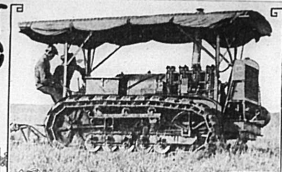
TANK NOT INVENTED AS WAR MACHINE

Thousands of Tractors Now in Use on Farms in All Parts of the World



TYPE OF TRACTOR USED ON MANY FARMS

TRACTOR CONVERTED INTO ENGINE OF WAR

MONSTER TANK OF CATERPILLAR TYPE

THOSE who have watched the operation of the tanks at the movies and have marvelled at the lumbering machines that crawl over the face of the earth like prehistoric monsters have gained some idea of the adaptability of the modern tank. No other armored machine that moves upon the ground is so capable of surmounting obstacles.

When the squadron of tanks appeared in the vanguard of Byng's famous drive at Cambrai, its appearance seemed providential, writes Hamilton M. Wright in the New York Sun. The armored leviathans pushed through the German barbed wire entanglements as if they were so many cobwebs. They sidestepped deep pockets, stretched their long tracks over miniature chasms, dipped, rose, backed and tipped at dangerous angles as they picked their way forward amid a hail of missiles.

And yet for all its supreme adaptation to the needs of the hour the tank was not invented for war purposes. The first tanks introduced into Europe were used in lumbering operations and in heavy hauling, just as they were in the United States. Rapidly their use was extended to large agricultural works and before the present war broke out the track layers were well known in every country in the world. Even the prosaic track layer used in farming will, if armored, make a tank for war use. Indeed during the 1917 recruiting season ordinary track layers armored with sheet iron plowed through walls almost as readily as the biggest war tanks yet built.

At the present time track layers are used in plantation work in Cuba, the Philippines, Java, Hawaii, South Africa and so on throughout the world. There are almost one hundred of them at work in Hawaii, taken there from California where the tractor flourishes.

They are hauling logging trains in Maine, Montana, Wisconsin, Minnesota and Canada as efficiently as they are transporting supplies in the mining regions of the West. On the dusty roads of the Panamint range, where the steep grades wear down the spirit of the strongest mule teams and where water stations are few and far between, track layers are as valuable for freighting as they are in the heat and whirling sand clouds of the Mojave Desert.

There are at the present time about fifteen firms engaged in making tractors with the endless belt type of drive. There are between eight and ten thousand tractors of this type of all different makes now in use in the world.

Factories are now speeding the construction of these track-laying tractors for the use of the United States in the field artillery, marine corps, signal corps and other branches of the service. Armored track layers are used in hauling supplies over ground that motortrucks cannot travel on. Today manufacturers of track layers find the war orders tax their facilities to such an extent that they are not able to keep up with the commercial demand.

The advance of the tank over the earth suggests the movement of a living creature. Yet its operation is simple. The track layer lays its track down in front of the frame, rolls over it, picks it up again and repeats the process.

The track consists of a broad-geared belt or endless chain of flat steel links, which is put in motion by large chain-supporting wheels which fit into the inside of the belt by gears. It thus resembles a belt stretched around the front and rear wheels of an automobile and presenting a flat surface on the ground.

The outside of the belt is comprised of broad links known as track plates which are ridged to prevent their slipping. The inside of the belt contains the twin tracks upon which rest the rollers that support the weight of the tractor.

Nine out of ten persons who watch a tractor demonstration for the first time get the impression that the track itself is moving upon the ground. The illusion is created by the fact that the top of the belt is observed to be going forward. But the forward motion of that part of the belt is taken up by the forward motion of the car. If the car is raised from the ground and the motor set in motion the belt will be seen revolving around the supporting chain wheels. In this case the tank is absolutely at rest.

There are two belts, one on either side of the car. When the car goes straight ahead both belts revolve at even speed. But the right and left hand tracks may be operated independently.

Through the operation of clutches that correspond to those in an automobile one track may be brought to a standstill while the other track continues to move at normal speed. The tank with all its power applied on one side will make a sharp turn. If the right hand track is moving and the left is still the tank will turn to the left.

The weight of the tank is distributed along the whole length of the track. In the crumbling newly reclaimed land of the San Joaquin delta, California, track layers travel on soil that will not support the weight of a man, much less a horse. They will pass over cracks in the crumbling earth that a horse could fall into, dragging harrows over the uneven ground until all crevices are filled with earth and the new-made fields presents a finely mulched even surface.

The tank is not only first in war. It is first in peace. For its weight it has more pulling power than any farm machine made. It is the biggest money saver and time saver ever introduced for power purposes upon the farm. The division of agricultural engineering of the University of California has found that one man with a 45 horsepower tractor on the university farm can do the work of from three to six men with mules. Moreover, the same machine may be kept going day and night, a great advantage in California, where it is necessary to get a large amount of work done in a short time. And it requires no feed or care when not working.

For a varied illustration of what a track layer can do take the case of the L-54, a husky little 45 horsepower tractor which has been out of the shop for eighteen months. The writer watched her working and learned of her career since the day she left the factory.

She was hauling beets when I first saw her. Under the thrust of her powerful engines she went forward in a cloud of dust that hid her from all eyes but her driver's. She mounted the sides of the levee, dragging her own weight of five and one-half tons and two eleven-ton truckloads of beets as easily as if there had been no load at all.

The ground on the island is what ranchers in the delta of the San Joaquin river call peat bottom fluff. It gave under like saw logs in a mill boom as the little L-54 dragged her weight over it, hugging the ground as closely as a badger. When she had reached the top L-54 stopped a moment and the driver got his bearings. Then the gears connected with her right track, her left track remaining stationary, and she swung around from right to left on her own axis quite as rapidly as a lady in the fox trot.

This, however, was nothing for the L-54. She can go backward or forward, up hill or down, and can spin around all day like a dervish if her driver throws in but one clutch. Time and again she has picked her way over the peat bogs of the newly reclaimed land, skirted the edge of big cracks six or eight feet deep, backed and sidestepped and bridged miniature chasms, confident that nothing short of a cave-in of the whole earth could stop her progress and that the harrows, plows or trucks behind were bound to follow wherever she led.

L-54 is a ponderous, deliberate creature with a tremendous grip upon the earth. If covered with sheet iron and armored she could tear her way through wire entanglements as easily as Byng's tanks tore through the German defenses at Cambrai. But more than all things else she is a money saver and a man saver.

This is all in the day's work with L-54, and night's work, too. In fact her driver can remember when she worked all day and then went at it at night with an acetylene lamp, plowing up beets with a subsoil plow 16 inches deep. She has been on the job in one way or another all the time for 18 months.

She had pulled a grader holding five cubic yards of dirt to level the land for irrigation before a single acre had been put into beets. She had been lent to a farmer in the nearby foothills. He had hitched her up to a chisel-shaped subsoiler that would break the hardest ground in the district and she had subsoiled the land to a depth of 20 inches, breaking up the hard-plow pan where ten span of horses had failed. For the first time in 25 years that land had produced 30 bushels of wheat to the acre.

When the L-54 mounted the levee with her two loads of beets she was doing the work of ten two-horse teams. With hay at $30 a ton, rolled barley at from $55 to $60 a ton and other feed proportionately high, it will keep a farmer busy to feed his work stock, let alone make a profit. The United States department of agriculture once made an estimate that it cost $121 in feed and time to keep a horse throughout the year. The operation of L-54, which replaces 20 horses, costs as follows: Twenty-five gallons of distillate developing 20 horsepower (the work of 20 horses for ten hours), at 10 cents per gallon, $2.50; two gallons of cylinder oil at about 55 cents a gallon, $1.10; track oil, transmission oil and cup grease will probably go from 75 cents to $1 a day. Total, $4.60.

If anything in the world could stave off a threatened crisis in the world's food supply it would be the tank in agriculture. If there were a sufficient number of gasoline tractors in the United States today with men who knew how to operate them and take care of them there would be no question but that we could export to our allies every bushel of wheat they require and still have an abundance for our own use. That is, if old Mother Nature and the weather man did not conspire to turn things topsy-turvy.

The first track layers ever manufactured and put into commercial use were very much like the track layers sent over to the Russian armies before the bolsheviki disturbed our calculations as to the course of the war. They were adapted to haul heavy loads through snow, ice, mud and slush and on uneven roads in the logging woods of Maine. They were invented by A. O. Lombard of Waterville, Me., who is, so far as is known, the inventor of the track layer. He put his first track layer in operation early in 1900 and secured a patent on it on May 21, 1901.

In the six months following our declaration that a state of war existed with Germany an average of two gas tractor companies have been incorporated each day. They are good, indifferent and bad. Some are of the stock-selling, get-rich-quick variety.

There is no way of telling how many gasoline tractors there are in use upon the farms of the United States. An expert in automobile power puts the number at 250,000.

Farm experts already foresee the day when gasoline power will be almost universal in agriculture. The war in a few months has done more to increase the demand for mechanical power on the farm than years of peace would have accomplished. The faithful horse will never leave us, but much of his hardest work will be done by gasoline, even on the smaller farms.

The Pershing Rifles.

Fifty yellow and blue badges, the insignia of the Pershing Rifles, a crack military company of the University of Nebraska, are being treasured by as many former students of that institution these days. One of them is William Green of Abilene, Kan.

"It was Pershing's own idea," says Mr. Green. "We had been picked from the military company of which he was instructor after coming from West Point to Lincoln. We met in his room one night to organize and 'The Lieut.' as we familiarly called the instructor—he was a second lieutenant then—asked what colors we wanted on our badges.

"'Yellow and blue—cavalry colors.'

"'I have the very thing,' he responded, and went to a chiffonier from which he took a brand-new pair of cavalry trousers. With shears he ruthlessly cut them across, making fifty badges, each with a strip of blue and the yellow leg stripe. We called the organization the 'Pershing Rifles' and were very proud of the honor. Pershing took us on long camping trips under strict military regulations, and we felt that he was more of a father than a professor to us.

"He never forgot his boys, as he called us. The night he arrived in San Antonio to take charge of the Southwest division after the death of General Funston, I was at his hotel. Though a score of prominent men and officers were waiting to see him he recognized me and spent five minutes asking after the students and laughing over the university days.

"He was a strict disciplinarian, always wanting things done in a hurry—which makes reasonable his impatience now to get at the Germans—but intensely human. He was the one professor to whom the boys went with their troubles—and that is a good test of the human side of anybody."

Effect of Cold Weather.

"The cold weather seems to give Mrs. Flinglt a livelier complexion."

"Yes," replied Miss Cayenne. "I think she puts on more to keep her face warm."

A Certain Fact.

"Concerning this food shortage, it seems to be there is one argument which covers the ground."

"What is that?"

"A good wheat and corn crop."

COPIED FROM MOTHER NATURE

Most Deadly Wartime Contrivances Are Imitations of the Denizens of the Sea and Air.

Man has constructed the submarine to course the ocean depths, imitating in shape and dark hue the sea monsters. He has produced a winged machine, along the lines of a bird or butterfly...

...of mimicry has been used by the warring nations. Just as many of the bright-plumed birds and gay butterflies use their brilliant raiment for attraction, squadrons of our war airplanes are lavishly coated with kaleidoscopic colors to attract the enemy into the danger zone, where a superiority of numbers lies.

...

Training Modern Artillery Officers

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LEARNING TO HANDLE UNCLE SAM'S GREAT GUNS

DOWN at the Coast Artillery school at Fort Monroe, Va., Uncle Sam is turning out the latest pattern of modern heavy artillery officers. The National Guard coast artillery officers and such of the regular establishment as have not yet been through this school have been ordered down in two sections, the first of which already has been graduated.

Upon the Coast Artillery corps has been thrust the burden of handling the heavy ordnance with which the army is equipped, and which in the field will be manipulated by methods more or less resembling the methods already laid down for sea coast ordnance. These methods are far different from those used by the field artillery proper—that is, the light three-inch rifles and 4.7-inch howitzers.

The present-day heavy artillery officer must be a mathematical shark, a railroad engineer and an expert in handling gasoline motors, besides having an intimate knowledge of gunnery, says a writer in the New York Herald. His equipment has changed from the battery commander's ruler of the field artilleryman to a slide rule, a transit and a book of logarithms.

In addition he must understand perfectly the manipulation of heavy masses—termed the art of mechanical maneuvers—for his guns will not be securely emplaced in concrete, but will be exposed to the mercies of the open road, with consequent overturnings and sudden shiftings. He must know how to use tackle of all sorts, and in general know all the tricks of the modern contractor.

The officers who came down to Fort Monroe were nearly all graduates of the National Guard courses prescribed by the war department and were fully competent to handle seacoast ordnance in the forts to which they were assigned. They thought that their knowledge was ample, and it would have been for this work, perhaps, but after a day or so they found out that while this knowledge was essential to them as basic, it was only the beginning.

Gunnery the Big Thing.

The big thing, of course, was gunnery. This included a practical knowledge of ballistics—the science of the movement of bodies through the air. Ballistics is a very exact science, and in these days of precision is absolutely essential for the artilleryman. Reduced to language for the layman, it consists in the knowledge of just how far a given piece of ordnance will hurl its projectile under all conditions.

Very simple, say you. Yes, under standard conditions. Every gun when it is turned out from the maker is known to fire a certain projectile to a certain range at a certain elevation. These data are compiled in tables and are theoretically the same for all guns of the same caliber and model. These tables are known as range tables, and the conditions given for the firing of projectiles for these theoretical ranges are known as range table conditions. Remember this.

Now some of the principal range table conditions or assumptions are that the earth is flat and does not revolve; that the atmospheric conditions are standard; that there is no wind; that the gun and target are on the same level, and that the action of gravity is constant throughout the trajectory.

All well and good. We know that our gun, then, will fire its projectile, let us say 10,000 yards, under range table conditions. In other words, given the above conditions, it will, if properly laid in direction, hit a target 10,000 yards away. But unfortunately for us the earth is not flat, our target is 10,000 yards away, and 200 feet above the level of the gun there is a ten-mile wind blowing straight across the line gun target, the thermometer is up to 85 and the barometer has dropped to 29. Will the projectile hit the target now? Not unless you correct the elevation of the gun for some of these conditions and its laying for the others. How are you going to do it?

First, you must find the force with which your projectile cleaves the air. This is called the ballistic co-efficient, and is reduced by a simple formula to a figure. Knowing the weight of the projectile, its form and its diameter the ballistic co-efficient is easily calculated.

The Air as a Check.

You have now taken the first step. You have the force of projectile to penetrate the atmosphere under standard conditions. But this force varies with the atmosphere. On a heavy, muggy day the atmosphere is dense, and you will be surprised the checking effect it will have on your projectile. By means of elaborate tables one can find just what this effect is, and we apply it to the original formula. Also in the atmospheric factor is included the temperature, for in hot weather our powder charge when ignited exerts more strength in decomposing into gases than it does on a cold day.

So far so good. What about this troublesome wind that is blowing? If it blows against the projectile it checks it; if with it, it helps it along. So we have two varying factors, which the ballistician juggles by utilizing trigonometry until he gets them in terms where he can once more change his ballistic co-efficient, making it larger or smaller as the wind impedes or accelerates the projectile.

Not quite so easy as you thought, is it? But we are not through yet.

We know that under range table conditions our propelling charge has a force that gives the projectile an initial velocity of so many foot seconds, say 2,250. But our powder has been stored in a dugout whose temperature is not normal, so by more figuring we find out just what this real velocity for the day is. Now we can begin to figure what elevation the gun must have to travel that 10,000-yard path to the target.

By dividing our old friend C, as the ballistic co-efficient is termed, by the distance in feet that the projectile must travel, we get a reference number. This number we take with us and bury our noses in more tables until we find opposite this number in a column headed by the muzzle velocity another number. This number, multiplied by C again, gives us the sine of twice the angle of departure. A quick glance into a table of logarithmic sines gives this to us, and dividing by two we have a figure in degrees and minutes that represents the angle which the gun must be elevated from the horizontal to send its projectile 10,000 yards today. Wait a minute. Our target is 200 feet above the level of the gun. Also because of the curvature of the earth this 200 feet height has been reduced somewhat. So once more we delve into mathematics to correct the curvature of the earth and height of site of the target. The result we subtract from the angle found, and this time our gun is ready for business. Is it? No; it is not so easy.

The Influence of the Rifling.

Every rifled piece of ordnance imparts a twist to its projectile, and this twist causes the projectile to deviate from its course. In our service this deviation, called drift, is to the right, and is in ratio with the range. It is constant, therefore, for each range, and we find it very easily, either by mathematic computation or from drift tables. Also we go back to our wind problem and find what effect the wind will have in pushing the projectile from its course, either to the right or left. These two corrections are brought together and determine the amount in degrees and minutes that the muzzle of the gun must be shifted from the target to the right or left in order that the projectile will curve toward its goal. At last we have our gun controlled so that it will hit the target.

Tarry just a moment. A gun, the text books tell us, is the simplest form of gas engine. Did you ever know two gas engines of the same model that acted alike? Neither will two guns of the same model.

The Fifty Per Cent Zone.

If you have an automobile you know that the piston rings wear out, allowing gases to escape, and thus reducing the force with which the piston is forced down. Also the cylinder becomes scored with the same result. Now, if you fire your gun many times the same thing happens. The projectile is the piston and the retaining band of copper the piston ring that seals the bore. If the bore is eroded or if the rotating bands are not perfect a certain escape of gases occurs and the flight of the projectile is consequently affected.

Again, there may be a difference in the weight of powder charges or in the weight of the projectiles, which will give slight variations in the flight of the projectiles. So that the battery commander must know the dispersion of each piece. This he finds out from observation of his shots, and it changes as the gun grows older. By figuring the deviation of a certain group of projectiles from the target, and which are known as trial shots or fire for adjustment, he finds out what is known as the mean error of the gun. This, multiplied by the factor .845, well known to students of probabilities, gives the mean probable error. Multiplying by two, the result in yards is what is known as the 50 per cent zone, within which 50 per cent of his projectiles will fall. This computation is done longitudinally and latitudinally, giving a certain oblong strip. If the center of this strip can be placed on the target by observation of fire the battery commander has done all that he can, and may now open fire for effect. Four times the 50 per cent zone gives the 100 per cent zone, within which practically all his shots will fall.

Knowledge of these zones is all important. By this means he can figure out how near he can come to our own first line trenches without murdering our infantry, and, what is almost as important, when it is necessary to save ammunition he can easily compute how many shots will be necessary to make a certain number of hits on a given target.

And what about camouflage? The enemy airplanes are on the alert and all gun positions must be disguised. The battery commander must be a master of camouflage, able to erect shelters and under their cover to build his emplacements, while by the exercise of discipline he restrains his men from making tracks about the positions which will give away to the all-seeing eye of the camera in the air the fact that guns are mounted there.

So that is why the student officers at Fort Monroe blistered their hands and strained their backs erecting camouflages and digging dugouts and bombproofs; that is why they dove and crawled under motortrucks and delved into differentials and gear cases, emerging dirty and grimy, but happy; that is why they toiled for hours at night, working out lengthy problems in trigonometry until angles danced before their eyes when they tried to sleep and endless chains of logarithms curved themselves through their brain cells.

TAKEN FROM EXCHANGES

Owing to difficulties in transportation from India, Great Britain is suffering from shortage of cottonseed, and oil cake for dairy cows is steadily rising in price.

The large sugar estate owned and managed for some years at Calamba by the Dominican friars has been purchased for $1,000,000 for Japanese sugar capitalists. This is the largest project yet undertaken in the island by Japanese business men.

An English golf enthusiast has patented a club in the head of which is a device to measure the force of strokes.

John I. Miller, his father-in-law, N. A. Renner, and Mr. and Mrs. Richards of Lincoln, Ill., were carried 50 yards in an automobile on the pilot of an engine. None was seriously hurt.

The city of New York has spent about $150,000,000 on its water front. The water front of Manhattan is 37.35 miles in length; the Bronx, 64.7 miles; Brooklyn, 200.67 miles; Queens, 196.72 miles; Richmond, 55.75 miles, or a total for Greater New York of 555.1 miles.

England, accepting men of nineteen to forty-one inclusive, has 3,000,000 soldiers in the field. Germany, accepting men of eighteen and forty-five, inclusive, has 5,000,000. Germany's permanent disablements are said to be 3,500,000, or at the rate of 1,000,000 a year.

King George rules over more Mohammedans than the sultan of Turkey, over more Jews than there are in Palestine and over more negroes than any other sovereign who is not a native of Africa.

A London cat, officially know as the "King's cat," is the only one in the Kingdom to receive an allowance from the treasury. He inhabits the Record office and 13 cents a week is spent for his meat.

The Three Bosses.

A broker was praising Charles M. Schwab's conduct of Bethlehem Steel.

"Schwab runs that plant well because he's in absolute control of it," the broker said.

He chuckled and went on:

"A big minority stockholder tried to get gay with Schwab one day—wanted to oppose the recent stock dividend—actually tried to boss the shebang.

"Schwab just looked at the duffer in that cool way of his. Then he said:

"'I may as well tell you first as last, my friend, that there are only three men who have any say in this concern—only three men.'

"'Hump. Who are they?' growled the stockholder.

"'The first is Charlie Schwab,' Schwab said. 'The second is Schwab. The third is Charlie.'"

The Real Thing.

Cholly—You're a perfect picture of your big sister.

Mazie—Sure, but me beauty is natural, and hers is artificial.

KICKS WIFE IN STOMACH

Michigan Court Decides Woman Is Not Entitled to Divorce Under the Circumstances.

Lansing, Mich.—A wife struck in the stomach by her husband while in bed is not entitled to a divorce if he strikes her while dreaming he is fighting a dog.

...band said the dream was due to having separated two fighting dogs during the day.

"HAD AVERAGE SPORT," WAS SAILOR'S REPLY

Naval Station, Puget Sound.—When a sailor recently returned here after seeing service on the U. S. S. Shaw, the speedy destroyer from the local...

...the effect that she had seen action.

"We've heard that the Shaw had some exciting times," said the interviewer.

"Yes?" replied the sailor with a rising inflection.

"Many reports have reached here indicating that the Shaw accounted for ten or a dozen submarines."

"Well, we had average sport," came the reply, and the interview ended.

Helping the Meat and Milk Supply

Women Food Specialists in Washington Entertaining Officials of the United States Department of Agriculture and the Food Administration at a Cottage Cheese Luncheon.

COTTAGE CHEESE AS STAPLE FOOD

Some Attractive New Dishes Made From Cottage Cheese