"The average time assigned to the drill of each student during the academic year (eight months) is seven hours per week This includes the time occupied by all seamanship, great guns, field artillery, boat howitzers, infantry, fencing and boxing exercises and dress parades. Besides these exercises, those members of the Fourth Class, who enter in June, are practised in gymnastics during the summer months, three hours every week, and in swimming every morning. The third class has instruction in gymnastics about three hours per month; and all the classes are invited and encouraged to use the gymnasium for exercise during recreation hours. The average time assigned to drill in infantry tactics does not exceed two hours per week throughout the academic year. . . . . As to the amount of drill which can be profitably employed in such a school as the Massachusetts Institute of Technology, for the purposes of exercise, discipline &c., I am of opinion that one hour per day could be so appropriated with great advantage to the physical culture and mental development of the students. . . . I have always been strongly impressed with the necessity of bodily culture as the true complement of mental development; and I know of no readier and more congenial method of obtaining a good result than the practice of military exercises, in the full meaning of that term. For in that sense what is called military training—a kind of training which is but a small part of a military education, and which ought to be common and not peculiar to soldiers and sailors—is to be valued not only in a muscular point of view, but as generating habits of just subordination, of manly self-control, and of neatness and good order in person and personal property."

"Admiral Worden also refers in his valuable letter to an elaborate article on "Physical and Military Exercise in Public Schools—a National Necessity," contributed by Gen. Edward L. Mollineaux of New York, to Barnard's "Military Systems of Education," first published in 1862, and revised in 1872. In this article we find the following suggestions:

"The influence of health upon the faculties of the mind is acknowledged by all, and yet how few in this country devote attention to those important exercises which are necessary to the preservation of health, and without which intellectual power cannot be applied to its highest use. The talents, the experience of our best educators of youth are taxed to devise exercise to develop the mental faculties, forgetting that too close application to study is detrimental to the growth of the body. . . . What, then, is the most simple, feasible, and useful plan to adopt for physical exercise in our colleges, normal, and public schools? We unhesitatingly reply that the only successful, orderly, and sytematic method is to engraft them upon the course of studies during school hours, and to carry it out under strict military discipline; the exercise being such as are best suited to the ages, strength and capabilities of the pupils, namely, calisthenics and walking for the girls and younger children, and military exercises for the elder boys"

High English authority is cited in support not only of the practice of infantry tactics in schools, but even of cavalry drill for the middle and higher grades. The Vice Chancellor of Oxford testifies that the institution of the systematized exercise of the volunteer drill in the mental labors, and of the whole of the order and discipline, as well as of the health of the university. Hon. Joseph White, the present experienced Secretary of the Massachusetts Board of Education, and also a member, on the part of the Commonwealth, of the corporation of this institute, says:

"Let the drill be regular and compulsory, taking the place of the very irregular and insufficient physical exercises now taken, and our colleges would be vastly improved in their educational power, and the Commonwealth would, in a short time, have a numerous body of educated men, well skilled in military science and art, who will become teachers in our lower grades of schools, and in our military companies and associations, and competent when the alarm is sounded, to lead our citizen soldiers to the field."

THE following official report is the embodiment of the opinions of the United States "Board of Engineers for Fortifications" on the official report of the Board of Officers appointed by S. G. O. No. 108, H. C. O., May 21, 1873, a Gatling Guns of large calibre for flank defences," which has appeared in former issues. This last is copied from United States *Army and Navy Journal* of the 4th July.

OFFICE BOARD OF ENGINEERS FOR FORTIFICATIONS, ARMY BUILDING, NEW YORK Feb. 3, 1874.

GENERAL:

The Board of Engineers for Fortifications having examined the report referred to them by your endorsement of January 23, 1874, of a special Board of officers upon the introduction of the Gatling gun for flank defence in fortification, have the honor to submit the following views thereon. The experiment firings with the Gatling gun compared with those of the 8inch howitzer and 24pounder Napoleon are clearly set forth and fully discussed by the officers conducting these firings, and this board concur generally in their deductions and conclusions. While a good flank defence of most of our forts may not require the introduction of the Gatling gun, its use as an auxiliary in special cases may be desirable.

The fire of canister, 440 bullets at once, has the effect of a volley, and the first discharge may completely break an assaulting colomn. This volley effect of the howitzer is in part made up by the continuity of fire of the Gatling, and the combination of the two, the latter filling up the intervals between the volleys, would seem to be superior to either singly, unless the howitzers gives a rapidity of fire approaching continuity.

The Gatling requires fewer gunners for its service, and there are some small works where the garrisons may be quite limited on the breaking out of war necessitating the economy of men in the service of the pieces. These guns on the ramparts in such works, would supply the place of a large number of soldiers. In many of our works the strength is superabundant, and either system of flank defence will doubtless be sufficient. Before determining to what extent the Gtling may be introduced as an auxiliary, it will be necessary to take up our permanent work *seriatim* and discuss the probabilities and nature of the attack, and decide therefrom if any change in the flank guns will be required. From their position and strength many forts will need no change. In the more exposed works, especially in the cases noted by the board, the Gatling will doubtless aid flank defence.

2d. This board give it as their opinion that a number of Gatling guns may be effectually used on the parapet of works, as being more accurate in their fire at a distance upon reconnoitring parties, both by land and water than field artillery, or pieces in position, or even musketry, and they can be served with less exposure. Many of the barbette-batteries that have been recommended by this board are isolated and unsupported by permanent works. Some small keeps will probably be built to protect them. The Gatling gun will be found efficient in these keeps to clear the advanced batteries if attacked by boat or store parties with a view to spiking the guns, and will sweep the approaches to such batteries. Further, the Gatling gun will prove very serviceable in firing into the embrasures of ironclad ships that approach within 1,000 or 1,200 yards of a fort. For these various purposes it will be perceived that each fort may use judiciously a number of Gatling guns, and their utility may be further developed when once introduced into service. The study of each fortified position should be made before determining, even in a general manner, the number of such guns needed.

Though concurring generally in the deductions of the special board as to the utility of the Gatling gun in many positions, a thorough discussion of our forts may show, as before stated, that only a limited portion of them will need the auxiliary assistance of the Gatling gun for an efficient flank defence. Its efficiency in field works, not only for flank but for direct fire, seems unquestionable.

The report of the board on Gatling guns, with letter of transmittal, are herewith returned, (in separate package, by mail).

Respectfully submitted.

J. G. BARNARD,
Col. of Eng and Bvt. Major Gen.
Z. B. TOWER,
Lt. Col. of Eng. and Bvt. Major Gen.
H. G. WRIGHT,
Lt. Col. of Eng and Bvt. Major Gen.
Brig. Gen. A. A. HUMPHREYS,
Chief of Engineers, U. S. A., Washington, D C.

The Prefect of Cuenca announces that thirty-four bodies of Republicans, murdered by the Carlist, have been found in a house in that town, mutilated so horribly, as to be unrecognisable.

The *Epaca* says that Don Carlos invited Cabreera to accept a position in his army, and that Cabreera replied that he would never make common cause with cannibals and fanatics.

The *Impareial* says that Senor Camacho, Minister of Finance, has informed the Council of Ministers that he has sufficient funds on hand to arm 125,000 reserves, and to meet the ordinary requirements of the State until next September.

The Imperial Parliament has voted a yearly pension of $757,000 to Prince Leopold, youngest son of Her Majesty.

The *Times* correspondent telegraphs from Paris, that the Marquis of Castellane will move for the prorogation of the Assembly to day, and that the motion will probably be carried, as the Government will accept it.

A special despatch from Berlin to the *Times* says. the Prussian Government have sent eight detectives to Kissengen to protect Bismarck.