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T. G. Bale

Otterbein Ægis

* * *

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SEPTEMBER

1903

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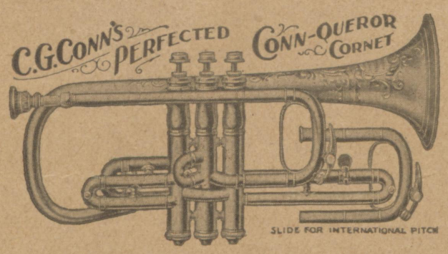

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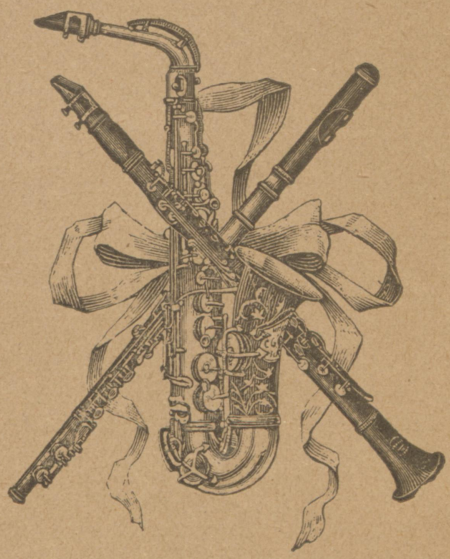

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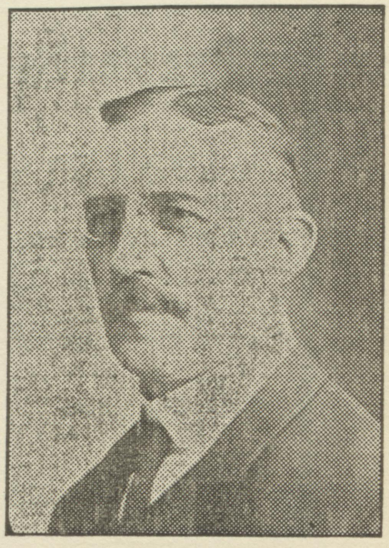

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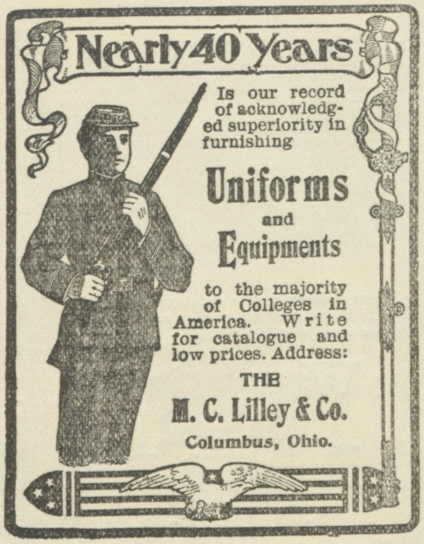

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OTTERBEIN ÆGIS

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Editorial

WE are again entering upon a new term as well as a new year in Otterbein University, and as we look back over the past year with its mingled pleasures and troubles we feel that we have a good cause for rejoicing. Our lives have been spared and our anxiety to be in school again and to meet and greet former associates has in a great measure been realized. We are permitted to take up our work where we left it and with renewed energy and greater ambitions we should strive to make this year more complete than last, so that there will be no cause whatever for regret.

The old students and upper classmen find new responsibilities. They are forced to take the places of those to whom they formerly looked as leaders. No doubt they feel a sense of inability as they look back over their work and see many places where opportunities might have been improved. However, we are all mortals, no one is perfect, and lost opportunities should only be an incentive to more careful and vigerous work.

To the new student we would say: be moderate in your ambitions to get through school; don't take more work than you can properly assimilate. Take less work and do it more thoroughly, and the benefits to you will far exceed that of heavy work.

We are glad to see you in Otterbein and we assure you that there is no school where the students are more sociable and where they are, in every department so near on an equality. The ÆGIS welcomes you and extends to you best wishes for the greatest success.

WITH this issue the ÆGIS enters upon the fourteenth year of its existency.

Its pnrpose is the same as ever, namely: to keep graduates and former students in close touch with our work, so that they may interest others and induce them to look to Otterbein in choosing a college, also to furnish an incentive for the writing of good productions and to increase the interest in literary work.

The editing of such a paper is no small task. All the work must be done in connection with the regular college work. Students do not contribute as freely as is wished. However, we hope to make the paper, this year, as interesting as possible, and to do so, we need the hearty support of all interested. Any suggestions that will help to make the paper more interesting and increase

its popularity will be gladly received.

The ambition of this Staff, to make the paper a success, is just as great and very similar to the hopes of former staffs. We congratulate the former editors for raising the paper to its present high degree of excellence and all we can hope is, to maintain this and prevent any retrogression.

Our Missionaries

SIX of our best young men and women will sail for Africa September 30, Mr. and Mrs. W. E. Riebel, Mr. and Mrs. C. Judy, Mr. and Mrs. Charles Snyder. They are employed by the Woman's Board of the U. B. Church and will work in Sierra Leone, teaching, preaching and conducting industrial work.

The consecration service was held at Fostoria in connection with the Board meeting in May. A farewell service was held in their honor in the college chapel Sunday evening, Sept. 20. A large audience of sympathetic friends greeted them and wished them Godspeed in their chosen work. Mrs. B. F. Witt, of the Women's Board, was present and spoke from experience and observation of the needs, the difficulties and opportunities of the African field. Of the interest of certain chiefs in the Christian instruction of their people, especially the boys. A special offering was taken for the opening of a new training school and there was some generous giving.

As a final goodbye the members of the congregation and all friends present formed two circles one around the wall, the other around the middle section of seats, and hand-in-hand sang impressively "God be with you till we meet again," and Mr. Deller, President of Y. M. C. A. offered the closing prayer. Mr. and Mrs. Snyder being in the east were not able to be present at this service.

Mr. Judy, who is from Germantown, O., and graduate of O. U., 1902, spoke of the bright side of missionary work and stated he counted it a privilege to go, and requested the young men of Otterbein, in case the field required the offering of his life, to fill up the ranks.

Mrs. Lambert Riebel, a Westerville girl and member of the local church, also of the class 1902, spoke of the home influences that led her to dedicate her life to the service of others. "I fear nothing," said she, "since I am enlisted under an all-powerful King."

Mrs. Riebel Judy, of Galloway, and student of O. U., mentioned the influence of the Christian associations of Otterbein upon her life; her happiness in the work and willingness to go where Christ leads.

Mr. W. E. Riebel, of the class of 1902, and former President of Y. M. C. A., stated that he goes out in the strength of God because of his love to Christ, the great need of the field and his belief in the power of prayer.

The prayes and sympathies and money of a host of friends will follow these noble young people to their chosen work. Otterbein may well be proud of her representatives abroad.

Our Standard Measures

PROF. LOUIS H. M'FADDEN

METROLOGY is a term that broadly covers the science of measuring. As old as the practice of establishing standards of measurements may be, less than a century will cover the time within which precision has been great enough to justify the expression, science of measuring.

What is a yard? What is a pound? are questions too elementary, at first sight, to propose, but there are few teachers or engineers who can answer them. This fact furnishes sufficient excuse for a brief enquiry this morning into the history and origin of our standards of length, weight, and capacity.

Measuring is usually effected directly by finding how often a selected unit, as a foot, for example, is contained in the given magni-

Clayton Juda.
Iva (Riebel) Juda.

W. E. Riebel.
Elsie (Lambert) Riebel.

C. W. Snyder.
Lucy (Grantham) Snyder.

tude. Uniformity, therefore, is of the very first importance. What dreadful confusion and carnival of untruthfulness would prevail in the ranks of fishermen, for example, if all did not carry tape lines and balances of standard make, can easily be imagined. Uniformity of standards, however, has been exceedingly difficult to secure. "In England from the earliest records of parliamentary history, the statute-books are filled with ineffectual attempts of the legislature to establish uniformity." (Adam's Report). Increasing commercial relations between European states and the demands of science for precision in the last century have accomplished more in the direction of uniformity than in all the world's history before.

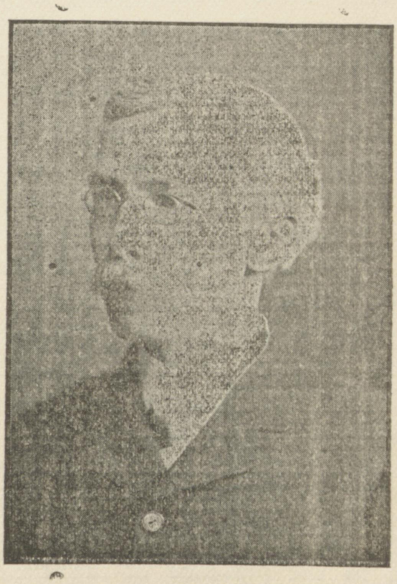
The tendency in recent time is strongly in the direction of reducing the numerous units of measure to a few called fundamental units. In terms of length, mass and time all known magnitudes may be expressed with great simplicity and precision. Since this much desired end is dependent upon the metric system, or something like it, further consideration of this phase of the subject would better be deferred. The discussion of our measuring standards might proceed along a number of chosen lines, dependent upon the object to be attained. As the present purpose is merely to present some facts relating to the origin and status of our standards, a strictly historical review will not be attempted.

Consideration will be given first, to standards of measure in our own country; second, to the origin of our standards in England; and, third, to the origin and character of the metric system.

The constitution of the United States authorizes Congress "to fix the standard of weights and measures," but Congress has never seen fit to do so. Onr standards are really due to state enactments.

In his message to the first Congress, Washington said; "Uniformity in the currency, weights and measures of the United States is an object of great importance and will, I am persuaded, be duly attended to." In accordance with this suggestion the House of Representative referred the matter to Jefferson, who was then Secretary of State, for a report. In July 1790 he submitted two plans, one of which proposed to define and render uniform the existing system, the other, to "reduce every branch to the other decimal ratio already established for coins, and thus bring the calculations of the principal affairs of life within the arithmetic of every man wha can multiply and divide."

At the time this report was being considered it became known that the National Assembly of France was taking steps which should



PROF. L. H. McFADDEN

lead to uniformity in the weights and measures of commercial nations, and in view of this fact, the Senate committee, to whom Jefferson's propositions were referred, reported that since "a coincidence of regulations on so interesting a subject would be desirable, your committee are of opinion that it would not be eligible at present to introduce any alteration in the measures and weights which are now in use in the United States."

Washington, in his opening address to the Second Congress, again urged the necessity for action, and a committee reported in 1792

in favor of Jefferson's second plan, namely, a decimal system. In spite of this report and the appointment of various committees, no legislation followed. It is interesting to note that we so narrowly missed the distinction of being the first government to formally adopt a decimal system of units of measure.

The Treasury department being obliged to execute the provision of the Constitution, that all duties, imposts and excises shall be uniform throughout the United States, found it necessary to procure through the executive branch of the Government certain standards which were adopted by the Treasury Department as provisional units. These were, in 1814, an eighty two inch Troughton brass scale for the Coast and Geodetic survey; in 1821, a platinum kilogram and meter; and in 1827, a Troy pound from London, which in 1828 was, by act of Congress, made the standard of mass for the Mint, and although totally unfit for such use, it still remains the standard for coinage purposes. The Troy pound here mentioned was a copy, made with great accuracy, of the British Troy Pound of 1758, which became the Imperial standard in 1825. The copy was sent to the United States in charge of a special messenger who deposited it with the Director of the Mint at Philadelphia, where it remained for a month without opening the casket. On October 12, 1827 the seals of the casket were broken in the presence of the President of the United States, John Quincy Adams, whose formal certificate of its condition then gave it authenticity.

The legislative history of our standards is so brief that it may be given practically in full. In 1830 the Senate directed the Secretary of the Treasury to institute a comparison of the standards of weights and measures used in the principal customs houses of the United States, and report to the Senate at its next session. As a result of this examination large discrepancies were discovered in the weights and measures in use.

By virtue of the general powers vested in it, the Treasury Department adopted the Troughton scale, before referred to, as the unit of length, or rather a portion of it comprised between the twenty seventh and sixty third inch divisions, equal to the British Imperial yard. It adopted, also, the Troy Pound of the Mint as the unit of weight, from which the Avoirdupois pound was to be derived, so that the ratio of its weight to that of the Troy pound should be as 7000 to 5760. For liquid measure, the Wine Gallon of 231 cubic inches, and for dry measure, the Winchester Bushel of 2150.42 cubic inches, were adopted.

Although Congress never legalized these standards it seems to have acquiesced in the action of the Treasury Department, since in June 1836 by resolution it directed the Secretary of the Treasury to cause copies of the standards to be made for the several customs-houses, and to be delivered to the Governor of each state in the Union. The states generally, probably universally, have legalized these standard measures by appropriate legislation. It was stated a moment ago that the Treasury yard was defined as lying between certain inch marks on the Troughton eighty two inch scale. This was supposed to be equal to the British Imperial yard at a temperature of 62° F., but there had been no opportunity to make direct comparison. When the new Imperial Standard yard was made by England under the Commission of 1843, about fifty additional copies were constructed, two of which, Nos. 11 and 57, were presented to the United States. These copies were taken to England between 1876 and 1888 and again compared directly with the Imperial Standard. Thus indirectly the yard of the Troughton scale was determined to be equal to the British Imperial yard when at the temperature of 59°.6 F.

The next and last legislation of Congress respecting standard measures was in 1866, when the use of the Metric System was made lawful throughout the United States. The same act also defines the exact equivalent of each customary unit of measure in terms of the corresponding metric units.

We now have the singular condition, and have had for nearly forty years, that the only system of weights and measures ever legalized by the Government of the United States is not in use among its people. And the additional anomaly that when great exactness is required the Internationai Prototype Meter and Kilogram are regarded the fundamental standards, and the value of customary units is derived from them.

Any investigation into the origin of our customary units of measure speedily carries the inquirer into the uncertain mists not of early English history only, but of middle as well. It is known that great variations in measures existed in, and prior to the 13th century, resulting in great injustice and hardships in levying taxes. Indeed, one of the principal objects of the Great Charter in 1215 was the establishment of uniformity of weights and measures.

One of the earliest enactments in this line was in the time of Henry III., in the act of 1266, called the assize of bread and ale, which concludes with the declaration that an English penny shall weigh thirty-two wheat corns in the midst of the ear, and twenty pennies, or pence, do make an ounce, and twelve ounces, one pound, and eight pounds do make a gallon of wine, and eight gallons of wine, a London bushel.

Although awkward in its numerical divisions, the system was really admirable in its comprehensiveness and simplicity. The unit of weight was the silver penny, the best known coin of the realm. The wheat grain was merely used, once for all, to define the weight of the penny, it was never itself a unit. The wine gallon was a measure containing eight pounds of wheat, or nearly ten pounds of Bordeaux wine; the bushel, a measure containing eight gallons, or sixty-four pounds of wheat. The pound here referred to is neither the troy nor the avoirdupois, but the tower, or sterling pound, which had been used as a standard at the mint for centuries before the Conquest, and which continued to be used for the coinage of money till 1527.

None of these ancient measures is now in existence, but by means of the known weight of the silver penny and the specific gravity of Bordeaux wine it is possible to calculate their contents in present units with a high degree of accuracy.

Another ancient table of measures, imposed upon the memory of suffering school children even to recent times, dates back to the reign of Edward II., 1324, when it was enacted that "three barleycorns round and dry should make one inch and twelve inches, a foot." In spite of this recognition of the foot, the fundamental English unit of length appears to be the yard, possibly of Saxon origin, probably the girth of some Saxon king. The earliest material standard yard, of which there is any reliable account, dates back to the time of Henry VII., about 1490. The next was that of Queen Elizabeth, about 1588, which remained a standard till 1824.

The Elizabethan standard yard was what is called an "end measure," that is, like a common yardstick it measures exactly one yard from end to end.

In 1760 an artisan by the name of Bird constructed the first "line measure" yard, that is, a yard is the distance measured between two lines engraved on gold studs set in a bar of brass. The superior excellence of Bird's standard was not formally recognized, however, till 1824, when an act of Parliament made it the legal standard of length. The same act provided that in case of loss the standard should be reproduced by the supposed known ratio of its length to the length of a pendulum beating seconds at London. Within ten years opportunity came to test the value of the second provision of this act, for the standard yard, with other standards, was destroyed by the burning of the Parliament Houses.

It is a singular comment on the extreme of English conservatism that the destruction of the Parliament Houses was caused by a fire among the "tallies," or sticks on which accounts had been kept by means of notches,

a practice persisted in by government officials long after "notching sticks" had become a lost art except among uncivilized races.

It was found impracticable to reproduce the lost Standard yard by the use of the pendulum, as had been provided by law, so recourse was had to several excellent copies of the lost standard, by comparison of which a new standard was produced on a bronze bar thirty eight inches long, and one square inch in cross section. This was legalized by parliment in 1825, and is the Imperial Standard Yard of Great Britain to day.

Concerning the early English standard measures of capacity, the first of which we have any knowledge is the Winchester Corn Bushel of 2150½ cubic inches, taking its name from the depository of standards in the ancient royal treasury at Winchester. As already pointed out, its origin doubtless is a measure made to contain a given weight of wheat, or of wine. At any rate the odd numbers 2150½ cubic inches for a bushel, 231 for a wine gallon, and 282 for an ale gallon, make it obvious that these measures were never constructed on the basis of the standard yard or its subdivisions.

At the present time the Imperial Standard Gallon must contain ten pounds of distilled water, making its capacity nearly 272¼ cubic inches. The Imperial Bushel contains eight such gallons. Since the Treasury Department of the United States adopted the old wine gallon and the Winchester Bushel before the restoration of the English Standards in 1843, our standards of capacity do not conform to the English Standards, our gallon and bushel being respectively 41½ and 29½ cubic inches smaller than the Imperial Standards.

The earliest standard of weight appears to be the old monetary pound of the Saxon goldsmith-bankers, called moneyers. Later it became known as the Tower pound, which was abolished as a standard in 1527. Down to the end of the reign of Edward III. 1066, the weight of all gold and silver articles in the king's treasury was expressed in pounds, shillings, and penny weights. This pound, the Tower pound, was the same in weight as the old apothecaries, or German medicinal pound, and both are supposed to have been derived from the Ptolemaic mina, the sixtieth part of the lesser Alexandrian talent of silver.

Both the troy and the avoirdupois pounds are supposed to have entered England from France, but not through the Norman invasion. The time and occasion of their introduction are entirely unknown. The troy pound was certainly known in England centuries before its adoption as a monetary standard in 1527. One century at least before that date it is mentioned in public documents. Its name is considered to have been derived from the French city Troyes, where a celebrated commercial fair was held, and possibly the introduction occurred during the English occupation under the Black Prince, about 1366.

In a statute of Henry III., about 1250, there is mentioned a merchants' pound of twenty-five shilling weight to be used in weighing all articles of merchandise except gold, silver, and medicines. This lies close enough in value to the avoirdupois pound to create the belief that they both were derived from the old French commercial pound of sixteen ounces, which was used in many parts of France.

At the present time the Imperial Avoirdupois pound is a cylindrical piece of platinum containing 7000 grains of the troy standard pound of 1758–60.

Of course no one believes that our common standards really had their origin in England, or even in northern Europe. Like other inheritances of the race they have followed the streams of migration from some unknown ancient head. The extreme antiquity of standards of weight and measure is certified in the fact that the ancient Greeks attributed their origin to Hermes, or Mercury, the Egyptians to the Ibis headed Theuth or Thoth, and Josephus mentions the Jewish tradition that Cain, after his wanderings, built a city called Nod, settled there and was the author of weights and measures. Back of that it certainly would be rash to speculate.

The only measure of length mentioned in the book of Genesis, as in use before the Flood, is the cubit, The earliest systems of measures of which we have any knowledge were the similar ones of Chaldea, Egypt and Phoenicia. Although the Chaldean is probably the more ancient, and noteworthy, since in it we seem to have the beginning of a decimal mode of division, as well as a duodecimal, it is generally conceded that the Egyptian had the greatest influence. It is generally admitted, too, that the weights and measures of Egypt passed into Asia, Judea, Greece, and Italy, and through the Romans to all European nations. In this way came the foot, a recognized Egyptian subordinate unit, it being two thirds of a cubit, and our more modern yard is doubtless a double cubit.

Fortunately certain architectural structures like the pyramids of Egypt, both within and without, and the platform on which stood the famous Parthenon of Athens, as well as several well preserved cubit measures in stone and wood of the time of the Pharaohs, have rendered it possible to restore the ancient standard cubit with a fair degree of certainty.

It has thus been shown that the English foot agrees with the Egyptian foot within one or two hundredths of the English unit. It must not be supposed, however, that the Egyptian foot has been preserved uniform among European nations through all the intervening centuries; indeed that is very far from being true. The Greeks relate that at the founding of the Olympic games by Hercules, the length of his foot was substituted for the cubit as a unit of measure of the race course. Six hundred of these constituted a stadium, which thenceforth became the standard itinerary measure of the nation. The Romans afterwards combined the foot in some way with the pace, a thousand of which latter units made a Roman mile.

The mile, like other itinerary units, has been characterized by great lack of uniformity. For example, the Roman mile was equal to about nine-tenths of an English mile; a short German mile, to three and nine-tenths English miles; a Danish, to four and seven-tenths; a Swedish, to six and six-tenths, and so on.

To the Romans can be traced the division of the foot into inches, after the duodecimal mode; and of the libra, or pondus, from which the French livre, and the English pound, into twelve ounces. The Roman pondus was identical with the Greek-Asiatic mina, and seems to have undergone its division into ounces during the period of Roman dominion in Egypt.

This historical phase of the subject cannot be followed in minuter detail without growing much more tedious than it has already become, and since the only purpose in its consideration was to connect our customary standards with as remote a past as possible, attention will now be directed to the most noteworthy attempt ever made to secure uniformity in weights and measures,—I refer to the inauguration of the Metric System.

The Metric System had its ortgin in the French Revolution, when France was seeking to reform almost everything. Washington Irving makes Diedrich Knickerbocker say of the dealings of the early settlers of New York with the Indians, "every Dutchman's hand weighed a pound, and every Dutchman's foot two pounds." It was almost as bad in France near the close of the eighteenth century, when the greatest diversity and confusion of weights and measures prevailed. Almost every town had its own standards.

It was to correct this condition of affairs that Prince Talleyrand, then Bishop of Artun, 1790, proposed to the National Assembly the founding of a new system based upon a single universal standard, either that of a pendulum's length, or of an aliquot part of the circumference of the earth.

A personal invitation from the King of France, Louis XVI, was extended to the King of England to take part in a joint commission composed of members of the Royal Society of England and the French Academy,

then, as now, the most learned and influential scientific assemblies of the world, to ascertain the standard sought in the length of a pendulum beating seconds at Paris. It is very much to be regretted that on account of distrust of the stability of the French government no response was made to this invitation, had there been, no doubt the whole civilized world would now be using identical standards of the same name, and, in all probability, a common coinage.,

Her invitation rejected, France took up the task alone and committed the preliminary work to five of the most eminent members of the French Academy. Their report was submitted in 1791. Briefly summarized it was:—

(1) That the new fundamental unit of length be the one ten millionth part of the quadrant of the meridian.

(2) The unit of linear measure, applied to matter in its three modes of extension, length, breadth and thickness, should be the standard of all measures of length, surface and solidity.

(3) That the cubic contents of the linear measure, in distilled water, at the temperature of its greatest contraction, should furnish at once the standard weight and measure of capacity.

(4) That the multiples and subdivisions of these measures should be exclusively in decimal proportions.

(5) That the principle of decimal division should extend to money, both coin and account, to thermometers, to angular measure, to time, in fact, to everything capable of being measured.

The work thus planned, involving the measurement of the earth's quadrant, and the determination of the tempeature of water at its greatest density, demanded the very highest skill and learning of even that age of brilliant philosophers.

It was during the course of these preliminary investigations that the important physical discovery was made that water is not densest at the freezing point, but at a temperature about four degrees above.

Eight years passed, so thorough were the investigations, before the committee was ready to report. In the meantime France had grown so impatient that in 1793 a provisional meter was adopted, based upon a measurement of an arc of the meridian in 1740. In 1799 the committee's final report was submitted with several standard meter bars and kilogram weights made by the most expert artist mechanic in France. One meter and one kilogram were selected and deposited with much formality with the keeper of the public archives, from which they are known respectively as the Meter and the Kilogram of the Archives; in all respects the most important standards, as their production was the most important achievement in metrology of the world's history.

During the next seventy years, that is down to about 1870, the metric or French system of measures was not only legalized, but adopted by most of the civilized countries of the world. At the same time there was a growing recognition of the fact that the copies of the standards in use in various countries differed among themselves, and that, although sufficiently accurate for commercial purposes, their relations to the prototypes were not known with a precision in keeping with the requirements of science. In consideration of these conditions the French government in 1870 invited the nations of the world to send delegates to Paris for the purpose of forming an International Commission, having for its object the construction of a new meter as an international standard of length. Twenty-nine of the principal countries of the world were represented by fifty delegates, comprising many persons of the highest scientific eminence.

1870 was not a favorable year for international work of any kind. Europe was a boiling kettle of political trouble. Still an organization of the commission was effected and a second meeting appointed for 1872.

It is not a little remarkable that the two periods of greatest activity of France in inaugurating the Metric System were times of

greatest political turmoil and peril; the first in the time of the French Revolution, the second, during the Franco-Prussian war.

The convention of 1872 decided all the important details relating to the making of the International Standard Meter and Kilogram. Let it be recalled that the standard meter of 1799, called the meter of the Archives, was intended to be exactly one ten millionth of a quadrant of the meridian long, and that the Kilogram of the Archives was based upon the dimensions of this meter. It was known by this time that the measurement of the arc of the meridian between 1790 and 1799 was not rigidly exact, and that probably its precision could not be increased by remeasuring.

Setting aside, therefore, all natural measures of length, like dimensions of the earth and seconds pendulums, it was decided that the old meter and kilogram of the Archives should be adopted as the prototypes of the new International meter and kilogram. So existing standards are purely artificial measures.

The Commission further decided that the standards should be made of an alloy of ninety parts platinum and ten parts iridium; a compound possessing in high degree the requisite properties of hardness, rigidity, freedom from corrosion, and small but uniform temperature changes.

The meter instead of having the ordinary bar shape of the meter of the Archives has a cross section resembling a deformed letter H. This shape was adopted both for its superior rigidity, and for the quickness with which its relatively large surface allows it to follow temperature changes in the surrounding air.

The preparation of the platinum-iridium alloy was entrusted to the members of the Commission resident in Paris. That it was a work of no little importance may be inferred from the fact that fully ten years elapsed before a product was obtained that met all the physical and chemical requirements. Out of this alloy were made thirty meter bars, and forty two kilogram weights. The latter had their densities most accurately determined by the use of a balance which permitted the transfer of weights and all the manipulations of weighing without approaching the balance closer than twelve feet; nearer approach than this being liable to disturb the balance by radiation of heat from the person engaged in weighing. A comparison of the thirty meter bars with the meter of the archives showed that none of them differed from it by so much as three one thousandths of a millimeter, or about one ten thousandth of an inch. From this lot of meter bars and kilograms one of each was selected to constitute the International Standards.

It was realized early in the deliberations of the Commission that even the completion of the standards would not bring their work to a close. So on May 20, 1875 a metric convention was signed at Paris by the representatives of seventeen governments, among them that of the United States, "for the purpose of establishing and maintaining, at the common expense, a scientific and permanent Internarional Bureau of weights and measures near Paris." "By this treaty the operations of the International Bureau are put under the control of a general conference composed of delegates from all the contracting governments." According to article six of the convention, the International Bureau of weights and measures is charged with:

(1) All comparisons and verifications of the new prototypes of the meter and kilogram.

(2) The custody of the International Prototypes.

(3) The periodical comparison of the national standards with the International Prototypes, and with their test copies, as well as the comparison of standard thermometers.

(4) The comparison of the prototypes with the fundamental standards of non-metrical weights and measures used in different countries for scientific purposes.

(5) The standardizing and comparison of geodetic measuring bars.

(6) The comparrison of standard scales of precision, the verification of which may be requested by governments or scientific societies,

or even by constructors, or men of science.

To return to the consideration of the standard meters and kilograms:—After setting apart one of each for the International Standards, the others were numbered and distributed by lot to the governments participating in the international convention. Meters Nos. 21 and 27 and kilograms Nos. 4 and 20 were allotted to our government.

The transfer of these standards from the International Bureau of weights and measures to the United States was an event of great moment, and called for the utmost care and minutest detail of formality. Perhaps the importance of the event will justify a recital of the principal incidents in the tranfer of meter No. 27 and kilogram No. 20.

Doctor B. A. Gould, who was the representative of the United States in the International Conference of weights and measures in 1889. personally inspected the standards, or prototypes, as they are called, saw them packed in wooden cases, and these in turn in metallic boxes.

Upon the inner cases he so placed his seal that it must be broken to reach the contents. These were then delivered to United States Minister Reid who, giving his official receipt, took perscnal charge of them, and conveyed them in his own carriage to the Legation. Here they were delivered on the 27 of October 1889 to special messenger George Davidson. His official report describes each box intrusted to him with all its marks, and proceeds with the following minutes of the journey:—

"On the 28th of October I carried these boxes to London via Calais and Dover, and on the 30th to Liverpool. They were moved carefully, on the cushioned seats of the transfer bus, and the cushioned seats of the railway carriages, and of the Calais-Dover steamer. They remained in my room at the Northwestern Hotel until the 6th of November, when I transferred them to the steamship Germanic, upon which I had the sole use of a state room for their safe keeping. On the 15th of November the steamship reached New York, and the boxes were carefully transferred to a palace car for Washington, where they were deposited in the fire proof building of the Coast and Geodetic Survey on the afternoon of that day, until I had made this written report and transfer to Superintendent Mendenhall. Up to this time the boxes have constantly been under my eye, or locked in my room in my absence. There has been no shock to them and no vibration except such as is inevitable to railway and steamship travel."

On Jan. 2 1890 the boxes were carried to the cabinet room in the Executive mansion, where the ceremony of breaking the seals was performed in the presence of the President of the United States, the Secretary of State, and the Secretary of the Treasury, together with a company of distinguished scientific men. A formal certificate declaring the condition of the standards on the opening of the boxes, was signed by the President and witnessed by the Secretary of State and the Secretary of the Treasury. By this official act meter No. 27 and kilogram No. 20 were placed in a rank above that of any other measures possessed by the Uuited States, becoming thereby our national Prototype meter and kilogram.

There is no need of argument, I assume, to impress the superiority of the metric system over the customary lack of system, characterized by Lord Kelvin as the "brain wearying, intellect destroying system of weights and measures." As beautifully perfect as the metric system is, it is improbable that any of us will see it in common use in commerce and the mechanic arts. The multiplication of expensive graduated tools and the inertia of custom are two enormous obstacles unlikely to be removed by anything but radical legistion. It may not be remembered, but it is a fact, that about the time the metric system was legalized in the United States (1866), Congress passed an act providing that postage should be charged in accordance with a scale of metric weights; a letter weighing fifteen grams or less to be charged one rate of post-

age. The following day another act unintentionally repealed the provisions of the preceding act by providing that for postal purposes one-half ounce avoirdupois should be deemed equivalent to fifteen grams. The blunder has never been rectified.

In the various attempts to establish systems of weights and measures the consideration of supreme importance has been the adoption of an invariable standard of length. Upon this end the best efforts of eminent men of science in all lands have been concentrated. It has been sought in nature in dimensions of the earth and in the length of the pendulum, under the assumption that nature's laws are uniform and inflexible, only to be given up, as, for the time at least, impracticable.

What is an invariable measure of length? The merchant reposes the fullest faith in the brass tacks in his counters. He is confident the counter neither expands nor stretches. The brass-tack-yard is sufficiently invariable for him. The carpenter, who has no occasion to measure closer than one-sixteenth of an inch, finds the foot rule an accurate tool. But the machinist, who often must consider magnitudes of the order of one-hundredth of an inch, cannot tolerate a carpenter's rule.

The physicist rules on glass and metal 40,000 nicely spaced lines to the inch; he measures the expansion of solids where the rate of increase of length is only one nine-millionth of itself; he deals with the magnitude of light and heat waves that measure only four ten-millionths of a meter, about one one-hundredth thousandth of an inch. With such microscopic magnitudes to deal with, what use can the physicist make of such variable tools as the carpenters' and the machinists'? Almost as well demand that the prescription clerk weigh his medicines on coal scales.

Evidently invariability is a relative term. The merchant and the mechanic need never trouble themselves about the infinitesimal errors in their copies of the international unit of length. To the physicist not only is this a vital matter, but the remoter question also,—is the standard platinum-iridium prototype meter itself invariable, unchanged by age and climate?

In view of this doubt many physicists are disposed to renew the attempt to secure in nature an invariable unit of length. The proposal that has the greatest promise of success is to adopt some specific wave length of light, yellow light, for example, and define the standard meter in terms of this unit. It would thus be possible any number of centuries hence, and anywhere, either here, or on the moon, or on Mars to re-measure the International Prototype Meter of the Archives. But is a wave length of light invariable?

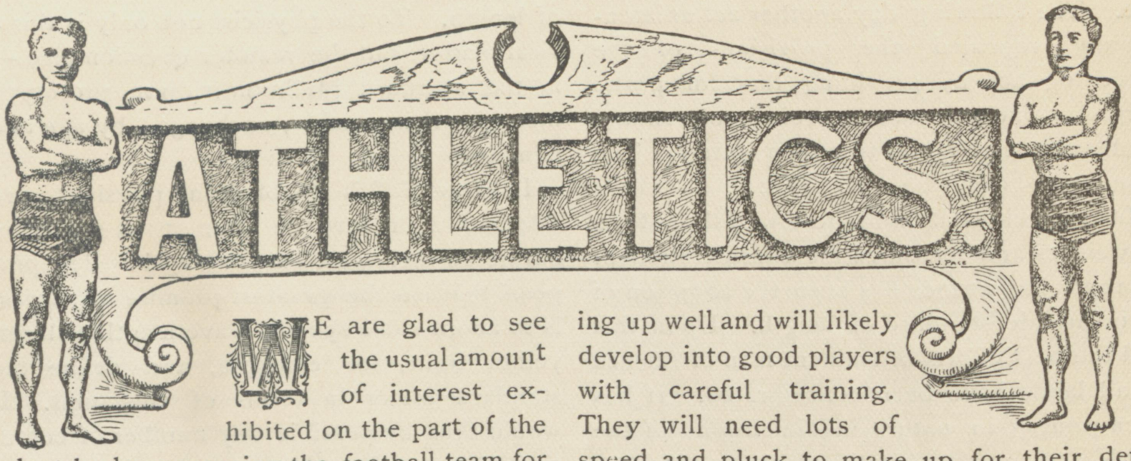
Unfortunately nobody knows.

Y. W. C. A.

The Y. W. C. A. conference held at Lake Geneva, Wis., August 15-25 was the largest ever convened at that place. The weather was ideal throughout the sessions. The whole company of teachers and delegates numbered 518. Ohio was represented by 42 delegates. Many noted persons were present among whom were Miss Anna Reynolds, of London, the world's General Sccretary, and Miss Mary Hill, of Madras, India.

Our president, Mabel Moore and Ora Maxwell represented Otterbein. You will hear more of these girls.

School opened with between seventy and eighty girls enrolled. Several of them do not belong to Y. W. C. A. It is our duty girls, of Y. W., to see that they become members. We are sure that there is no other institution in college in which we can get so near to one another, and receive so much good from the meetings. It is the testimony of our old members that they place the benefits attained from Y. W. work, above every thing else in college.



WE are glad to see the usual amount of interest exhibited on the part of the student body concerning the football team for the season which is already upon us. Every loyal student and alumnus is inquiring as to the number and condition of the men who have showed up on the field. This is only natural, for the men who represent us on the gridiron in college athletics not only represent the college but each individual student who is connected with it.

There is a tendency among new students to avoid the athletic fieid. Their one ambition is to get knowledge, and to do this they study all the time. They haven't time to play football and baseball or to engage in sports of any kind. This is far from the proper conception of students' life. No one can afford to miss the advantages that come from this phase of college disciline. The training thus obtained and the lessons so severely taught will be of untold benefit to the young man when he rubs up against the cold world. The lesson of endurance will then be put into practice and be sure to win in the game.

It is difficult to say what the outlook is for a winning team. Quite a number of the old men will not be back this year. In the line, McLeod at center, Williams and Worstell at guards, Vansickle at tackle and Cowan at end will be greatly missed. In the back field, VanAuken's place at full and Yost's at half, will be to fill.

Of the new material several men are showing up well and will likely develop into good players with careful training. They will need lots of speed and pluck to make up for their deficiency in avoirdupois. Benett is doing well at center. Climer, Sexorn and Rymer are getting in the game. Others are showing the proper spirit. Of last year's subs., Funk, Kiehl and Lloyd are candidates for the team and are showing up nicely. Capt. Bates, McDonald, Altman and Shively will be found somewhere in the game.

At present the worst feature in Otterbein's athletics is a lack of enthusiasm. In all her past the presence of this one all important essential has won for her the admiration of all the colleges with which she has contested. The "never say die" spirit has characterized her athletic career and won for her the enviable record which she cannot afford to lose.

Let every student realize that he has a part to play as well as any member of the team. Now is the time for everyone to act. Come out and support the team. Stand by it until the last game has been played and we assure you that victory will be ours.

Coach

Mr. Hersey R. Keene was on the grounds early this fall and to the satisfaction of all is proving himself an excellent coach. He is very ambitious, full of life and energy and just such a man as will thoroughly develop our new material. He will have charge of all athletics, coach of football, physical director

of the gymnasium and coach of baseball.

To have one man director of all athletics is a departure from the former mode of management, but which we hope will prove successful. Mr. Keene is an all round athlete and we feel safe in leaving all our athletics to his management.

Y. M. C. A.

The work of the year has started well There will be taken into the Association a large number of earnest young men, who with those of last year's workers will make this a year rich in spiritual good to the school.

The regular joint reception was given Saturday, 12th. This was, as always, an enjoyable occasion. Many new and helpful associations are then formed and from this event many date their acquaintance. Miss Turner, the instructor in voice, sang some very beautiful selections. Miss Bertha Monroe and Mr. E. C. Worman each gave two readings which were very much appreciated.

The Bible Study Rally will be held Thursday, September 17. Secretary McLaughlin will be present and address the meeting. This department of the work this year will be very successful. The enrollment in Bible study is expected to reach ninety and perhaps more. All of the leaders for the work have been secured and all classes will begin their study now. There will be twelve classes.

Thursday night the old members gave a reception to the new men. Quite a number of the different phases of college life were presented. Football received its share of attention. Among those who spoke were Captain Bates, Manager Bookman, Coach Keene.

It was good to have present at the first service three men who graduated last year and who for many years were active in the work and who carried many of the burdens and led the Association into aggressive work. These men were C. W. Snyder, W. E. Reibel, and C. Judy, all of whom will soon sail as missionaries to Africa.

They are loved and honored by all and though we rejoice to have them with us we are nevertheless glad for their lives of consecration, and know that in His service there they will each continue to lead men to a larger life. They have the prayers of every Christian man here.

Alumnals

Maybelle Collins '03, is teaching in Fostoria.

Mr. L. M. Barnes, '01 is assistant cashier in the Westerville bank.

Bertha Lenore Smith, '99 is doing nicely in her school work at Akron.

W. G. Kintigh '95, is president of the Western Pennsylvania Alumnal Association.

J. C. Blackburn '95, is making a fine record for himself as an attorney in Greensburg, Pa.

We are sorry to announce the death of Honori Cornell Miller '99, wife of J. D. Miller '00.

Mr. G. P. Macklin '79, at the recent session of Miami Conference of the U. B. Church was elected to one of the presiding elderships.

Mr. Charles Kellar, '01 has been transferred from the Dayton to the N. Y. House of the Lorenz Publishing Company.

Lulu May Baker '96 who has for several years been teaching music in Colorado is now assisting Prof. Meyer in the Conservatory here.

On the evening of Commencement Day last Spring Mr. Walter E. Baker '99, and Miss Florence May Rock '99, were married. The ceremony was performed by the bride's father at the Baker home in Westerville. Except the families represented, very few were present

and altogether 'twas quite a surprise. Mr. Baker is salesman for a Cleveland hardware firm.

Mrs. L. R. Harford '72, President of the Federated Womans Clubs of Nebraska, has been elected Vice President of the W. M. A. of the U. B. Church.

L. A. Bennert '97, until recently superintendent of the Westerville schools, is now taking post-graduate work in Harvard. Mr. J. P. West '97, has succeeded him.

Hon. U. S. Martin '92, is bringing honor to O. U. by his success as an attorney. He is one of Dayton's best lawyers and was recently elected Prosecuting Attorney.

Arrived—at the home of Mr. and Mrs. Frank Anderson in Cleveland a fine, new baby boy. Master Anderson, whose parents both graduated in 1900, has our wishes for a long successful and pleasant life.

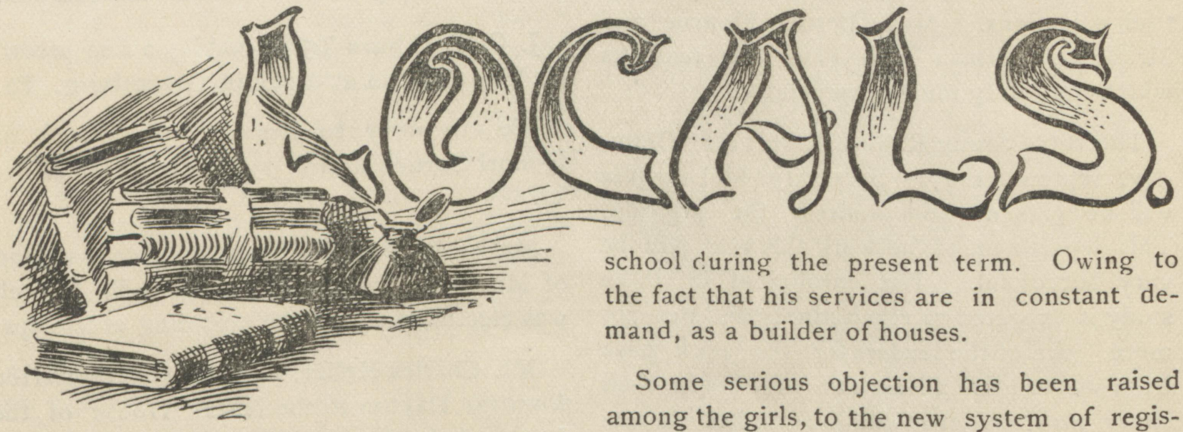
"To him who in the love of nature is (not) content"—Listen.—

Soon after Commencement Maggie Lambert's many friends received the following announcement:

Mr. and Mrs. G. A. Lambert
announce the marriage of their daughter
Maggie Myrle
to
Mr. Barzillai Owen Barnes
Wednesday, July first
nineteen hundred and three
Anderson, Ind.

At home
after August first
Twelfth Street
Anderson, Ind.

Mr. Barnes is a member of the class of 1900 and his wife graduated last Spring. B. O. will ply the Real Estate business in Anderson.



The opening address was given by Prof. McFadden.

Go to Prof. McFadden for nice ripe peaches. Hours 1 to 2 a. m.

During the past week the seniors have been busy practicing the art of assuming dignity, with varying success.

The mechanical bump of Hiram B. Wostell developed to such an extent during the past summer that he finds it impossible to be in school during the present term. Owing to the fact that his services are in constant demand, as a builder of houses.

Some serious objection has been raised among the girls, to the new system of registration. Under the old system they were simply asked their age. Now they must give the date of their birth.

Through the efforts of Prof. Cornetet the Greek department has been improved until it is now one of the strongest departments in the University. During the past summer the proffessor's class room has been fitted up with a new gas heater by Mr. Wm. Redkey, of Rainsboro, Ohio, and a new floor by Hannah Halderman and Homer Flannigan, of

Hallsville, Ohio, all under the professors direction and at his solicitation.

D. R. Wilson, '04, will not be in school before the winter term.

The seniors appeared at chapel Monday morning in new caps and gowns.

N. R. Funk was pleasantly surprised Tues day evening, by a visit from his parents.

"Buck" Coover, '00, is engaged at Ames College, Ames, Iowa, as professor of science.

Among the late arrivals were Lorin Ulrich, '04, U. B. Brubaker, '04, and Chester Scott.

A much needed improvement has been made on the Conservatory by the application of a new coat of paint.

Football coach to new quarter back—"In this play pass the ball to the full back."
New quarter back—"Which one?"

E. A. Sanders and A. W. Whetstone, both of the class '02, left last Tuesday for Yale where they will take a course in Forestry.

Dr. Scott gave a nice talk to the new students Monday morning and explained to them how it was a crime against society to attempt to break up a class "push."

L. A. Weinland, last year's popular base ball manager, was a conspicuous figure at the opening reception. Louis spent a few days in town renewing old acquaintances and incidentally called at the Scott house.

It is said that there is no regular arranged program for the opening session of the girls' literary societies, instead they have an "experience meeting," each girl tells how she spent her vacation. The girls might do well to make this an open session.

Through the efforts of C. M. Bookman, arrangements have been made for a debate with Wittenberg College, to be held at Springfield during the winter term. A movement is also on foot to form a debating league. Wittenberg and Denison have already expressed their willingness to join, and Kenyon College will doubtless be invited to make the fourth member.

H. V. Bear, '03, came up from his home at Germantown, O., last Sunday, and visited his old familiar haunts in that beautiful little shady ravine on the Houghton property. Even if Harvey is a Bear he is not so foolish as to start out on an expedition of this kind alone, so he was accompanied by a certain young lady who for a year past has not shown the least fear in his presence.

A bran new yell was heard in the old chapel Wednesday morning after the regular exercises. It was given in a very timid way and could hardly be understood. But confidence will come with practice, so keep it up, Freshmen, and if you do not get your heads all broken before the next week ends, you will doubtless be able to make as much commotion as the ordinary Freshmen congregation.

The familiar voices of Benny Cunningham, '03, and Frankie Edwards, '03, were heard on the tennis courts during the past week. Both seemed as enthusiastic as of old, and as they wielded the great tennis rackets with their mighty hands and exerted their herculean strength in sending the heavy tennis balls through the air, it almost seemed as if the old days had returned and they were both boys again.

It is with much sorrow and many regrets that we are forced to announce through the columns of this paper that the "Barnes Annex" has gone out of commission. During the past two years the Annex has been baseball and football headquarters. It was at the Annex that the many schemes originated for the spiritual and physical welfare of many students, both old and new. The Annex furnished the rooms for the trial of C. O. Altman, who during the past year was convicted before a jury of twelve men, good and true, of the heinous crime of mop-

ery. It was with sad hearts that two young men learned that the Annex could no longer be used as the rendezvous of the good and the brave and they were compelled to employ a drayman to remove their personal belongings which consisted of five suit cases, two trunks, three pairs of skates, one baseball suit, two fishing tackles, numerous pictures of prize fighters, two football suits, one Latin text book, twelve horses, two suits of clothes, one overcoat, five sweaters, a shot-gun, a new testament and one pair of number 12 rubber boots. This property is at present stored in the Flick house just across from the gymnasium where last year's occupants may be found any hour during the day.

Otterbein Haberdasher

Students' Headquarters

For Men's Furnishings and Hats. Ask for the "Ticket."—A big advantage for you—we'll explain.

Any design in *Special CAPS, JERSEYS and SWEATERS.*
Pennants Specially Ordered.

PENDLETON,

562 North High St., Columbus, Ohio. **Opp. Park Hotel.**

ROBINSON CRUSOE lived with himself and couldn't get shaved; ESAU was so hairy and contrary he wouldn't get shaved. Both are back numbers and out of our sight, but GENTLEMEN OF TO-DAY can and must come to our

Tonsorial Parlors

BERT YOUMANS, Proprietor.

or like the old foggies, get back out of sight.

Coal! Coal!

Students! Now is the time to order your coal for the winter.

Massillon Lump, Hocking, etc.

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L. W. WARSON.

B. T. DAVIS.

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Republican Candidate for
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FRANKLIN COUNTY.

Election November 3.

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We make a Specialty of Violins—and
have them in stock from

2.00 to $175.

Inspect our new hand-made Violins and
also rare old specimens.

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Artist's Material

Supply Store.

GROFF BROS.

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W. M. GANTZ, D. D. S.,

Operative and Prosthetic Dentist.

Porcelain and Gold Crowns, Bridge Work and Plate work. Crooked teeth made straight, broken down and decayed teeth built up and made as good as new. Especial attention given to children's teeth.

Office over Markley's Store.

THE COLUMBUS RAILWAY & LIGHT CO., WESTERVILLE TIME CARD
DAILY

Leave Columbus, Spring and High.			Leave Westerville.		
A. M.	P. M.	4.30	A. M.	P.M.	5.30
5.30	12.30	5.30	5.30	12.30	6.30
6.30	1.30	6.30	6.30	1.30	7.30
7.30	2.30	7.30	7.30	2.30	8.30
8.30	3.30	8.30	8.30	3.30	9.40
9.30		9.40	9.30	3.30	10 50
10.30		10.50	10 30	4.30	
11.30			11.30		

FARE—Round trip, between Columbus and Westerville, 25c.
NOTE—Upon request made to Superintendent of Transportation, telephone 488, last car will be held at Spring and High streets for not less than ten (10) passengers, until the theaters are out.
Baggage Car leaves Town and High streets, 9.25 a. m. and 4.05 p. m., dialy except Sunday.

Mandolins, Guitars, Violins, Banjos at Moore & Brocks, 80 N. High.

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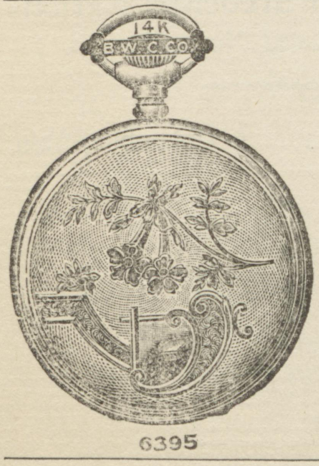

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