed of ordnance officers of great experience and ability. The mixed boards which preceded it had yielded comparatively small results, owing to want of harmony of views among the members. The new board being more homogeneous accomplished more every year than its predecessors had accomplished in three or four. The first work before it was systematizing the armament of the country, including, so far as practicable, the entire range of ordnance material, making complete the equipment of every arm of the service in all details, preparing working drawings of every part in such manner that they could be made of exact record and regulation. It was also advisory to the Chief of Ordnance on all matters referred to it concerning improvements in material and as to experiments upon new devices or inventions. Its systematic work lasted eight years, at the end of which time (1849) it may be said that we had, in theory at least, a true system of ordnance material and the means of creating any amount of it that Congress might deem it fitting to appropriate the money for. The equipment of light batteries was completed in 1842, and their performance in the Mexican War is well known. Material for siege trains had received full consideration by 1845, and at the outbreak of that war an effective siege train was assembled by Huger assisted by Hagner, and took a highly creditable part in the operations of General Scott's army from Vera Cruz to the City of Mexico. The mounting of guns in casemate and barbette was completely revised, the cast-iron carriages which had been preferred since 1820 being virtually condemned in 1839, and timber carriages were again adopted.*

The armories at Springfield and Harper's Ferry since their first establishment in 1798 had been under the immediate charge of civil superintendents. Though placed under the nominal control of the Ordnance Department by the law of 1815, it seems to have been held that the executive management of the affairs of the armories was vested by law in the superintendents. Although some highly objectionable features of the management had grown up and were well known, no decisive measures were taken by the Secretary of War to correct them until 1842. By an act approved August 23, 1842, the offices of civil superintendents were abolished and the duties were imposed upon officers of the

Ordnance Corps. Craig was put in command at Harper's Ferry, and Ripley at Springfield.

The same act provided for the employment by the Ordnance Bureau of a competent person to superintend the manufacture of iron cannon. This was no doubt intended for the recall of Wade to his proper sphere. Since his resignation in 1832 he had been in the employ of the Fort Pitt Foundry at Pittsburg, and as a result of many costly experiments had made great progress in obtaining large iron castings of increased strength and reliability. This was of much importance in view of the desire to obtain guns of greatly increased power. About 1830 Bomford had designed a class of large guns for firing shells to which he gave the grotesque name of "Columbiads." At first they were 50 and 100-pounders, but owing to the uncertain character of the metal it was deemed inexpedient to procure more than sufficed for a trial of them. In 1843 shell guns (columbiads) of 8 and 10-inch calibre were undertaken with some degree of success. The metal was of excellent quality, but it had become plain that its advantages could not be fully realized until advances were made in the knowledge of gunpowder and in controlling its action. Experiments upon gunpowder were begun by Mordecai at the Washington Arsenal in 1843. As models of scientific method in research they will always rank high. The results lie at the foundation of those remarkable improvements in the use and control of that agent which came in after years. Their completion rendered possible a considerable advance in the power of heavy artillery.

In 1842 Talcott became the real Chief of Ordnance, and after Bomford's death in 1848 was promoted to be colonel. During the Mexican War there were added to the corps by the act of March 3, 1847, two captains and six lieutenants. Among the new names, appear those of Charles P. Stone (1845) and Jesse L. Reno (1846), Julian McAllister (1847), and S. V. Benet (1849), all of whom attained distinction in after years.

Great as had been the advances from 1840 to 1850, those from 1850 to 1860 were greater still. But it will be impossible to do more here than to allude to the most important. First in importance was the adoption of the rifled musket in place of the smooth-bore. The invention of the sub-calibre expanding bullet was the turning point. Prior to that, the rifle was the inferior arm in the main line of battle, and its utility had been limited to special corps of troops. The new bullet made it superior for all purposes, and in 1855 the rifle was adopted in all the armies of the world as the infantry arm. It was in the early part of this decade that Rodman's experiments were mostly conducted on metals, resulting in the establishment of the principle of initial tensions in the construction of cannon. His experiments on gunpowder, establishing the control of its combustion and carrying that control further than had ever before been contemplated soon followed. Of all methods of applying the principle of initial tensions, Rodman's was the crudest and least satisfactory. But the demonstration of the principle itself, remains as the most important contribution to the art of gun construction which has ever

been made, and established his fame as effectively as the twitching of the frog's legs established the fame of Volta. Little if any less important was the control of the action of gunpowder. But Rodman's contribution in this line, while entitling him to high honor, must be shared by others.

This decade 1850-1860 was remarkable for the extraordinary number of devices for breech-loading arms, as well as for attempts to introduce rifled cannon. The results were at best very imperfect, though important advances and some partial successes were attained. The introduction of breech-loading arms as a finality took place immediately after the war, and was determined by a great invention which in the period was little thought of though it was foreshadowed. This will be spoken of further on. The cavalry, however, accepted the Sharp's carbine in 1857, after a stubborn resistance to all breech-loading arms, beginning with the organization of the 1st Dragoons in 1833. Of the many forms of breech-loading arms, Sharp's model was doubtless the best, but the ammunition was from its nature very perishable.

Perhaps no better indication of the character of the progress of that decade can be found than in two inventions, Rodman's pressure gauges and Benton's electro-chronograph. The first (with the crusher improvement) is indispensable in interior ballistics; the second was an important addition to the many devices which are equally indispensable in exterior ballistics. They effected a revolution in scientific methods of investigating the more difficult problems of gunnery.

In this decade also began the transitions from ancient to modern artillery. It proceeded by slow and difficult steps. The establishment of the principle of initial tensions and the control of gunpowder were two great achievements. But before they could be so utilized as to secure the enormously improved results which were afterwards reached, collateral advances along other lines were necessary. The enlarged chamber leading to the principle of variable "density of loading" was a third advance. The development of the art of making large masses of steel suitable for guns was the fourth, and the longest delayed, as well as the most costly.

In 1851 Talcott was succeeded by Craig. Between 1850 and 1859 the corps received Crispin, Balch, Shunk, Treadwell, Baylor, O. O. Howard, Strong, Horace Porter, and Edson. Soon after the war Balch and Porter resigned; the others (except Major General Howard) are all dead. The seven senior officers of the corps now on the active list entered it in 1861.

The outbreak of the Civil War found the Ordnance Department in a trying situation. It had been its policy since its organization to accumulate as large a store of the durable munitions of war as its appropriations permitted. But the change from smooth-bore to rifle in 1855 had rendered the old muskets obsolete. Such rifles as had been procured

since that year had been mostly distributed to the army and militia, and nearly all of the remainder had been sent by Secretary Floyd to the Southern States in anticipation of secession. The first Secretary under Mr. Lincoln took the matter of providing arms to volunteers in chief part into his own hands, and sent agents to Europe to purchase whatever arms could be found. Meantime, measures were taken to enlarge the capacity of Springfield Armory, and contracts were made with private armories to furnish with the greatest practicable haste large supplies of muskets of the Springfield pattern. This required time, and the first volunteer troops were in many cases armed with indifferent weapons derived largely from Europe, and of several widely distinct patterns. All other supplies were forthcoming in abundance about as fast as the troops were ready to receive them, and from the beginning to the end of the war there was no lack of small arms, artillery ammunition, or equipments. Much of the contract work and material was of inferior quality in comparison with the outputs of the Arsenal, but this was due in a great measure to the fact that the Government had accumulations of good raw materials and specially-trained workmen, while contractors found it difficult and sometimes impossible to secure them. The efficiency of a well-trained corps of officers was signally displayed in the promptness, accuracy end good judgment with which all demands upon it were met, and in the judicious economy with which its material was managed and husbanded.

But at the outbreak of the war, the corps lost some of its best officers, Mordecai resigned, but did not give his great abilities to the South. Gorgas became Chief of Ordnance to the Confederacy, and displayed the highest ability in that office. Bell, Huger, John F. Lee, and Welcker, resigned and entered the Confederate service. Strong became a brigadier, and afterwards a major general of volunteers, and was killed in the attack on Fort Wagner. Reno (Jesse L.) also became a major general of volunteers and died most gallantly at South Mountain. The distinguished career of Oliver O. Howard, who was a first lieutenant of Ordnance at the beginning of the war, can only be alluded to here.

The need of more Ordnance officers was obvious, and the act of August 3, 1861, provided that "there shall be added to the Ordnance Department * * * one Chief of Ordnance, with the rank, pay and emoluments of the Quartermaster General of the army, one colonel, one lieutenant colonel, and six second lieutenants, the field officers to be appointed by selection from the officers of the army, and the second lieutenants from the graduates of the Military Academy, by transfers from the engineers, or the topographical engineers, or the artillery." The office of Chief of Ordnance, with the rank of brigadier general being thus an original vacancy, was filled by the promotion of Ripley over the head of Craig. The field officers were selected from the Ordnance Corps in accordance with seniority. As thus organized, the corps numbered (January 1, 1862), one brigadier general, two colonels, two lieutenant colonels, four majors, twelve

captains, twelve first lieutenants, eight second lieutenants, twelve storekeepers, and four vacancies in the lowest grade.

The act of March 3, 1863, provided for the addition of one lieutenant colonel, two majors, eight captains, and eight first lieutenants, to be appointed by promotion, and the vacancies at the foot of the list to be filled by transfers from regiments or other corps of the army. It also provided "that no officer of the Ordnance Department below the rank of a field officer shall be promoted to a higher grade, nor shall any officer of the army be commissioned as an Ordnance officer, until he shall have passed a satisfactory examination before a board of not less than three Ordnance officers senior to him in rank." It also provided that this organization should continue only during the Rebellion, and that thereafter the officers promoted should have the rank they would have had if the act had not passed, and the number should be reduced to the organization of August 3, 1861. By the act of July 28, 1866, the number of officers authorized by the act of March 3, 1863, was made permanent, but with the following grades: one brigadier general, three colonels, four lieutenant colonels, ten majors, twenty captains, sixteen first lieutenants, ten second lieutenants, and thirteen Ordnance storekeepers.

In June, 1863, Craig, and in September following, Ripley, were retired after more than forty-five years of active service, and George D. Ramsey was appointed Chief of Ordnance. He was the senior officer of the corps at the time of Ripley's retirement, having entered the artillery in 1820 and transferred to the Ordnance as a captain in 1835. In September, 1864, Ramsey was retired, and Major A. B. Dyer, then commanding the Springfield Armory, was appointed Chief.

The close of the war was followed by dark days for the Ordnance. Disappointed contractors and inventors whose hopes had not been realized, were embittered against the bureau and carried their grievances into Congress, A joint committee was appointed to investigate their complaints, and the procedure, it is gratifying to know, has not often been paralleled in Congressional committees. Its report (drafted by the most bitter and most unreasonable of the complainants) reflected severely upon General Dyer, who at once asked for a court-martial. It was refused, and he then asked for a court of inquiry, which was granted. The inquiry of the court was long and thorough, and not only exonerated him, but held him up as an example worthy of the imitation of all army officers. Probably the worst effect of the investigation by the Congressional committee was the encouragement it afforded to similar attacks, and though this appears to have been the only personal one, the Ordnance Department found to its great embarrassment that similar influences were ever present to poison the minds of Committees against all its projects for the improvement of heavy ordnance, and to impose upon it heavy burdens of proof against other projects which it could in no way recommend. These influences were maintained through many years. They created a feeling of distrust towards the Department and its officers for which there was no real ground. They

caused Committees to give precedence to and vote large sums for, the trial of costly devices whose failure was assured in advance, and every attempt in the true path of improvement was hampered or kept waiting indefinitely.

The year 1866 marks a revolution in the armament of the infantry. To say that it marks the change from the muzzle-loading to the breech-loading musket does not accurately nor logically express its real significance. Breech-loading arms, both great and small, have been experimented with for at least three, and perhaps four, centuries. The period from 1840 to 1857 abounded in devices for breech loading which became more numerous every year. It is a common idea that the aversion to them on the part of all officers was founded in mere conservatism, or even prejudice. But the truth was otherwise. All things considered, the breech-loaders were inferior to muzzle-loaders, and the superiority of the former was established only when the centre fire metallic cartridge was perfected. The ordinary notion is that powder and ball are mere accessories to the gun; that the gun is the all-important and substantive thing, while the cartridge is a minor incident. So all-pervading has this idea been in times past, that even the most expert have been not only influenced by it, but sometimes governed by it. The truth is the opposite. The cartridge is primary and antecedent, the gun secondary and consequent. Before the metallic cartridge was perfected, breech-loading arms were all of varying degrees of badness; afterwards they were all of varying degrees of goodness. At no time since, has there been a year in which it was not possible to select half a dozen or more designs of breech-loaders, such that if we were to assign 100 as a figure of merit for the best, the corresponding figure for the poorest would be at least go and perhaps 95. Under the old system, the ball, the powder and the priming were separate and separately handled; under the new system, they formed one piece. The gun with its breech mechanism follows as a logical sequence.

We may now perceive why progress with breech-loading arms was so slow, prior to the war, and why "science moved but slowly, slowly, creeping on from point to point." All inventive thought was concentrated on the gun as the primary factor. But when the centre fire metallic cartridge was developed—presto! "Science" had put on its seven-leagued boots. The change to the breech-loader took place at a bound.

These remarks are offered as a general answer to the frequent criticism that Ordnance officers were slow to adopt improved arms, and that they were behind other nations in this respect. If our army was later than others in receiving breech-loaders, it was the first to have the metallic cartridge, and other armies only got bad muskets and worse ammunition by being too previous.

The metallic cartridge it seems to me is the greatest military invention since the discovery of gunpowder. It is, however, an evolution rather than an invention, embodying a slow accretion of the ideas of many workers and inventors. The earliest

patent I am aware of on the centre-fire form is that of Morse, though his design is crude. It was, however, worked up to a thoroughly effective form and with many changes at the Frankford Arsenal. With the developed form came the necessity of providing machinery for manufacturing it rapidly and cheaply. This, too, was accomplished at the same arsenal during the commands of Benet and Treadwell. The designer of this machinery was Jabez H. Gill, a master mechanic at Frankford, who was much aided by Robert Bolton, the foreman of the cartridge factory. Achievements such as theirs, if attained outside of the government service, would have made their names illustrious.

The development of the Springfield rifle, with the swinging breech-block, quickly followed. Though some minor improvements have been made from time to time, its essential features have lasted to the present. While foreign armies have changed their arms repeatedly, and while our own Ordnance Department has repeatedly offered competing arms which seemed from the tests of the proving ground to be better, the infantry have clung to the Springfield arm with a tenacity for which Ordnance officers sometimes find it difficult to account. In the change to the magazine system, the policy of the Department has been the same as in the sixties; it is comprised in the old proverb: "Be sure you are right and then go ahead." In this second change, something more than a device for the more rapid loading and discharge of cartridges was required, and that was a cartridge of reduced size and weight, without any reduction, but rather with an increase of power. Until the cartridge was greatly improved the change was at best of very doubtful advantage.

The act of March 8, 1869 (Army Appropriations bill), stopped all promotions and appointments in the staff corps until further legislation. The act of June 23, 1874, reopened promotions and gave to the corps its present organization. The grade of second lieutenant of Ordnance was abolished, and also Ordnance storekeepers, but without affecting the status of the storekeepers then in service. All vacancies in the grade of first lieutenant were to be filled by transfer from the line, and all promotions and appointments to be subject to a satisfactory examination before a board of Ordnance officers. These provisions have been of great value and importance to the corps, and are in a large measure due to the efforts of the lamented Lyford. They have secured a class of officers to whom the professional reputation of the corps may be entrusted for many years to come with the entire confidence of the army and the country. There might seem to be one drawback, as it has thus far had the effect of taking from the artillery some of its brightest and most capable lieutenants; but that corps is so abundantly supplied with splendid material of that kind that it will hardly feel the drain.

In May, 1874, General Dyer, after a long illness, passed away, and in the following month, S. V. Benet, then a major in the corps, was appointed Chief of Ordnance, which position he held until his retirement in 1891.

Since the close of the war, the corps has suffered the severest visitations of death. The complete list of those who have died in active service since the war is, Wainwright, Rodman, Benton, Crispin, Shunk, Todd, Treadwell, Baylor, Edson, Bradford, Hill, Buel, Lyford, Edie, Chaffee, C. F. Rockwell, McKee, Ramsay, Jr., Michaelis, Prince, Poland, Clifford, Wright, Starring, Wier, Medcalfe. If death loves a shining mark, he seldom missed it when he aimed at the Ordnance Corps. If the average efficiency of their successors shall be as great as theirs, more could not reasonably be asked nor expected. The names of those who have passed in the same time to the retired list and thence to their graves will also serve to recall the early history of the corps in whose achievements they bore a highly honorable part. The assemblage of names is a strong one: Craig, Ripley, Ramsay, Maynadier, Thornton, Hagner, Laidley, McAllister. Of the corps which antedates the Mexican War, there is but one survivor, Colonel and Brevet Brigadier General R. H. K. Whiteley, whom the older officers of the present corps recall, not only with profound respect and admiration, but with affection. He and his contemporaries just mentioned, present themselves to our recollection as models to be imitated in respect to industry, fidelity, discipline, devotion to duty in the military relation, and dignified courtesy in the private one.