

# PRUSSIAN MILITARISM SENT US GREAT PRINTING GENIUS

## Honor Paid to the Memory of Ottmar Mergenthaler, Whose Invention Has Carried the Message of the Printed Word to All the People

## Art of the Types Had Stood Still Since Gutenberg's Day When German Boy Fled Here to Find the Open Door of Opportunity

OUT in Chicago on Friday afternoon of last week they unveiled a bust of Ottmar Mergenthaler, the man who invented the typesetting machine and who, had he lived, would have been 63 years old on the day before.

A good many of the people who attended the exercises in the Shepard public school in Chicago did not know that the genius they so signally honored was a German by birth. Nor was it recalled by many of them that the only other man who had done as much for the typesetting branch of the printing art, Johannes Gutenberg, was also a German.

But if Germany gave the boy Ottmar Mergenthaler to the fatherland, Prussian militarism gave the youth to America and America gave the great inventor to the world.

The story of the man is the story of his invention; and the tracing of his personal failures and struggles and successes follows line for line with the development and perfection of the machine "that does everything but think."

And aided as it was by a score of contributing forces this same machine ushered in a little over a quarter century ago the greatest boom in the printing industry that the world had ever seen. Newspapers dropped in price and increased in size, composing rooms of great city dailies alone showed immediate savings that in some instances reached as high as \$80,000 a year; a flood of magazines swept over the country and the home library table that before held one newspaper and a single magazine was suddenly swamped with reading matter.

Prussian militarism was justifying itself.

On the morning of October 26, 1872, the steamship Berlin, hailing from Bremen, warped into its berth at Locust Point in Baltimore. Some 500 Leucost passengers lined the rail eagerly straining their eyes for the first sight of an American city. Most of them were immigrants bound for the farms of the middle West, but here and there was a skilled artisan who hoped to earn good wages without going far from his landing place.

Among these was a little, comely young fellow of about twenty, with seven inches in height, with well shaped head and sturdy body. On his shoulder balanced a round topped wooden trunk and in his pocket was \$30 in cash.

But more important than the trunkful of winter clothes or even the \$30 in cash was a silver watch that kept perfect time, for it was one that he had made himself. Eighteen and a watchmaker—there it was on the steerage lists, "Ottmar Mergenthaler, watchmaker"—a skilled and finished artisan at the age when most American boys were just getting ready to be sent to college. Yet this boy's hands had been trained to handle and fashion the most delicate of instruments, his eyes to measure to the hundredth of an inch, his hand to delve into the unfathomable and his will to keep others from doing so.

of her arts and sciences. And never did four and a half decades bring more change than the years since the German boy walked down the gangplank of the Berlin and set into the streets of Baltimore gave to the newspaper and printing arts.

Let us pull back the curtain and peek in at the composing room of this son of 1872.

Long lines of men stand or sit on high stools before their type cases. In the left hand of each is a stick—a little steel box just the width of a newspaper column, the depth of a piece of type and approximately two inches long. In the sloping case in front of him are many various sized compartments, each holding the separate types of the individual letters of the alphabet, the figures, punctuation marks and all the characters used in newspaper work.

With his right hand our ancient friend reads his galleys, takes a fresh and large chew of finecut, and then so swiftly that the eye can hardly follow the movement picks up one by one the individual type pieces, deposits them in the stick, and with the thumb of the left hand instantly finding the niched side sets them right side up and in place.

For instance, to set "Columbia" he picks up the capital C, then the small letters o-l-u-m-b-i-a one after another; next to this word he places a blank piece of metal, a space, and then starts on the next word. With the line finished he must space out by hand until it is tightly filled and nicely proportioned. Justifying his lines required one-sixth of his time, and although inventors had been working for years on hollow spaces, wedges and even rubber, no successful mechanical method had ever been found to do the work.

A fast type sticker, given plenty of fine cut, could set up 1,000 ems in one hour; this was equal to 350 words, or about one-third of a column, which would require an average working day. But when the paper had been printed the type had to be redistributed in the cases again, and although it only took one-quarter of the original time it was pure lost energy.

Here was one branch of the printing art that had practically stood still for 400 years. Machinery was used to make paper, cast type and run presses, but the type was still set by hand just as it was in the days of Gutenberg.

Now, hold tight and we'll jump across the forty-five years and the blood that has been shed at separate times. The old hand composing room from the spick and span machine composing department of to-day. A well fed, highly paid and white collared skilled mechanic sits in a comfortable chair before a modern typesetting machine. His hands rest lightly on a keyboard of some ninety characters, resembling very much that of a typewriter but responding much easier to the touch.

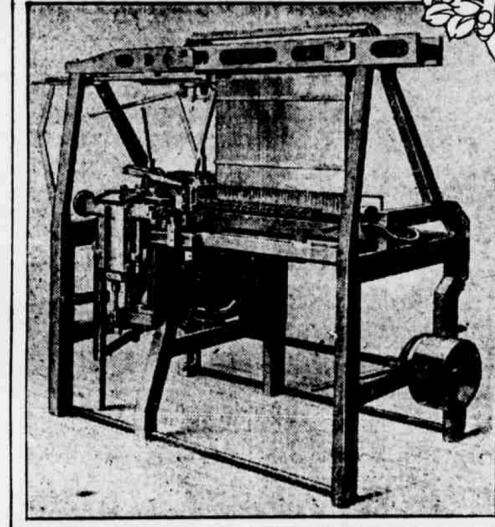
And like an experienced stenographer the operator can look up at you and talk while his fingers play out the words that will soon be sung by the presses to make the whole world laugh or cry or just plain think.

Let's see how he sets "Columbia." He presses lightly the key marked "C" and matrix "C"—a slender slip of brass in which is sunk the character to serve as a mould—is set free from its box in a large magazine of similar matrices at the top of the machine. This C, in full view, now glides to an assembling space which supplants the old fashioned type stick. Next the keys for o-l-u-m-b-i-a are touched and the matrix for each comes shooting into place.

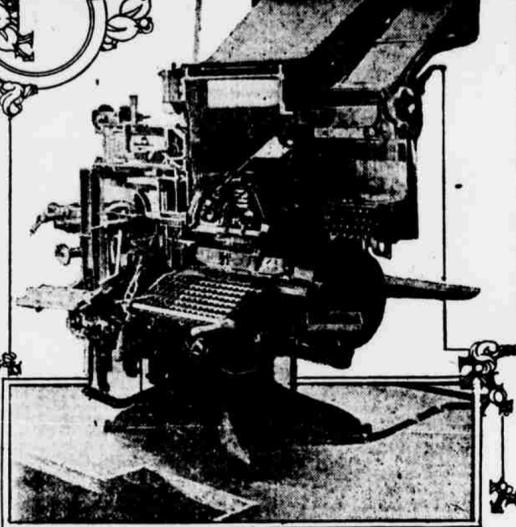
At the end of the word another key is touched and a space band of varying thickness is lowered. With the end of the line finished a lever is touched and the several space bands separating the different words slip down until the line is tight or exactly justified. Then the whole line is carried to a mould where liquid type metal is forced against the matrices, very much as when type is cast at a foundry, and in an instant a perfect line of type—linotype—type high and column wide, is ready for the stereotypor.

One man now with a machine will do the work that it used to take four or five hand compositors to do. There is a tragic story to tell some day of the other three or four who lost their jobs—the old timers who fought a good fight, though a losing one, against the invasion of this mechanical giant that trampled rough shod over the sacred right of their trade. Verily, the wheels of progress are the true steam rollers of history.

But let's get back to our own story. Johannes Gutenberg, before he invented movable type in 1450 or thereabout, was a cutter of gems and a framer of mirrors. In these handicrafts he came to a daintiness of touch and an exactness of eye that schooled him to cut type moulds with such strict uniformity that a revolution of



The first "individual matrix" linotype.



One of the latest models of linotype, which does everything above—Bust of Ottmar Mergenthaler, but think.



the art of typography resulted. Mergenthaler never learned the compositor's trade, but what was of far more importance, he did learn the art of fine and accurate mechanics.

Germany at that time was the home of some of the most wonderful clock and watch makers in the world. It was almost an art rather than a trade. The master artisan was in his glory and in no country had the fine trades reached greater perfection and honor than in Germany. And this age of individual genius and this country where it was most respected gave Ottmar Mergenthaler to the world.

He was born on May 10, 1854, in Bietigheim, a quaint, picturesque town of 4,000 inhabitants about twenty miles north of Stuttgart. His father was a poor school teacher, and when the boy reached the age of fourteen he was apprenticed to the brother of his stepmother, a maker of watches and clocks in Bietigheim. He was to serve four years without wages, pay a small premium, furnish all his own tools and receive board and lodging from this stepmother, Mr. Hahl. As to his success it will suffice to say that for a whole year before his apprenticeship expired he received regular wages.

It was in the summer of 1872 that Mergenthaler, then a lad of 18, finished his training and started looking around for a job. The Franco-German war had only shortly closed and the vast army of Germany had returned home and been disbanded. The workmen thus set free poured into every avenue of business and in most cases, as a reward, they displaced men who had not gone to the front in the service of the fatherland. To make matters worse there were no longer any large army contracts to maintain the activity of nearly every field of manufacture.

Everything industrial was being re-adjusted and the increased taxes, added military duties and decreased opportunities for wage earners created widespread dissatisfaction. This was especially true in southern Germany, where the people seriously objected to the yoke of Prussian militarism. Thousands of young men left their homes to avoid military service, and young Mergenthaler was caught in the general discontent and he determined to emigrate.

Already his two elder brothers had been drafted into the army and it was decidedly up to him to act at once if he was going to act at all. The result was that one August Hahl, a son of his uncle and old employer, who was established as a maker of electrical instruments in the city of Washington, sent him passage money and on that fall day in 1872 the young watch maker landed in Baltimore and at once proceeded to the Hahl shop in Washington.

In a short time the newly arrived German boy had made his mechanical and inventive genius felt in his cousin's electrical works and within two years he was acting as foreman

and general assistant to the owner. Besides the manufacture of electrical clocks and bells his skill was chiefly used in executing instruments for the United States Signal Service, that had only been recently established.

Washington at that time was the Mecca of inventors throughout the whole country. The patent law then required that a model should accompany every application for a patent, and as these models were usually built in Washington young Mergenthaler came into daily contact with inventors from far and near and the whole atmosphere of his life was steeped in invention.

The year 1872 was marked by a memorable financial panic and business in Washington fell into utter stagnation. The Hahl shop was caught in the crash and deeming that Baltimore would revive his fallen fortunes the owner moved his shop and best workmen there.

Some two or three years later one Charles T. Moore came to Hahl's office and laid before him the plans of what he called a writing machine. Its failure he attributed to defective workmanship and with the idea of having Hahl reconstruct the machine he referred him to his mechanical sponsors, James O. Clephane, Louis Clephane, Maurice Pechin and J. H. Crossman, all of Washington.

Hahl left for the capital at once in the hope of securing the order but found the backers discouraged and unwilling to advance more cash unless a satisfactory result was guaranteed. In the meantime young Mergenthaler examined the machine, and satisfying himself that he could remedy the defects advised his employer to take the work even under the terms offered. Hahl finally consented and the contract was signed.

In the original form the machine bore upon successive circles of a cylinder the characters to be printed. By manipulating keys while this cylinder revolved its characters were printed in lithographic ink on a paper strip. This strip was then cut into lengths of a line each, justified by the separation of words and syllables and then transferred to a lithograph stone for printing. Crude though it was it had been used in Washington and other cities for printing copies of legislative proceedings, court testimony and other documents.

This, then, was the machine that Mergenthaler, now 22 years old, was commissioned to overhaul and improve. His chance, or whatever you will, dictated that the young German American's great inventive genius should be used in developing what was then a backward art. The jerk of a different string and Mergenthaler might have been an Edison or a Wright or a Bell; but neither electricity nor flying machines nor the telephone needed him, while printing did.

The completed machine was finally ready for trial during the summer of 1877. As in the stock ticker to-day, Mergenthaler had one wheel for capitals and another for small type. The type impressions were sharp and clear, but the reproduction was disappointing because the stone, heated and then allowed to absorb the fine lines of the imposed script.

Convinced that the difficulties of lithography were insurmountable James O. Clephane, one of the backers, proposed that stereotyping should be resorted to. Working on this idea, Mergenthaler built in 1878 a machine which clearly impressed on paper mache letters and words duly spaced. But as the matrix was forty lines in length the casting proved unsatisfactory. Little by little through the next five years improvements were added, but still success kept well hidden around the corner.

Discouraged and with the treasury empty Clephane and his friends all but abandoned the project, and in a fit of rage Mergenthaler tore up his plans for a matrix line by line, each line being justified as a unit. J. G. Hine, a leading lawyer of Washington, was fortunately interested in the proposition at this critical time and brought money and energy into the struggling enterprise.

In the meantime Mergenthaler had married Miss Emma Lachenmayer. They had four sons and one daughter. On New Year's Day, 1883, he dissolved a partnership with Hahl which had existed two years and began business for himself in Bank Lane.

The first machine to be constructed with the backing of Hine printed twelve letters at a time, but the difficulty of stripping off the matrices while still wet made it impracticable. In solving this difficult question Mergenthaler passed one of the great turning points in the evolution of the successful machine. He determined to do away with the paper mache and to cast direct with type metal.

Machine after machine followed, each bearing new additions and improvements. Finally, instead of the type making a matrix the plan was inverted so that the letter character indented in the edges of a series of brass

bands—in themselves matrices—direct from these to have casts made directly by pouring the hot metal through a mould of proper dimensions. It was a great step and when in January, 1884, the machine was completed and the final test made and from the machine dropped a finished linotype scene was enacted as worthy of monumental commemoration as the first pulling of a gun from the movable types of Johannes Gutenberg.

At this period in the history of the linotype the National Typographic Company of West Virginia was organized and a contract signed whereby Mergenthaler agreed that all his inventions for and present should become the property of the company. When a practical machine was produced he was to receive a royalty of 10 per cent, on the cost of all machines manufactured and 1,000 shares of the company's stock.

Two years later the inventor worked night and day for two months perfecting his machine. In February, 1885, he exhibited a greatly improved model with an automatic justifier that began to attract serious attention among newspaper publishers. Finally in July, 1886, one New York newspaper placed an order on his composing room and so successful did it prove that by the end of the year a round dozen had been installed.

The high road to success was now in sight and the company's business shot forward. One hundred machines were ordered and in a short time the number was doubled. At the time Mergenthaler was improving and developing new models.

In a moment of weakness when the future looked especially dark he had consented to destroying his old contract and accepting a flat royalty of \$50 on a machine in place of the original \$150. This he now began to regret and in 1888 he suffered a serious illness.

With the return of strength he again took up his work plunging away month after month. During these years he was practically dependent on a small group of loyal friends who turned over to him sufficient funds to buy his last and best machine. It was finished in February, 1890, exhibited in the Judge building in New York and so complete was it that all doubt and hesitation on the part of printer friends came to an end.

A little money came in to him from the \$50 royalty and during the final period of the inventor's life he was at least surrounded with the necessary comforts. Toward the end of 1894 his health underwent a marked change for the worse. The dreaded white plague had marked him, and in search of relief he took up his abode in the Southwest. In April, 1895, following the burning of his home in Deming, N. M., in which the manuscript of his autobiography was destroyed, he returned to Baltimore. He had but time to finish a brief history of his life before his strength failed and death came October 28, 1899.

The inventor had done his work well, and the corporation that he was so largely instrumental in forming grew like magic. Improvements were added to the machine, its scope enlarged and a great selling campaign organized. To-day there are 26,000 machines in America and some 10,000 more scattered throughout the world made after the Mergenthaler patents and bearing his name. Last year's report of the Mergenthaler Linotype Company, the present company, showed \$18,011,324 in assets, and carried the announcement that it was declared when the first dividend was declared, the shareholders have received in cash dividends \$35,918,229.50. During the year 2,312 machines were ordered, giving to the Mergenthaler estate a neat sum of royalties.

A niche in the hall of fame and some degree of financial glory came to the inventor and millions in profit flowed into the hands of the manufacturers, but to the old time hand compositors this same success spelled tragedy. Superseded by bright, dexterous young mechanics, they scattered to the four winds, fleeing before the seeming wrath of a machine that does everything but think!

To-day they are no more found around the big city shops, fighting over "fat" and swearing at "dirty cases." The old time music of their type clicking against the composing rule has forever given way to the rattling of the keys and the humming of the matrices.

Tramp printers—strangest of all breeds of men—many of them became, passing from city to city, town to town, and finally as the machines entered every nook and corner of the country, only the smallest, weekly shops remained open to them.

The memory of Mergenthaler will live forever, and the machine that was born of his genius will grow in power and numbers—only the old time printer is gone, the printer Otto Heid wrote the hand composed article that "Gene Field loved and cast his rhymes for.

# SUBMARINE WILL FIND SPERRY A DANGEROUS ENEMY

Continued from Third Page.

June 18. It was conducted by the Aero Club of France, under the patronage of the French military authorities. The Sperrys had a dark horse, but it didn't take long to show that it was really a snow white steed. Lawrence Sperry was at the wheel when the Americans had their chance and with him was a mechanic named Cachin. A huge crowd had assembled for the show and there was no more interested spectator than Mrs. Elmer A. Sperry, mother of the young driver.

Several foreign machines had their go with varying success, and then Sperry, Jr., took his craft aloft. In about two minutes he had the crowd with him and in about five it was plain that the prize would surely be his. Such dives and capers as he cut in the air even France had never seen, and when Cachin climbed out on one wing of the machine and stood there while the huge craft swept along absolutely even keel and the driver didn't even have to keep his hands on the controlling levers but stood up in his pit the enthusiasm exceeded all bounds.

After the official test the Sperrys were besieged by French and Russian army officers and by members of the Aero Club of France, who wanted to see what made it. Obligingly the twenty-year-old flier took them left and demonstrated more of the marvellous capabilities of the 30 pound instrument that seemed to make dipping in the air as safe as diving into bed. The French War Department's prize of 50,000 francs was awarded without hesitation to the American competitors, and it has since been whispered that Mr. Sperry could have made a whole lot more if he had turned his invention over to France. He didn't, for he isn't that sort of an American, as he has since frequently been told about the French contest.

After a short stay in France with their aerial wonder the Sperrys came back to this country to be received with open arms by all interested in aviation. The first night they arrived Lawrence was the guest of honor at a reception at the Aero Club, where he was told about the French contest. Later on Brookline paid its debts to the venturesome father and son and gradually Americans realized that the Sperrys "had the goods," indeed had had them all along. Since that time the gyroscope has been placed in most aeroplanes and is recognized as a necessary part of the equipment. One was installed on the flying boat America, which Lieut. John Cyril Porte was to have flown across the Atlantic for a \$50,000 prize if he was able to prevent it. The America has since been used as a practice plane for British fliers and it hasn't been smashed up or worn out recently the gyroscope that was put on base is

still keeping it straight amid the temptations of war.

The gyroscopes really isn't a singular number at all, but is distinctly plural, for there are four gyroscopes. Each of them is about three inches in diameter and they are placed under the hood of the aeroplanes. They thus maintain four horizontal elements so that when the machine inclines to the left or right in front or behind the gyroscopes act on levers which work automatically and instantly re-establish the horizontal position of the machine. The device is eighteen inches across and twelve inches high. One pair of the gyroscopes works the elevating planes and one pair controls lateral stability so that under ordinary conditions the driver doesn't have to drive at all; the plane can run itself. If the engine stops in flight the machine volplanes automatically and it rights itself in a gust of wind before the aviator can perceive that it has deviated from the normal. The device, as described above, has numerous variations and some recent improvements which have not been made public, but the description is accurate for general purposes.

During the time that he was working on the stabilizer and other inventions Mr. Sperry managed also to put in quite a few hours on some little things he had in mind. One of them was a new radio set for aeroplanes which was so much lighter and so much more compact and practical than anything of the sort before evolved that it revolutionized that particular field. The complete set weighed only about twenty pounds and it was perfected to such an extent that aviators were able to direct gunfire on battleships and also from land fortifications. Incidentally he was simultaneously directing the production of the big factory he had built in Brookline, was attending to extensive private affairs and was even doing some lecturing before scientific bodies.

In October, 1916, a cable despatch from London revealed another phase of Sperry versatility, an aerial torpedo which he had developed. This is especially interesting in view of the latest reports of Sperry's productiveness. "A device which is likely to revolutionize modern warfare has been invented and tested and will be ready for the market within a short time," the despatch said. "It is an aerial torpedo and the men who have worked out the idea are Elmer A. Sperry, president of the Sperry Gyroscopic Company of Brookline, and his son, Lawrence B. Sperry."

red miles away without the slightest risk to the assailants. The plan was to equip aeroplanes with stabilizer and gyroscopic compass and with torpedo of deadly explosives weighing about 600 pounds. The flight of the plane was to be controlled by the operation of the gyroscopes, which were to be regulated so that the machine would rise for a certain distance, proceed in a horizontal line for a certain distance and then, at a calculated point swoop down upon its target, a veritable eagle of destruction.

The principle here was the same as that applied to the Sperry marine torpedo—mention of this may have been omitted before, but this is not surprising in view of the long list of inventions credited to the Brookline man and the wide range of his genius. Incidentally the London despatch declared that the German gyro-compass had been openly stolen from the Sperry plans. The interesting article concluded as follows: "Summed up, the new invention is a self-controlled aeroplane, flying without a pilot and loaded with death."

In all his work Elmer Sperry has had no more faithful or valued assistant than his son Lawrence and on account of the stabilizer and other inventions would be complete without a word about the youngster. Like his father, Lawrence went to Cornell, where he stayed for two years, leaving to help his father in the gyroscopic researches. He is a tall, handsome youth of 23 years and he knows not the meaning of fear. He has flown aeroplanes of every sort and description, has taken the most daring of chances and has half a dozen times been face to face with death, always escaping, however, through the exertions of some people call "luck" and those who know them just plain nerve, backed up by ability. To his friends Sperry pere always refers to Sperry fils as his right arm and his right eye. They have worked side by side in difficult times and now that success has come to them they are still partners in more than one way.

New Yorkers never get blasé at the sight of a soaring aeroplane and in the past couple of years their necks have been craned many times to see Lawrence Sperry aloft in some daring flying maneuvers. One of his interesting "stunts" was to drop on the roof of the Hudson Terminal Building a card signed by his father and pledging a contribution of \$500 to Stevens Institute, which was at the time conducting a campaign to raise funds for improvements in the institution. A goodly proportion of the aerial feats of recent months have been contributed by this capable young man. Recently he has joined the Reserve Corps of the United States Aviation Service and is now a full fledged flying soldier.

On the personal side Elmer Sperry is a quiet, homeloving man, physically



Elmer Ambrose Sperry, who is reported to have devised a U-boat killer.

somewhat resembling Secretary of State Lansing. His home is in Brookline and there he is generally to be found when he isn't at Washington or some other place doing work for the country as a member of the Naval Advisory Board. In addition to the first prize won in France for stability in flying he has received the John Scott Legacy and Premium awarded by the Franklin Institute of Philadelphia for extraordinary scientific achievement. The stabilizer brought him this honor.

He also received the Collier Trophy awarded by the Aero Club of America. He was one of the founders of the American Institute of Electrical Engineers, a founder of the American Electrochemical Society, and is a member of the American Chemical Society, the Aero Club and the Society of Naval Architects and Marine Engineers. For diversion he plays a little golf and does a lot of work. As has been said before, he does not work. That's his watchword and motto.

shell at the point of intersection of the cannon.

The second Lieutenant, lowest in rank of the commissioned officers, may be distinguished from the enlisted man, despite the fact that he wears no insignia on his shoulder straps, by the gold marking on his collar. This symbol, as in the case of the enlisted men, is of crossed rifles, sabres or cannon, according to the branch of the service, and is worn by all regimental officers. On the other side of the collar are the letters "U. S." in gold. Infantry officers may be distinguished from the enlisted men by the fact that the latter wear canvas leggings, while the officers have tan leather leggings.

First Lieutenants have a silver bar on their shoulder straps, while Captains have two bars. Of the field officers, the Major wears a gold leaf, the Lieutenant-Colonel a silver leaf, and the Colonel a silver spread eagle. The Brigadier-General has one silver star, and the Major-General, the highest officer in our army at present, has two silver stars.

The campaign hats—broad brimmed felt hats with stiff brims—afford another clue to the arm to which the wearer belongs. The hats of all enlisted men are alike, but the hat cord around the crown reveals his color

of the branch of the service to which the man belongs. A blue cord signifies infantry, a yellow cord cavalry, and a red cord artillery, either coast or field. The men of the Quartermaster Corps have buff hats, the Engineering Corps red and white, the Signal Corps orange and white, and the Hospital Corps maroon and white hat cords. Officers of all branches wear gold and black hat cords, the insignia on their collars being the only indications of rank.

The insignia of the Quartermaster's Corps is a winnow wheel crossed by a key and sword, of the Engineering Corps three turrets, and of the Signal Corps crossed flags. There are a few other emblems, but these are the most important.

In addition to the hat cords used in the service there are frequently seen on the streets the red, white and blue cords of the men who have been at Plattsburg or other camps, but who are not actually in the service. The home defence men wear green and white hat cords and slate colored uniforms to distinguish them from the regulars. Columbia students at the members of the Columbia corps wear light blue and white hat cords and regulation uniforms without the two buttons on the collars.

# WHAT THE INSIGNIA ON UNIFORMS MEAN

IN times of peace by means of the amount of gold braid and shiny buttons displayed the New Yorker could usually guess the rank of an officer within a few grades, but in the stern days of war, when officers and men are clad alike in businesslike khaki, there is little to tell a private from a Major. There is, of course, a method in this, for it would not do in modern warfare to make officers conspicuous to the enemy.

In all branches of the service, infantry, cavalry and artillery, the same symbols or insignia of rank are used. The corporal, at the bottom of the scale of officers, is distinguished from the private by the chevron, consisting of two bars on the right sleeve. In the case of the sergeant, next highest in rank, the chevron is of three inverted V shaped bars. All enlisted men, including these non-commissioned officers, wear on one side of their coats or blouses a bronze button with the number of their organization, and in relief crossed rifles for the infantry, crossed sabres for the cavalry and crossed cannon for the artillery. Coast and field artillerymen may be distinguished by the fact that in the case of the former in addition to the cannon there is a

shell at the point of intersection of the cannon.

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