

...ring charge was 452 lbs., the initial velocity was 1,018 ft., the
 ...up work 32,211 ft. tons—the work per inch circumference
 ...ft. tons, or 11,370 ft. tons, to a penetration of 32.12 ins. The press-
 ...the bore was 19 1/2 tons.
 ...highest test obtained with the 100-ton gun of 17 1/2 ins. cal-
 ...withers, has recently been furnished me by Captain Noble,
 ...follows: charge, 573 lbs.; projectile, probably about 2,000 lbs.;
 ...ity, 1,751 ft.; stored-up work, about 41,200 ft. tons, or 742 1/2
 ...tons per inch circumference, equivalent to a penetration of
 ...of iron, or armour. The pressure on the bore was 17 1/2 tons,
 ...is quite clear, from the above, that the 71-ton gun is a much
 ...weapon than the 50-ton gun, inasmuch as it beats it in every
 ...It fires a heavier projectile with a higher velocity, which
 ...therefore more energy or stored-up work, and an inch and a
 ...more penetration, and all this is done with less pressure on
 ...of the gun. The reason is that it is a better proportioned
 ...its main advantage being its greater length. The 100-ton gun
 ...is much more favorably with Krupp's gun, but nevertheless
 ...would do so better if its length were greater. The main differ-
 ...in the guns depends on the difference in the length. Compar-
 ...these three guns together, I must remind that the 100 and 80
 ...are productions of an earlier date than the 71-ton gun; and
 ...the latter ought therefore to be better proportioned. I am not speak-
 ...of any superiority in knowledge shown by Krupp; on
 ...other hand, I am anxious to do justice to the labors of General
 ...Coughthead and Captain Noble in making investigations on
 ...the question, which the artillery world generally has turned to
 ...account. Speaking, then, not of the knowledge but of the
 ...ment of it in new guns, the question naturally arises, how
 ...ant our Government should be slow completing and issuing
 ...guns so inferior in power to Krupp's 71-ton gun, which
 ...gave the results we speak of half a year ago? The answer is,
 ...the guns are designed for the "Inflexible," and that, being
 ...loaders, the vessels had to be made with portions of the
 ...corresponding to the length of the gun to make provision for
 ...loading. All this was determined five or six years ago. Since
 ...my own investigations have shown us the desirability of
 ...increasing the length; but the gun being a muzzle loader
 ...impossible to do so. For the ship in question, a muzzle loader
 ...limited to its length by inflexible conditions; and all that
 ...done is by enlarging the chamber, to utilize to the fullest
 ...the proportionate thickness of metal. Circumstances
 ...in this instance, then, combined so as to bring out the dis-
 ...stage of a muzzle-loader in a peculiar way; for we find our-
 ...in the case of the "Inflexible," leaving new guns of obso-
 ...proportion for a new ship. Apart from this trying instance,
 ...it is clear that every increase in length is in favor of the
 ...loader, because the labor and inconvenience of muzzle-
 ...increase in an increasing ratio; and, in the case of turret
 ...and in some guns in casemates and cupolas, muzzle-loading
 ...long guns becomes eventually almost impossible.

The conclusion of the paper the President invited discussion.
 ...General E. E. Gordon, C.B., R.A., said: It appears to me
 ...breach-loading is, in a manner, forced upon us by circum-
 ...we have reached the extreme power of muzzle-loading
 ...simply because we are unable further to increase their
 ...We have made them as long as they can be for use on
 ...ships and in casemates. Guns of greater power are demand-
 ...we cannot arrive at greater power without greater length,
 ...we all know that naval guns are limited in length by the
 ...space available for recoil. The bore of this gun of Krupp's
 ...calibres in length, while our 33-ton gun is, I think, 18 calibres,
 ...of the 80-ton gun is about the same. There is no doubt
 ...the power of the Krupp 71-ton gun is greater than the 80-ton
 ...present, but if we could put on a few more feet at the muzzle
 ...the latter, we could realize a far greater energy. Well; in
 ...to increase the length of the gun, you must introduce a
 ...loading arrangement. As to the question of the weakness
 ...loaders, we must remember that the gun which burst
 ...the German training ship was an old gun, and that it was
 ...itself which gave way, and not the breach-loading arrange-
 ...Therefore, that occurrence affords no argument against
 ...loading, although it may be an argument against making
 ...steel. In 1893 the Ordnance Committee very strongly
 ...ended a trial of breach-loading guns, but there were said
 ...very good reasons why the recommendation was not follow-
 ...I have not a great number of short guns, very good of their
 ...beyond doubt, but nevertheless unequal to longer B. L. guns
 ...might have been produced of the same weight.

Militia General Orders.

PROVINCE OF ONTARIO.

Sarnia Battery of Garrison Artillery.

Captain:

Lieutenant Charles S. Ellis, G. S., vice Joshua
 ...fourth Adams, who is hereby permitted to retire
 ...retaining rank.

PROVINCE OF NOVA SCOTIA.

Yarmouth Battery of Garrison Artillery.

Adjutant.—Adverting to No. 4 as General Orders (21)
 ...November, 1886, for "Thomas F. Jolley," read
 ..."Thomas R. Jolly" as the name of the Officer promoted
 ...command of the Battery.

CERTIFICATES GRANTED.

ROYAL SCHOOLS OF GUNNERY.

PROVINCE OF ONTARIO.

Cavalry.

THIRD CLASS "SHORT COURSE" CERTIFICATES.

- Sergeant T. A. R. Peel, 1st Regiment.
- do George Shoppard, Princess Louise Dragoon
 Guards.
- do Sterling LeRoy, 4th Provisional Regiment.

FOURTH CLASS "SHORT COURSE" CERTIFICATES.

- Sergeant Henry M. Ryan, 1st Regiment.

Gunnery.

FIRST CLASS "LONG COURSE" CERTIFICATES.

- Lieutenant R. W. Rutherford, 66th Battalion.
- 2nd Lieutenant G. F. Cole, N.B., Brig. Garr. Artillery.

THIRD CLASS "SHORT COURSE" CERTIFICATES.

- Corporal E. A. Day, Ottawa Field Battery.
- Acting Bombardier Chas. Simpson, "B" Battery.
- Gunner Richard Lake, do

FOURTH CLASS "SHORT COURSE" CERTIFICATES.

- Sergeant J. Bernie, Collingwood Batt. Garr. Artillery.
- do Evan Ladow, Trenton do
- do William Watts, do do
- Gunner H. A. Wright, Kingston Field Battery.
- do John Fournier, "B" Battery.
- do Michael Ryan, do do
- do Thos. Callaghan, do do
- do George Hastie, do do
- do George Meeker, do do
- do William Woods, do do

PROVINCE OF QUEBEC.

Gunnery.

SECOND CLASS "SHORT COURSE" CERTIFICATES.

- 2nd Lieut. H. M. Campbell, 5th Regt. Cavalry, N.B.
- 2nd Lieut. J. D. Roche, No. 3 Battery, Quebec, G.A.

FOURTH CLASS "SHORT COURSE" CERTIFICATES.

- Bombardier T. Novison, Shefford Field Battery.
- Gunner J. O. Alix, jr., do
- do E. Bailey, do
- do J. H. Doyle, Richmond Field Battery.

Progress of Heavy Artillery.

The progress of heavy artillery in its developments and
 manufacture has now reached a very interesting stage. We
 have all maintained that the system of building up guns by
 placing the hard steel tubes inside soft iron coils was contrary
 to the rules of science, especially when the outside casing was
 subjected to severe tensile strain necessary to compress the
 steel tube. We say necessary, for though the steel tube is no
 doubt very strong, it will not stretch under sudden strains, but
 will snap or split; hence the severe tensile strain on the casing
 is necessary to prevent the tube stretching to its snapping or
 splitting point. Steel will stretch considerably under a grad-
 ual strain, but snaps under a sudden strain. We pointed to
 the various explosions which had taken place, such as the two
 Thunderer guns which broke up like carrots, one on board ship
 and the other at Woolwich, also to the 100-ton gun on board