GERMAN HEAVY MORTARS

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Joachim Engelmann

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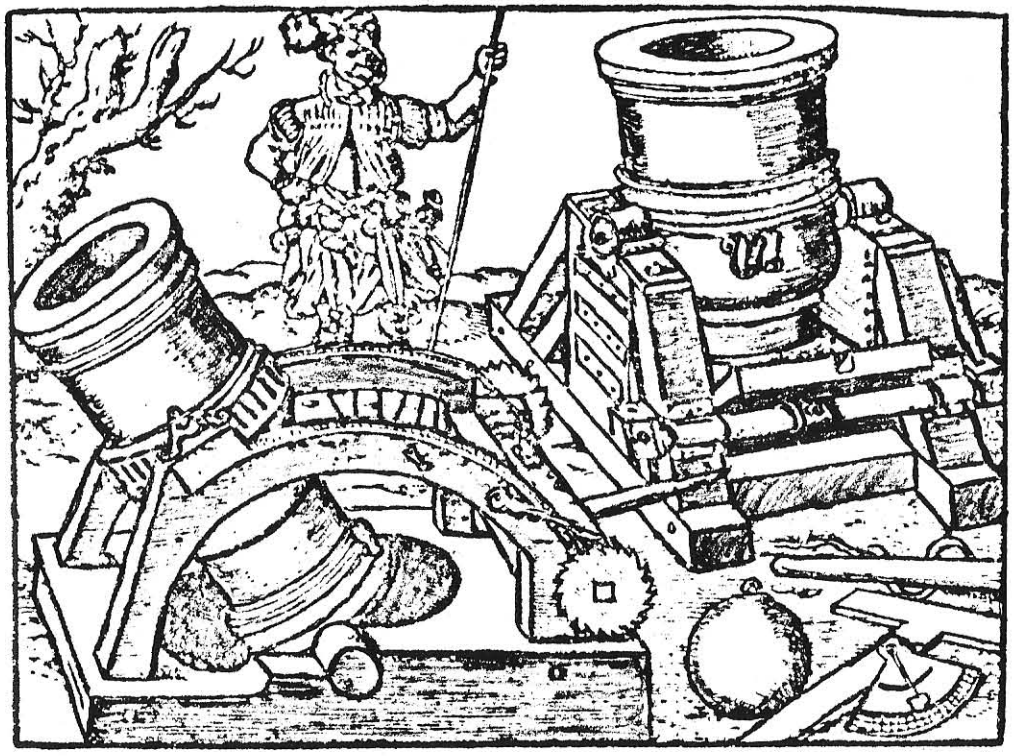
21 cm Mörser 18



Left page:
The barrel must be lowered each time a shell is loaded.

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Mortars

21 cm mortar - "Fire!"

Mortars are considered to be one of the earliest forms of artillery weapons. They began life as siege weapons, breaking down the walls and ramparts of fortified positions, and later also became used in the opposite role as fortress guns. Since the 13th/14th century, the mortar's primary characteristics have been a steep angle of fire coupled with increased penetrating power, a large caliber (up to 80cm) using heavier projectiles, and a relatively short range. For all this, however, mortars are usually stationary weapons or, when mobile, extremely cumbersome.

The name "mortar" basically means a "sturdy container made of metal with a semi-spherical bottom chamber", or later, a chamber which "directs the explosive force in a predetermined direction and propels projectiles."

Originally, the predominant idea was simply destroying fortified masses; the concept of an actual barrel supported on a trunnion and resting on a heavily reinforced carriage came about later. Simply put, mortars are shorter and squatter than howitzers, and those of recent history are shorter than cannons with their long barrels and extended trajectories. The most significant difference between a mortar and a cannon is a mortar's effectiveness as a type of "throw gun", with a typically high-angle (45-90 degrees) barrel elevation and sharply compressed trajectory. While the total percentage of mortars used by the artillery has been limited to approximately 10-15 percent, their destructive power throughout history is considered legendary.

The first large-scale operations involving mortars made world history in May of 1453, when Sultan Mehmed II used them to destroy the Byzantine fleet blocking the harbor of Constantinople. During the 16th century, the mortar became even more popular under Maximilian I. The typical mortar of his day had a caliber ranging from 15 to 47cm, projectiles weighing anywhere from 10 to 150lbs, a barrel length of 50-150cm, a range from several hundred meters to 2000 meters, and a barrel life of only 20 rounds to just over 100 rounds for short barrels (L/1.5 - 2). Initially, both small and large stone or iron balls were fired, soon followed by the use of fire balls. By the 19th century, these had developed into hollow charges filled with gunpowder, called bombs. For a time, the Netherlands were the leading developers of mortars; the mortar's daily rate of fire rose from 20 to 100 shots. By 1634 France had assumed the lead.

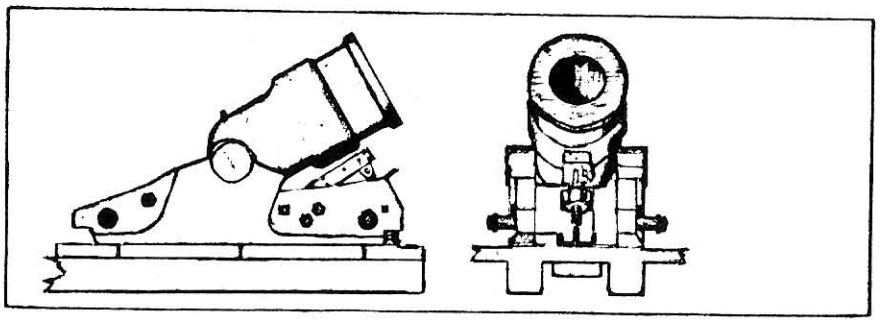
By the end of the 18th century the mortar had replaced the catapult. However, there still did not exist any type of ballistic theory or practical experience. In order to check its operational suitability, the mortar had to be lifted by a trestle onto a makeshift carriage and then test fired. Mortar rounds were fired by igniting two separate fuses in succession, one to the chamber and one to the bomb. This made it a rather risky proposition for the bombardier, who had to accurately estimate the burn time of the bomb's fuse. By 1862, however, it was possible to fire the mortar with a single fuse. Considering these difficulties, it is remarkable to note the massive utilization of mortars during the 347 day siege (October 1854-September 1855) of the sea fortress of Sevastopol during the Crimean Wars. Mortars were also used extensively during the Franco-German War: at the 14 day shelling of Strasbourg (beginning August 13th, 1870), at the siege of Metz (end of August to the end of September 1870), and during the shelling of Paris (December 27th, 1870 - January 29th, 1871). From the Middle Ages until the end of the 19th century, mortars remained unchanging in their role as a fortress and siege gun; while at the same time the howitzer came to be relied upon more and more for battlefield operations.

However, in the short period of time from 1899 to 1914 the mortar quickly grew into a mobile, modern high-angle fire weapon with decisive penetration and defensive abilities, forming the backbone of the field army's heavy artillery. Several factors which contributed to the mortar's newfound popularity were: the introduction of uniform calibers, explosive shells, improved barrel life despite greater stress, longer ranges, a full combat capability based on the experience of 1870/71, and the expanding construction of fortresses, as well as the use of the mortar in field positions. Austrian and German weapons manufacturers were able to provide an unexpectedly high output of mortars, which paved the way for the capture of Belgian, French, and Russian fortifications during the First World War. Due to this, heavy howitzers and medium mortars began to take on similar characteristics through the increase of elevation angles for both weapons, while the infantry began receiving trench and front line mortars as early as 1907 with the minenwerfer; in 1927 the light infantry gun appeared, soon followed by the heavy infantry gun of 1933, and in 1936/38 the granatwerfer of even greater caliber gained popularity.

Several conditions prevailed prior to the outbreak of the Second World War that made it clear there would be a greater demand placed upon the Heer's heavy artillery, which, in 1931, had no more than 23 obsolete 21cm mortars with a total of 16,000 rounds. First of

all, there had been restrictions on heavy artillery placed upon the Reichswehr (the Heer's predecessor). In the West, the French had begun construction of their Maginot Line starting in the 1930s. In the East, there were the Czech Schober Line of 1937/38, the Soviet border fortifications (such as at Brest Litovsk), and the Stalin Line running from the Duna to the Dniestr. In addition to the heavy cannons and howitzers, the backbone of the Heer was the 21cm Mörser 18 - actually a mortar-howitzer - which constituted 19 battalions and a total of 171 guns. Of the nine total mortar types regularly used from 1939 to 1945, the 21cm Mörser 18 was an improvement of an earlier design, the 35.5cm Mörser and the 60cm/54cm Mörser were two new designs, and the 38cm Sturmmörser was a completely new construction type using available parts from four antiquated mortar types dating back to the First World War, two of them being Austro-Czechoslovakian. In addition, five types of French and one type of Austrian "Beute-Mörser" (prize mortars, appropriated from the occupied countries) were used in limited numbers beginning in 1941/1942. Mortars fulfilled their purpose at the gates of Warsaw, on the Maginot Line, at Brest-Litovsk, Sevastopol, Leningrad, Stalingrad, and Warsaw again.

Throughout the mortar's operational life there were constant trials undertaken with every means available to improve the range and penetration force. The 21cm Mörser 18, introduced in 1939, was an outstanding example of Krupp construction. It was mobile, being transported by two vehicles, and was effective in both the upper and lower elevation groups. Production was halted by Hitler in 1941/1942 in favor of the 17cm and 24cm caliber guns. In mid-May of 1942 Hitler decided to resume production of the mortar and in June of that year ordered a monthly output of six guns to maintain the stock of approximately 400 21cm mortars. The raw materials required for the manufacture of a single gun included: 48.8 tons of iron, 252 kilograms of chromium, 32 kilograms of aluminium, and 236 kilograms of nickel. Production time was 22,000 man-hours, roughly equivalent to 15 months. Total delivered price without tires was RM107,000. By mid-May 1943, after 100 mortars had been manufactured in the three month period from March to May of 1943, even steel had been prioritized for mortar production. Up until then, six per month were produced from October 1942, and from May of 1943 until July of 1944 the monthly rate was twelve. As a result of the air attacks on the Ruhr, monthly production dropped to one mortar per month until December of 1944, when Speer promised new high quotas for the spring of 1945.



Yearly Production	1941	1942	1943	1944	1945
Guns	167	-	100	103	4
Ammunition(x1000)	268	236	440	459	25

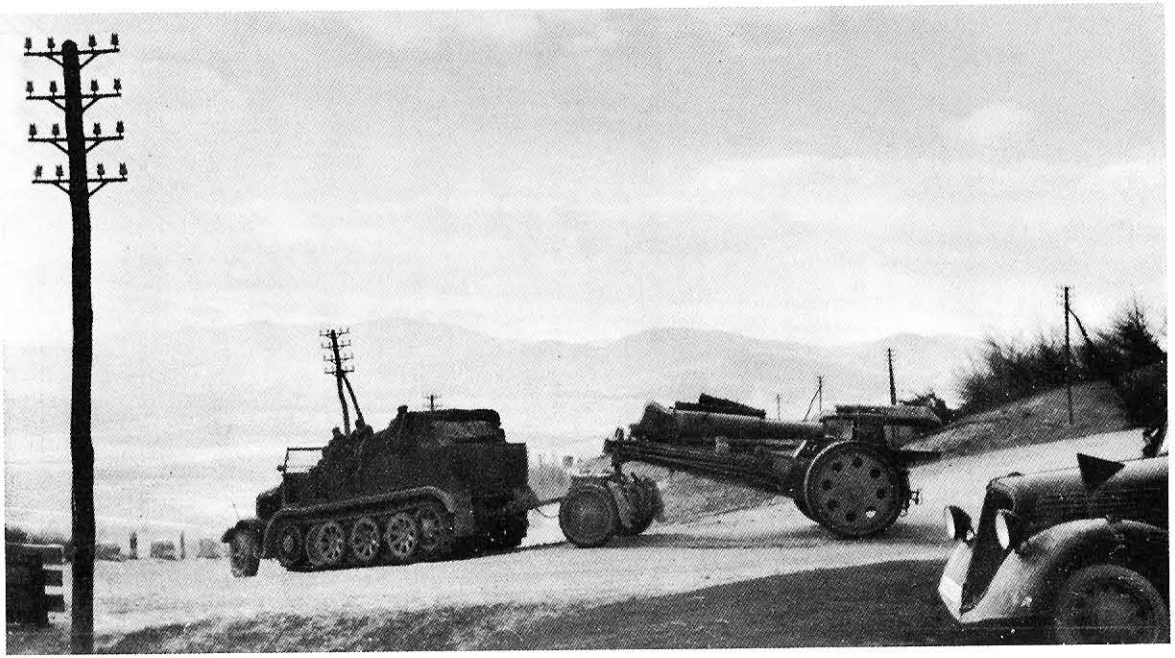
Not including practice rounds, a mortar fired six different types of shells. Two of these were the 21cm Rö (chling) Gr 42 and 44 Be (ton) (concrete-piercing), which were fin stabilized long-range shells of 2.6 meters and 1.6 meters in length. These shells could penetrate concrete up to four meters thick, which was roughly 2 1/2 times the penetrating power of a standard HE round, and when fired into an earthen surface were able to penetrate to a depth of 60m! The flush-mounted spring steel stabilizer popped out after the shell had been fired and the cartridge casing had dropped away.

Beginning in April 1942 a further development of the mortar as a self-propelled mortar was planned by Krupp and Hanomag, among others to be based on the weapons carrier "Grille" 17/21, weighing 120 tons. This design, however, never came to fruition, as was the case with a design study begun in October 1942 to mount a mortar on a Panzer IV chassis with 80mm frontal armor and a range of 4,000 meters — to be used as a "Sturmgeschütz." Only in the Fall of 1943 — still early enough to see action — was a mortar mounted on a self-propelled chassis used operationally, the Brummbär. Today, mortars are seldom used; the 24cm mortar of the Red Army is therefore not only the largest, but probably also the only modern heavy mortar being used at the present time.

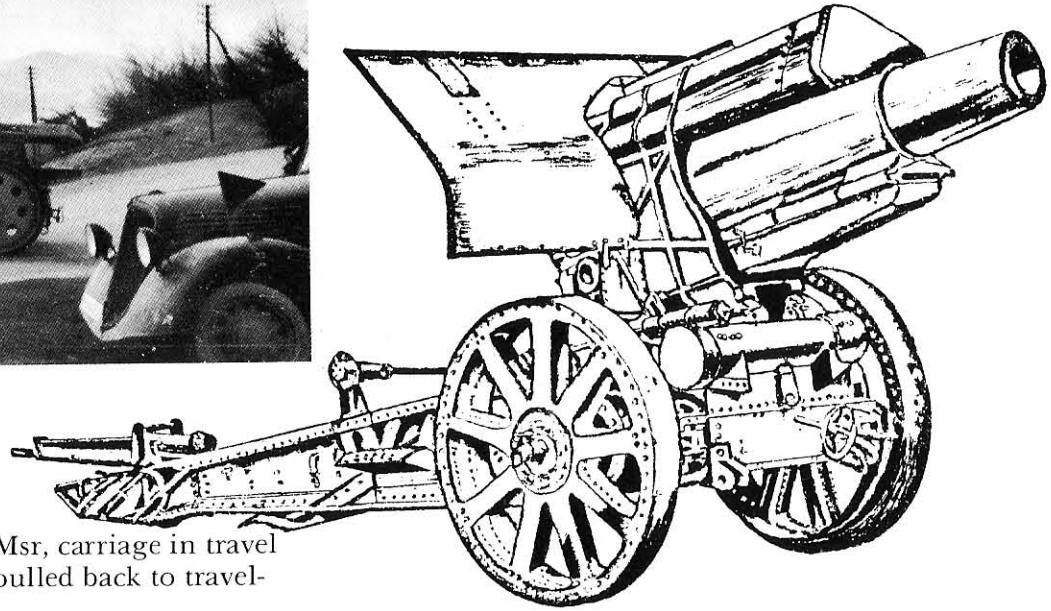
A comparison table including the more detailed technical data can be found on page 47.

21cm Lange Mörser M 16 L/14.5

World War I type.

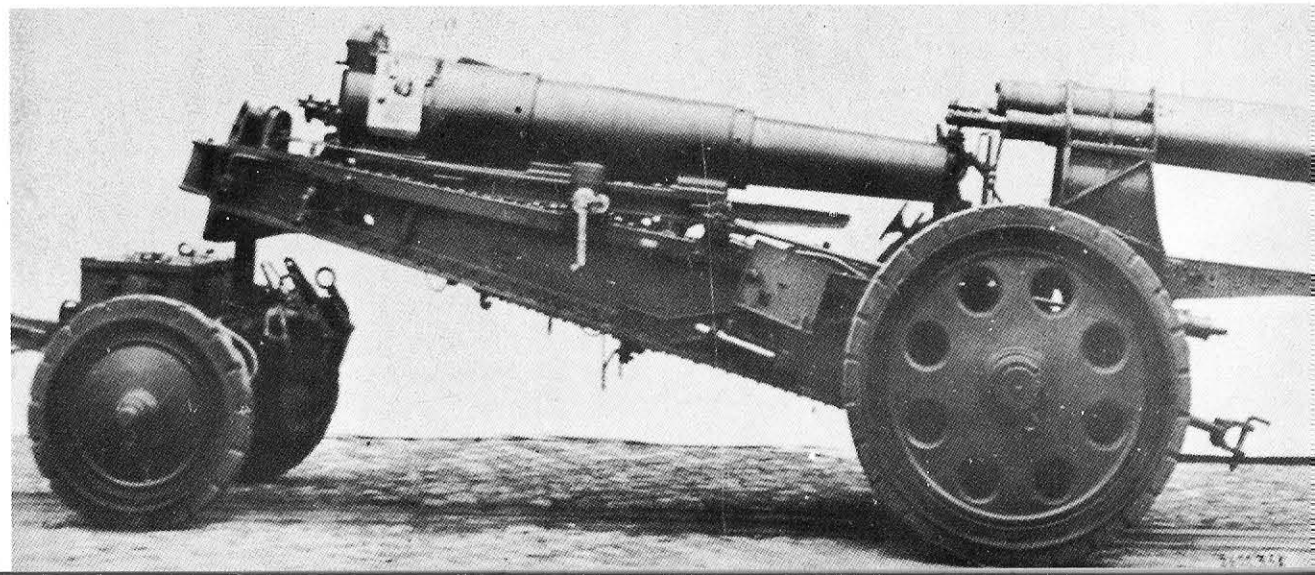


Above: 21cm LgMsr (long mortar) on the move, being pulled by tow vehicle.

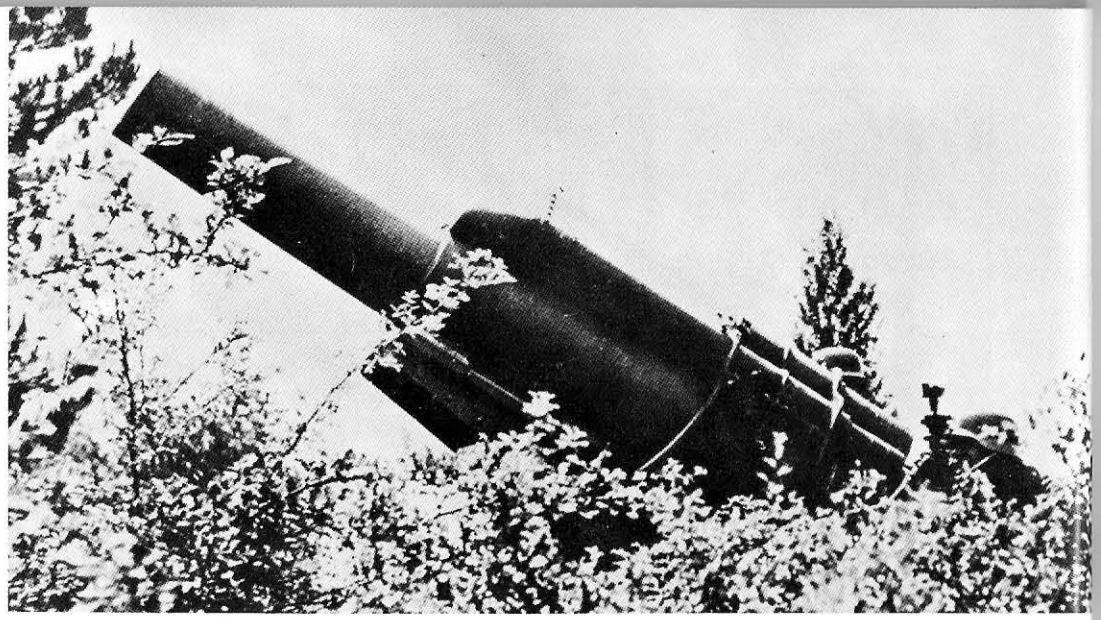


Below: 21cm LgMsr, carriage in travel position, barrel pulled back to travel-lock position.

A follow-on to the Model 1910 with an increase in barrel length of 53cm, the 21cm Long Mortar received its great test at the defensive battle of the Champagne beginnning on September 22nd, 1915. The gun, originally designed to be carried in two sections by horse team, was modified between the wars to be transported as a single unit by powered vehicle. Another change included rubber-rimmed wheels made of cast metal, which did away with the protective shield. Double hydraulic recoil buffers in the cradle, a spring balance compensator for the overweight muzzle, and a hydro-pneumatic counterrecoil piston mounted on the barrel rounded out the improvements.



Right: Setting the mortar up in its firing position, 27 March 1940.



The rifling totaled 2,296 meters and the barrel was able to pivot 4 degrees from center. A horizontal sliding wedge served as the breech mechanism, with which 30 rounds per hour could be achieved. The 21cm SprGr 18 (high explosive shell) with impact fuse and double fuse weighed 113 kilograms; the 21cm Beton-Granate 18 (concrete piercing shell) with a base fuse — used against hardened targets - weighed an astonishing 121.4 kilograms. These mortars were replaced by the 21cm Mörser 18. A short barrel and the chassis were the significant weaknesses of the Long Mortar.

The mortar had seven separate charges providing initial velocities of 247 meters per second (m/s), climbing to 310m/s, and topping out at 393m/s, which gave it a very flexible trajectory. The C/12 nA was used as the fuse. The mortar was only a temporary provision, antiquated in its construction and possessing unsatisfactory ballistic qualities. Only a very few guns were in use after 1939.

Left: After the proper barrel elevation has been set, the mortar is ready to fire.

21cm Mörser 18 L/31

This mortar was introduced in 1939 to replace the obsolete model of 1916. Thoroughly proven on all fronts and in all hotspots, it was never technologically overtaken by any later models. It had a total weight of 22.7 tons and was transported in two sections, along with an equipment support vehicle.

Above: barrel transporter with the barrel more than twice as long as that of the 21cm LgMsr M 16. The barrel had a life of 8000-10000 rounds and could shoot one and a half times farther than the M 16.

Right: carriage transporter on the move in the Hochgebirge range, 1940. The transporter was later improved with a double axle and balloon tires.

When positioning the mortar, the carriage rested with raised wheels on a pivot in the center of the base plate, which had to be sunk and anchored. In such a manner the mortar became fully traversible from side to side. Here the anchors are driven directly into the ground in order to counter the gun's weight of 16.7 tons.

Above: the mortar being moved into position.

Left: Using its winch, the 12 ton DB 10 tractor (Sdkfz 8) can pull the entire carriage if necessary, without the aid of a tow vehicle.

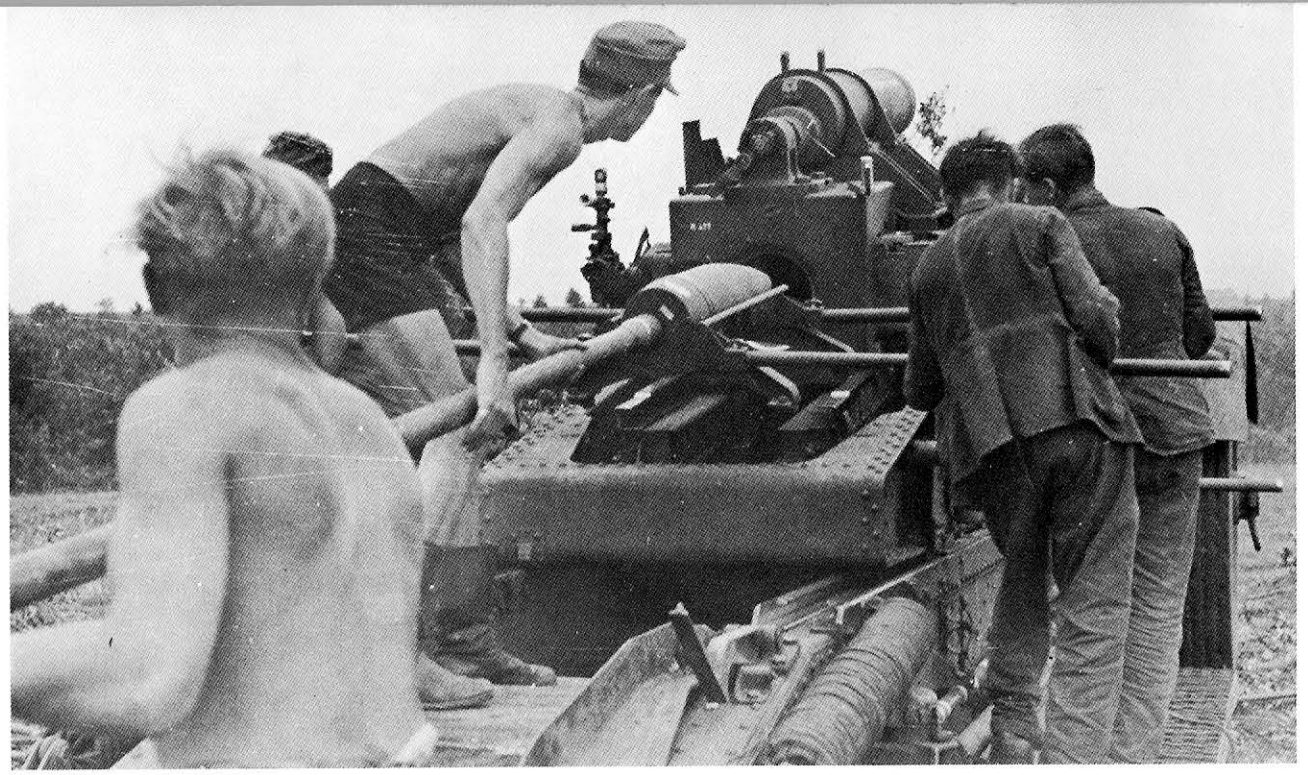
The 17cm Kanone (cannon) 18 "on a mortar carriage" differentiates itself only through the more slender barrel, lengthened by 2 meters, and through the elevating gear, which restricts the elevation to 50 degrees. Both the mortar and the cannon use the same type of carriage, here seen in operation southeast of Berdichev on 2 February 1944. The carriage wheels have already been raised, and the anchor for the base plate with its three support braces is clearly visible; these run on rollers attached to the reinforced edge of the round base plate. When a greater pivot of the gun is necessary the rearmost of the three supports raises the carriage and the tail blade in such a manner that the gun pivots on the three rolling supports.

The heavy mortar battalions didn't belong to divisional artillery, but were independent units under various artillery commanders subordinate to corps or army artillery. Normally, three mortar guns comprised a battery.

Above: ammunition vehicle, showing delivery and unloading of the 21cm mortar cartridges. The six charges in each cartridge provide more than double the charge of the 21cm LgMsr.

Right: the barrel is dropped to the horizontal loading position, where the four cannoneers of the six man crew use the loading trough to bring the 113 and 121 kilogram shells up to the breech.

The mortar's box carriage, here seen in an older version, was 2.83 meters wide and 12.81 meters in length. The heighth of the mortar in its travel position was 3.11 meters.



Above: Using the ramrod, two or three men push the shell into the gun at a height of almost two meters. The barrel has 64 rifles.

Left: Afterwards, the loading trough is carried away.

The cartridge is pushed firmly into the combustion chamber of the massive breechplate by hand, using the semiautomatic sliding wedge breech mechanism. The rear of the barrel counterrecoil can be seen above the breechplate.

The recoil mechanism on both the barrel and upper gun carriage consists of a hydraulic recoil buffer and a hydropneumatic counterrecoil. The barrel moves only 50-85cm and the carriage 1-1.2 meters.

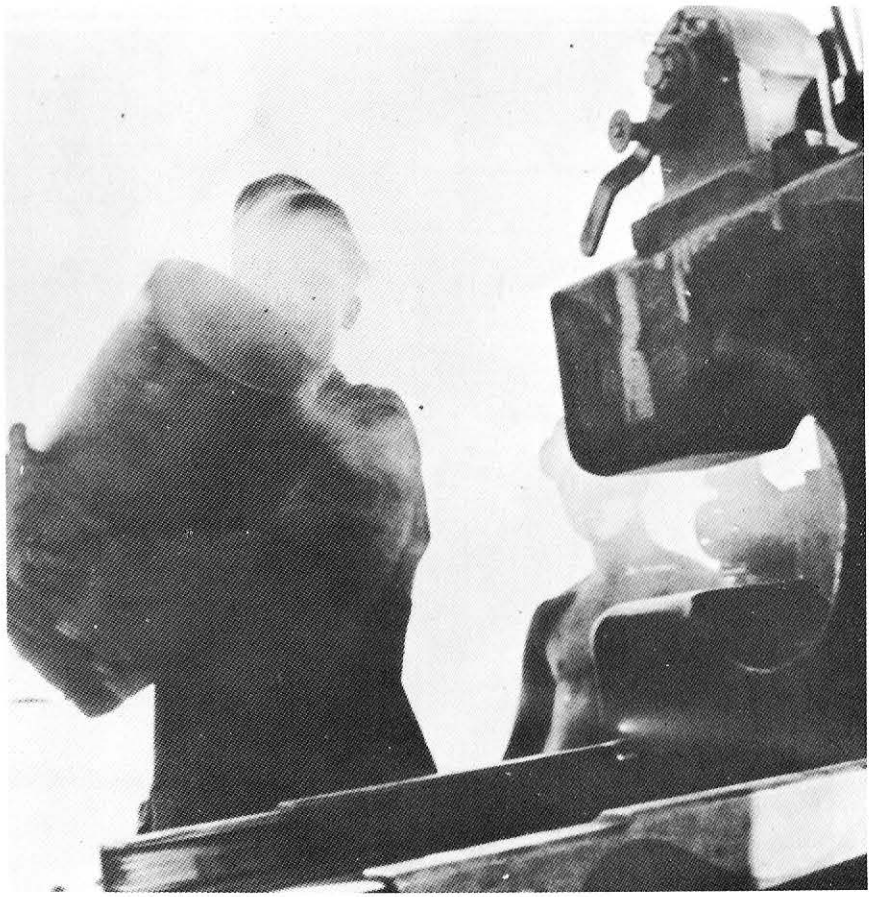
After loading, the barrel is brought to the proper elevation. There are two barrel elevating drives, one for quick, rough adjustments and the other for slower, finer adjustments.

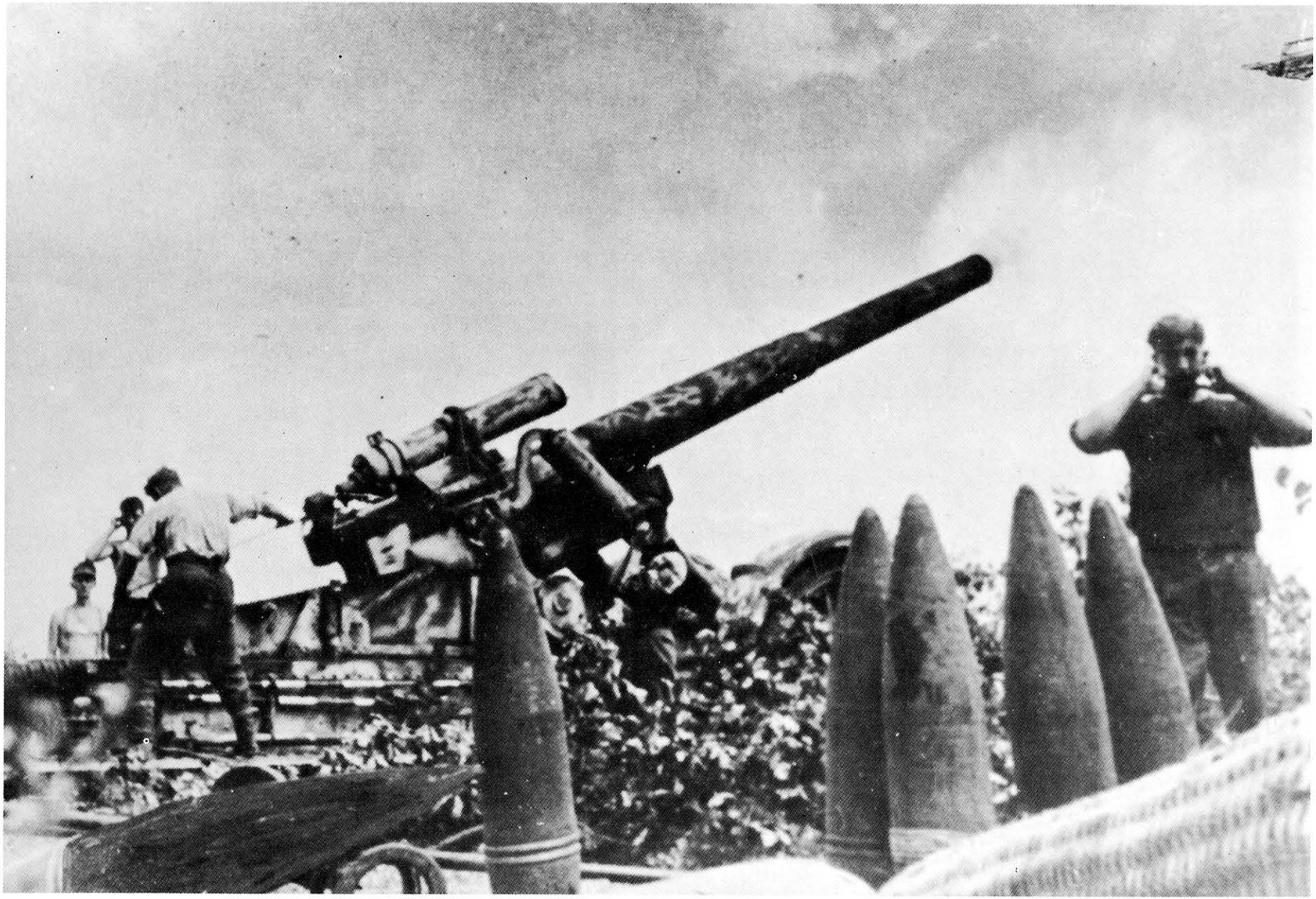
The K 2 (breech mechanism handler) pulls the lanyard to the firing mechanism taut, awaiting the command to fire.

21cm Msr 18 firing in the lower elevation group in Russia, September 1943. HE and concrete-piercing shells can be seen in the foreground, ready for the next salvos. The 100kg shells smash into their target with an initial velocity of between 225-565 meters per second.

Right: Using a barrel cleaning rod and oil, the barrel is cleaned of any powder residue and foreign objects, as seen here with a 28cm Msr (f); (f) = French manufacture (appropriated).

Below: After firing, the hot cartridge comes flying out of the opened breech. Latvia, August 1944.





21cm Msr 18 firing in the lower elevation group in Russia, September 1943. HE and concrete-piercing shells can be seen in the foreground, ready for the next salvos. The 100kg shells smash into their target with an initial velocity of between 225-565 meters per second.

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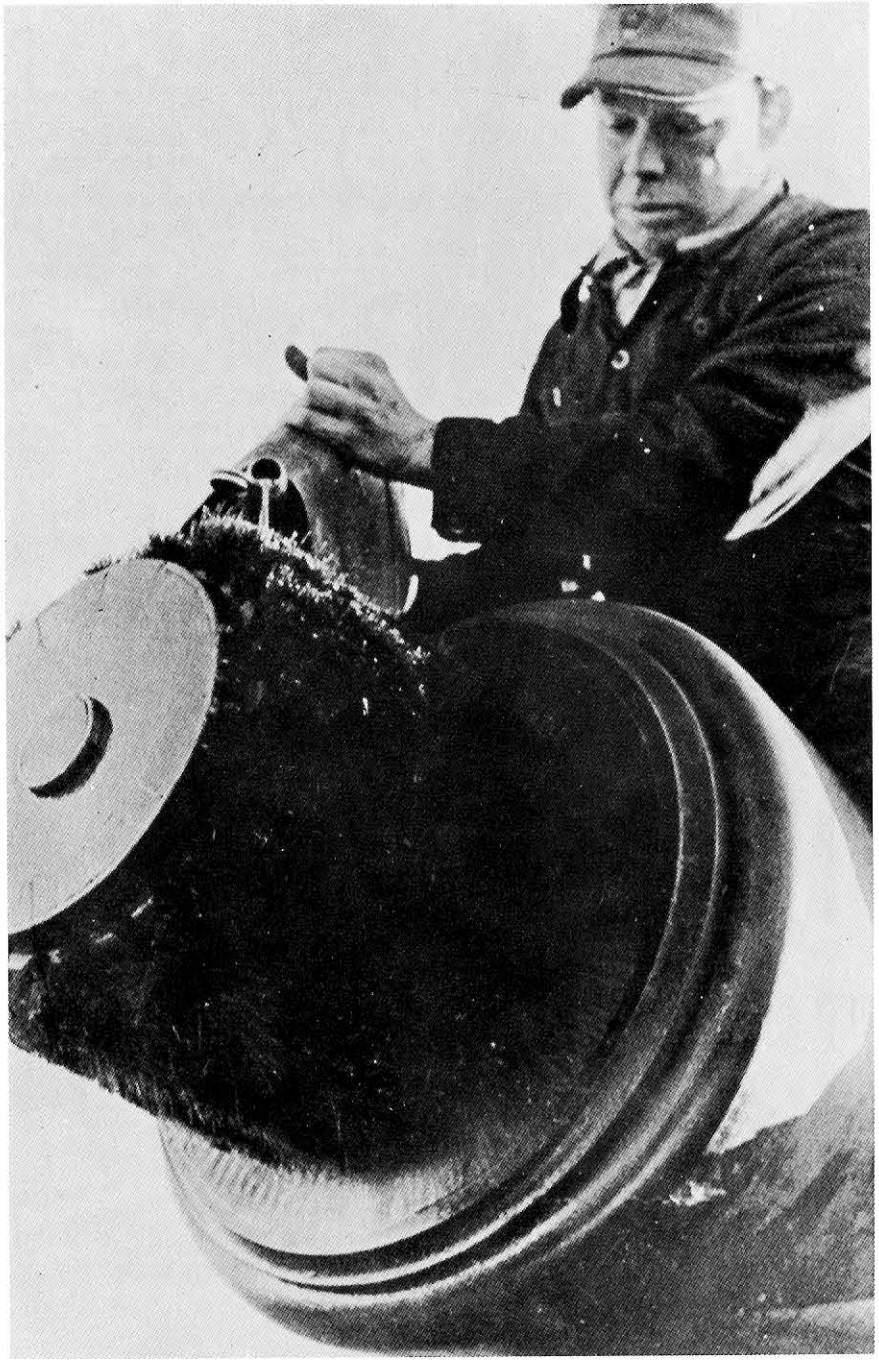

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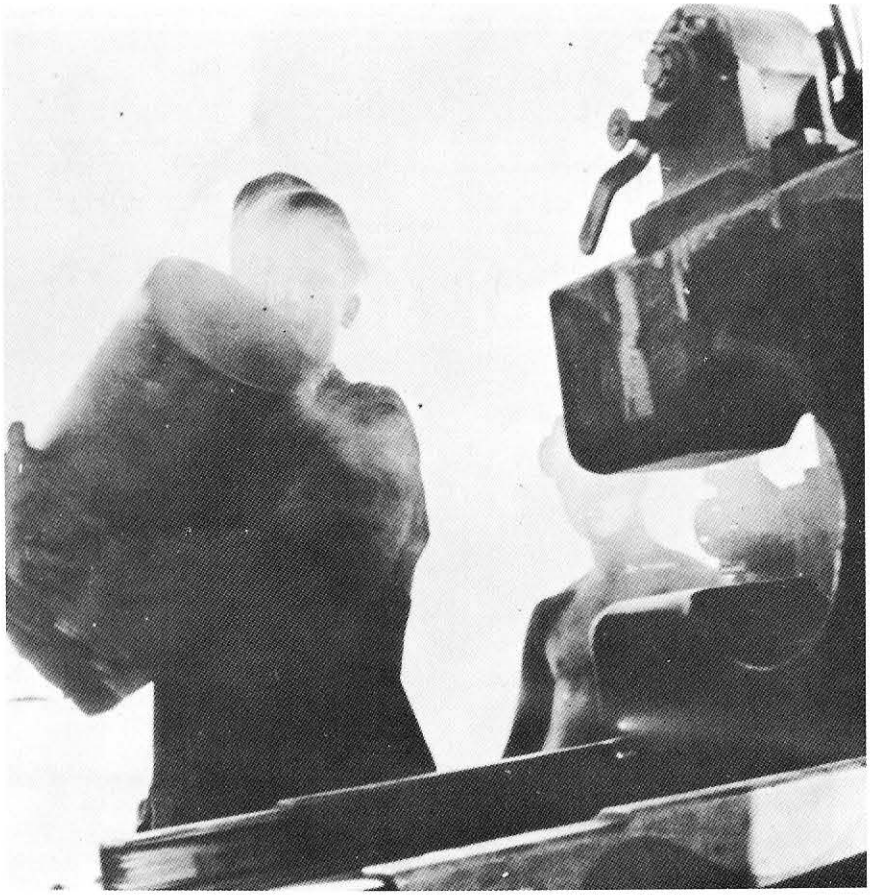
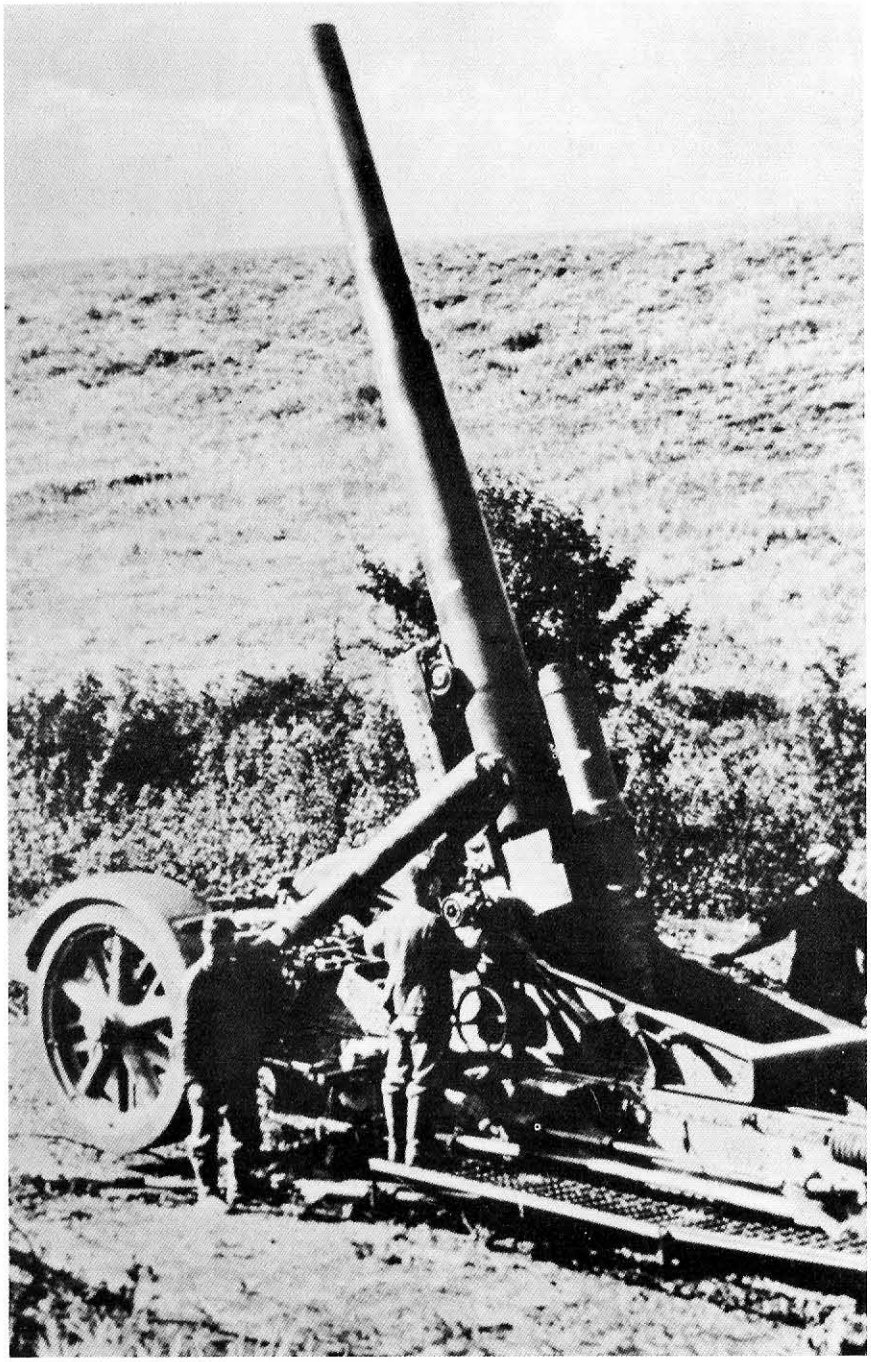


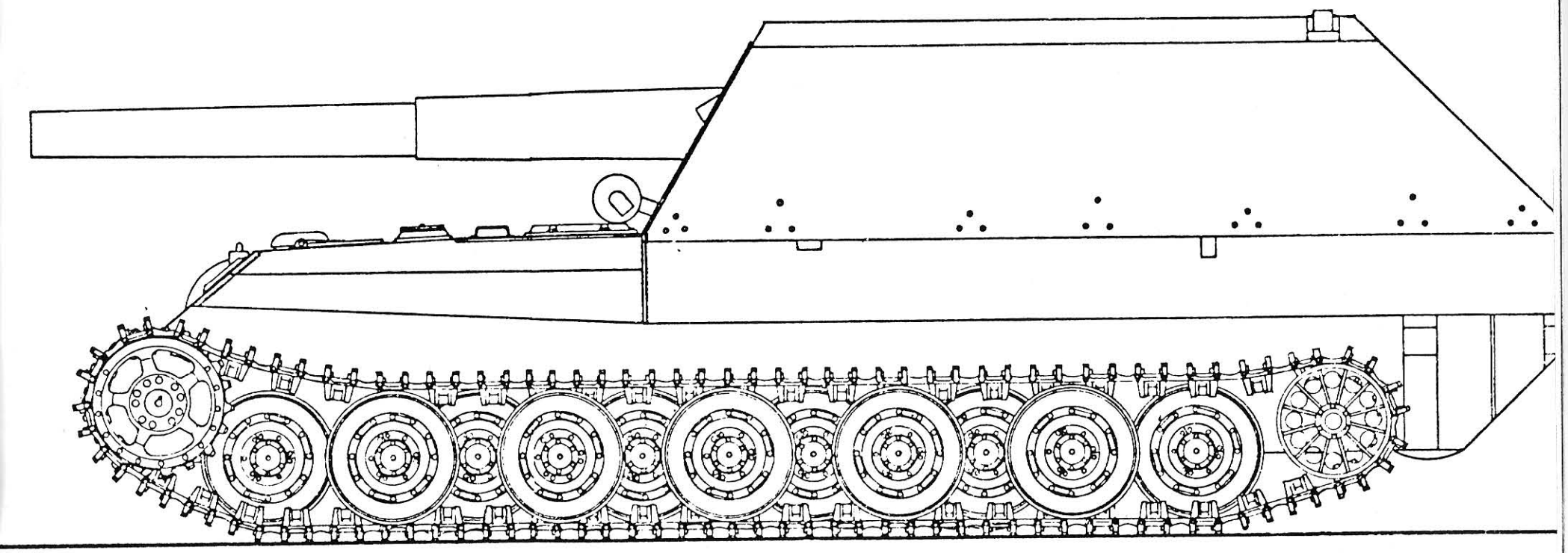


The various charges ranged in weight from .5kg up to 15.53kg with a full charge. The fragmentary effect of a high explosive shell extended to a radius of at least 70 meters. A single battery could thereby cover an area of 420-450 meters with great effect.

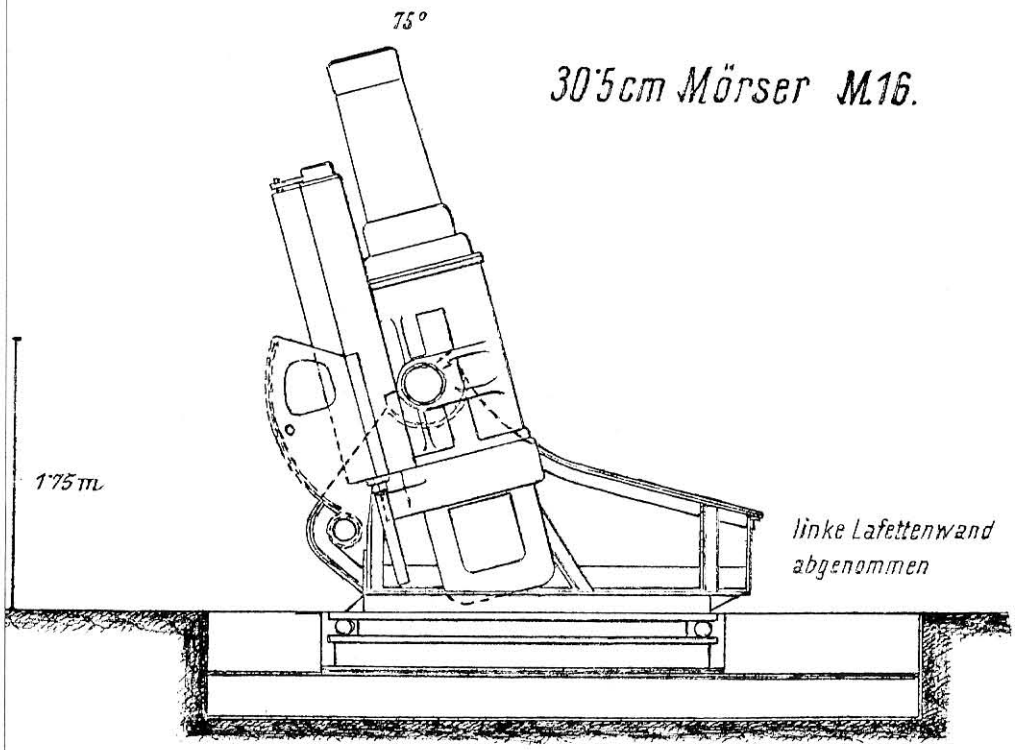
Left: The 6.51 meter long barrel seen at its highest elevation of 70 degrees, used to penetrate fortified sites and reach rear positions in mountainous areas.

Below: Side view of a 21cm Msr 18 during night firing, winter of 1943/44 in Russia.

21cm Msr 18 (Sf)/Geschützwagen VI



Beginning in 1943, Krupp mounted the 21cm Msr 18/1 on the 810 Gefechtswagen VI tank chassis, driven by a 650hp motor, and in so doing, developed the self-propelled vehicle "17/21." The gun had a total combat weight of 58 tons, could reach 35 kilometers per hour and had a range of 200-300 kilometers on roads, and 100-150 kilometers on terrain. With a total length of 11 meters, a width of 3.27 meters, and a height of 3.15 meters, the mortar carried 3 rounds on board for immediate use. The gun could cross trenches 3 meters wide, had frontal armor 3cm thick and side armor 1.6cm thick. Aside from the normal 360 degree scope Rundblick-fernrohr 36 used for sighting, it also had a 3 x 80 anti-tank targeting scope sight. This type of chassis was also used as a self-propelled chassis for the 17cm cannon.



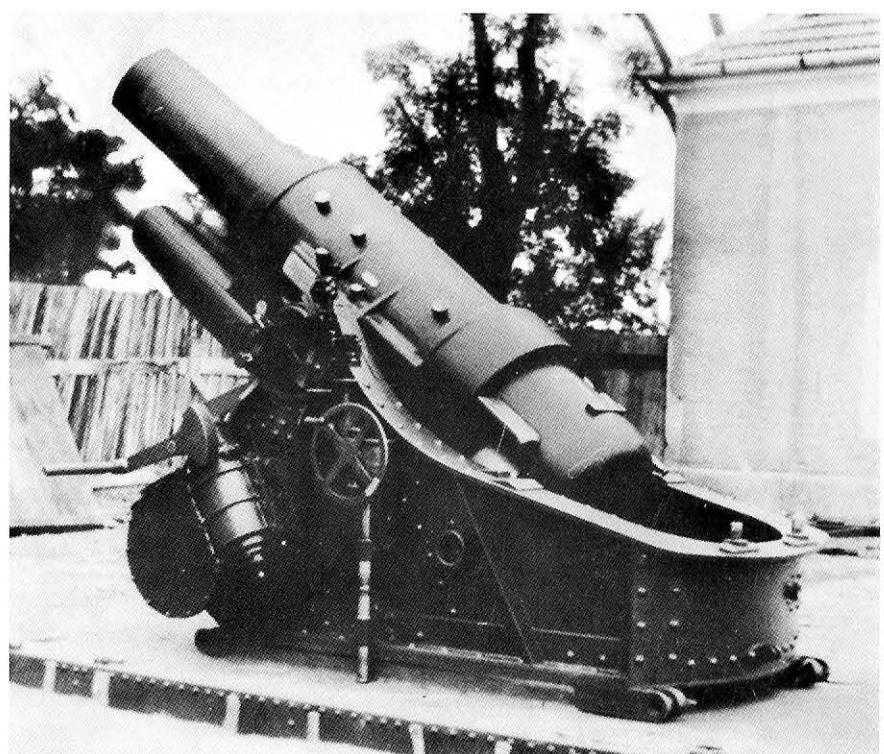
Above: Cutaway of a 30.5cm Mörser (ö) M16 of the First World War, with a total weight of 20.9 tons.
(ö) = Austria

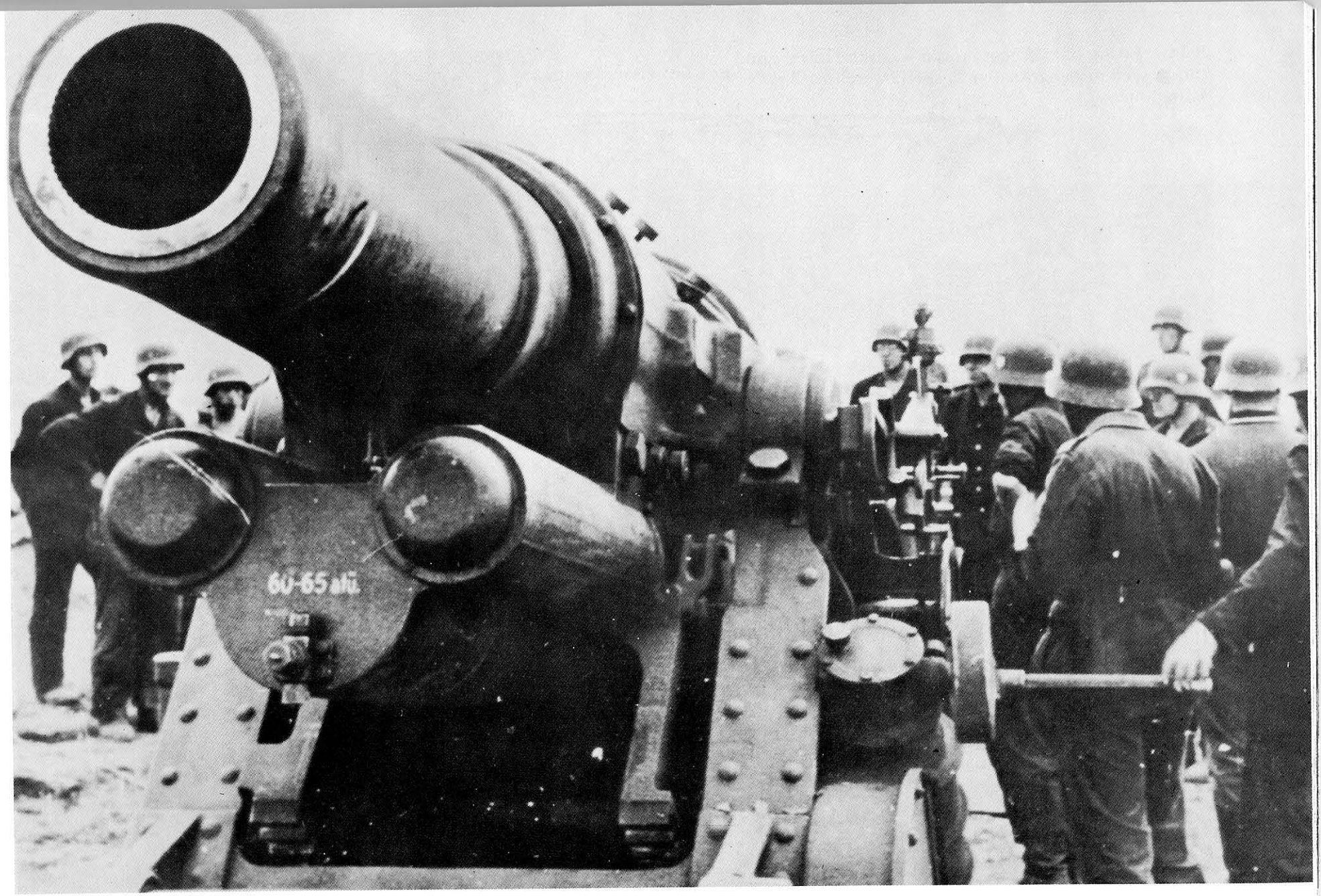
Right: 30.5cm Mörser as a memorial to the traditional art of gun building in Austria between the wars; due to its proven record, the gun was later reintroduced by Hitler.

30cm Mörser M 17 L/12

This mortar was developed in 1908/09 by the Skoda Works from successful naval mortars, borrowing concepts used in Krupp's 28cm howitzer. Beginning in 1910, it was constructed in Germany, where the gun became known as the "Beta Gerät." From 1914 on it was mounted on a wheeled chassis, then fully integrated into the Wehrmacht; the mortar was kept in production until 1943.

Because its range was too short, the barrel of the follow-on model M 17 was lengthened to 3.66 meters and the charge increased. The gun rested on a fully traversible pivot plate. Austria had 72 pieces in its inventory in 1918; these guns could be broken down and carried in three sections by powered vehicle.



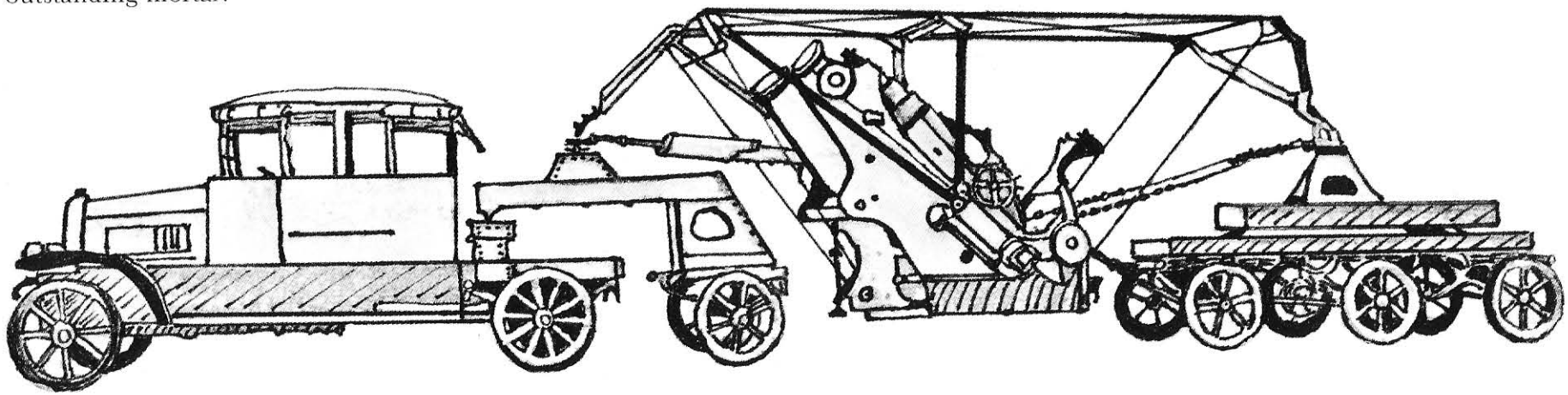


Front view of a 30.5cm Mörser in position near Kiev — a powerful and effective weapon that also saw action in the Second World War. Three two-gun batteries were used against Leningrad as well as against Sevastopol earlier in the war.

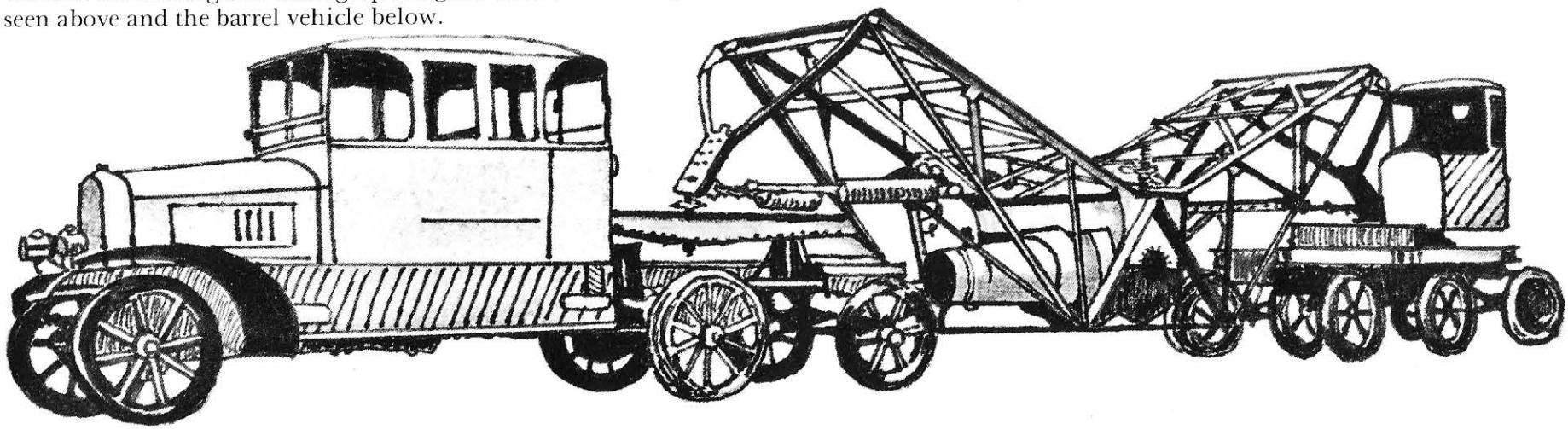
Below: Firing of a 30.5cm mortar — in the foreground can be seen minengranaten 35 shells weighing 384 kilograms.

Above: 30.5cm mortar camouflaged and ready to fire. Notice the low barrel angle and the weight of only 23.15 tons.

As late as mid-September 1942 Hitler demanded the delivery of more barrels and ammunition for this outstanding mortar.



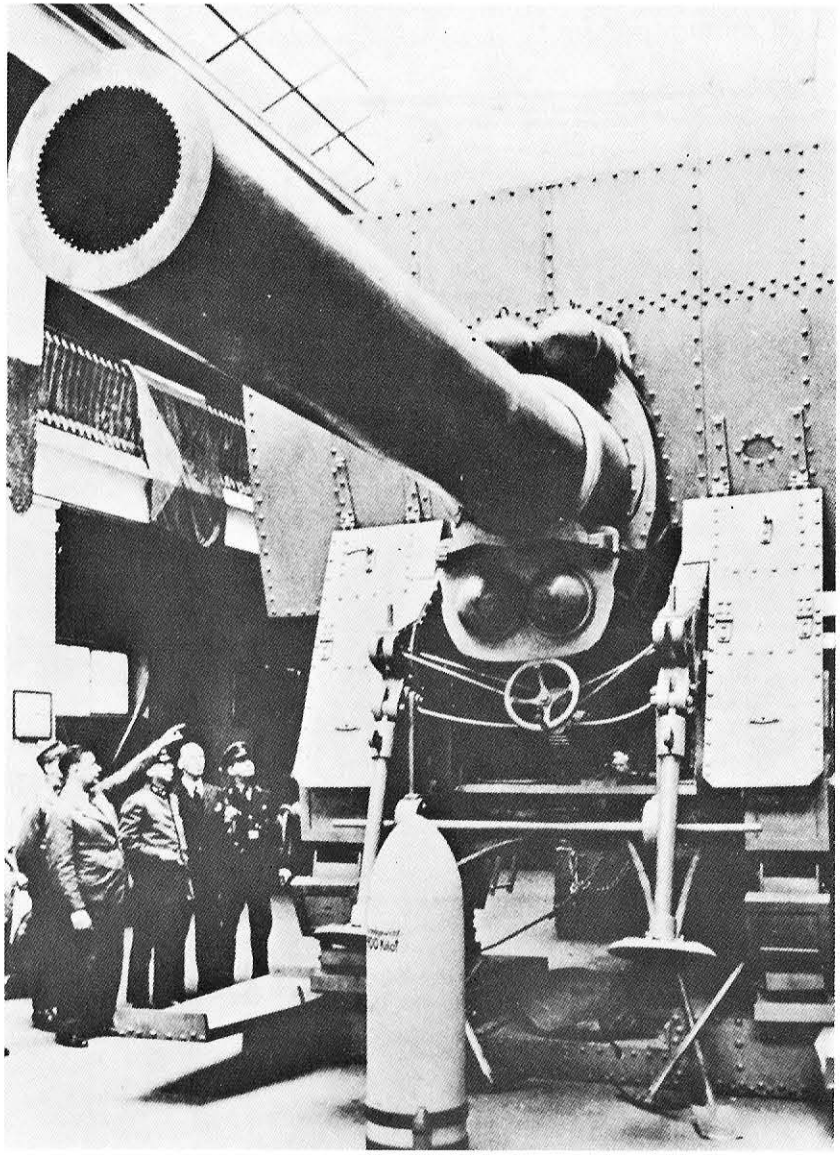
In World War I, both barrel and carriage required complicated and awkward, yet purposeful transport vehicles for moving and setting up the gun. Called "load dispersement vehicles", the carriage vehicle can be seen above and the barrel vehicle below.



The 35.5cm Mörser M1, designed in 1936 by Rheinmetall-Borsig and introduced in 1939, was a follow-on weapon transported in seven sections. The gun not only had a larger caliber, but also a barrel almost 3 times longer, a shell weighing twice as much, and a range of over 20km, which is why it was designated a howitzer. There were, however, only ten guns built, because Hitler, who favored Skoda, determined at the end of 1942 that the construction was "poor."

The base plate transporter weighed 13 tons, as did the carriage transporter, and the barrel transporter weighed 12.5 tons. These were either pulled by a tractor or carried on a Panzer IV chassis. A round could be fired every five minutes; the barrel had a life of 2000 rounds. The muzzle velocity roughly corresponded to that of the light field howitzer FH 18. The greatest barrel elevation was 75 degrees, and the gun had a crew of 12. The shells struck the enemy at speeds greater than sound.

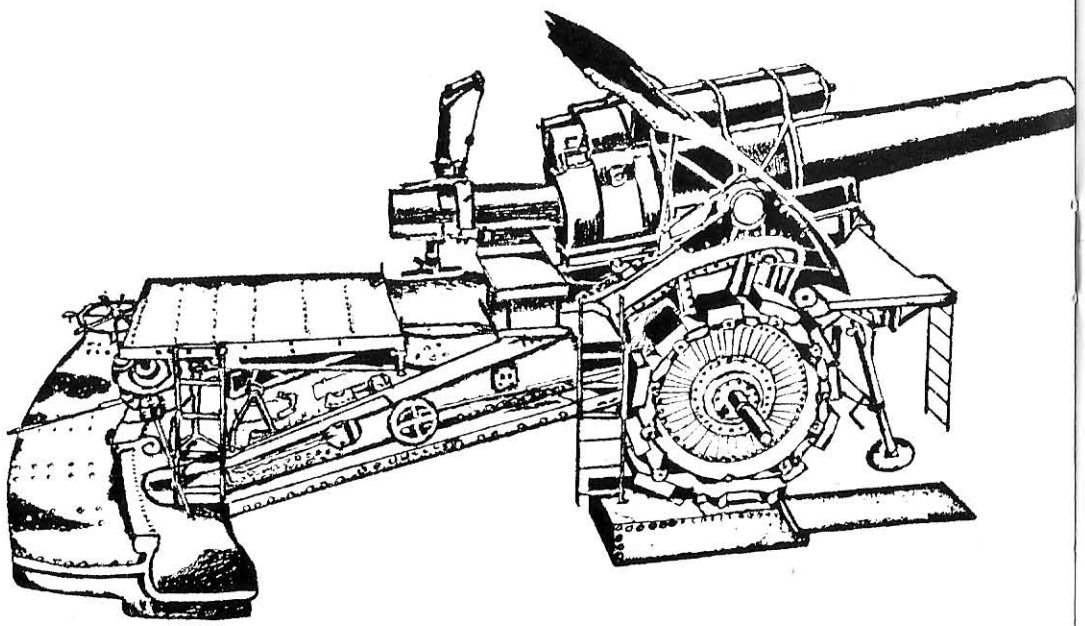
42cm MORSER

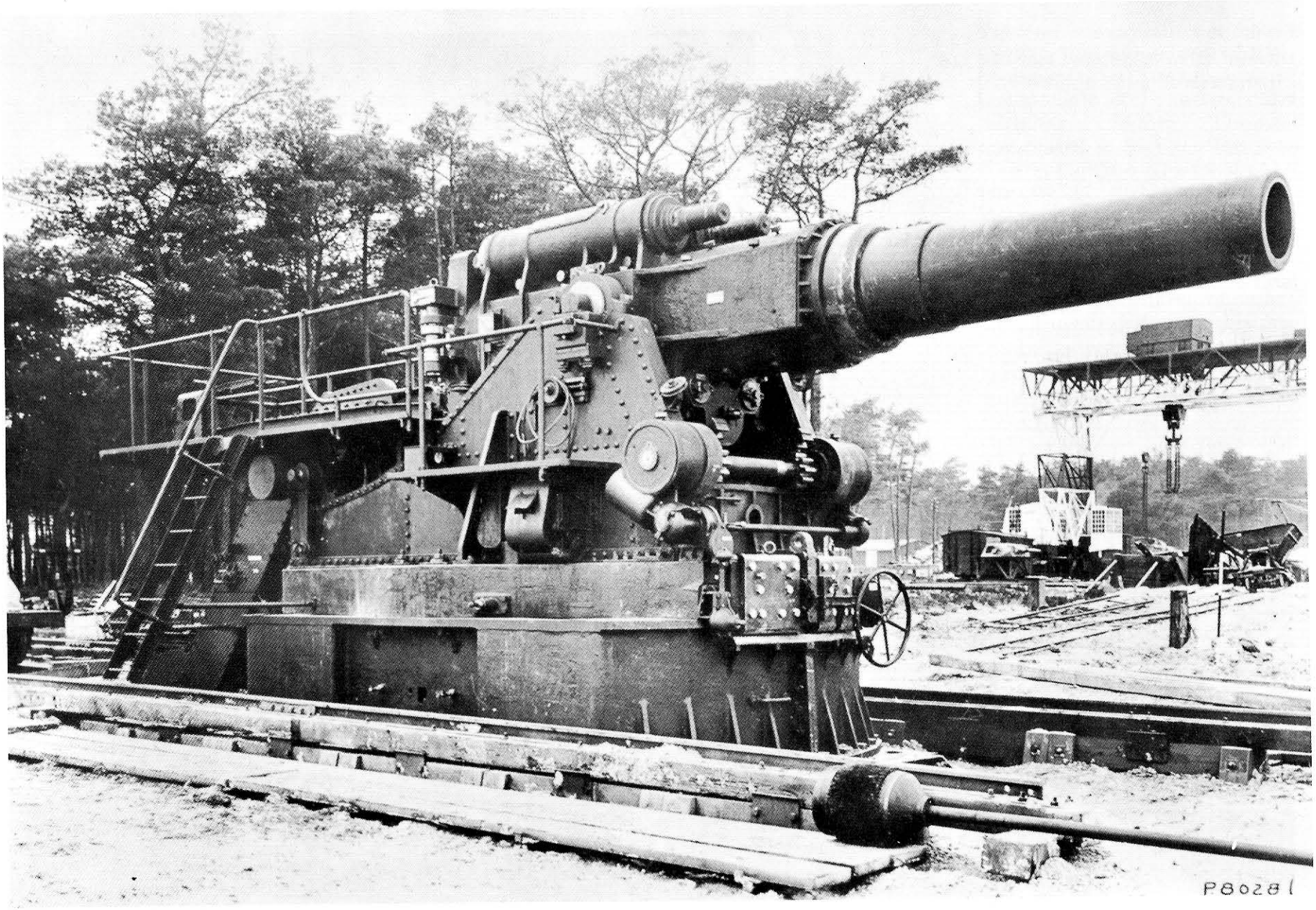


Introduced in several versions in 1911, the 42cm Mörser saw parallel development by Skoda for Austria beginning in the fall of 1910. This gun remained a secret until the outbreak of war in 1914, when it caused something of a technological sensation in the arms world. The barrel alone weighed 15.43 tons, and the gun required 385.5 tons of iron during the manufacturing process.

Left: The Krupp 42cm Mörser L/12, called "Dicke Bertha" (Fat Bertha) after the youngest Krupp daughter (1886-1957), used caterpillar bands as a tractor drive. Seen here as an exhibit at the Deutsches Museum in Munich, each gun cost one million goldmarks in 1912/1913; each shell cost 3000 marks. The gun demonstrated its horrible effectiveness at Lüttich, at Douaumont and the "Toter Mann", and at Przmysl; in 1918 it fired the last shots. There were a total of eight models built.

Below: With the exception of the base plate, the four piece gun (barrel, carriage, blade and cradle — and equipment vehicle) could be assembled in its firing position in just four hours. Originally, the mortar was mobile by means of its caterpillar bands and through the use of steam tractors.

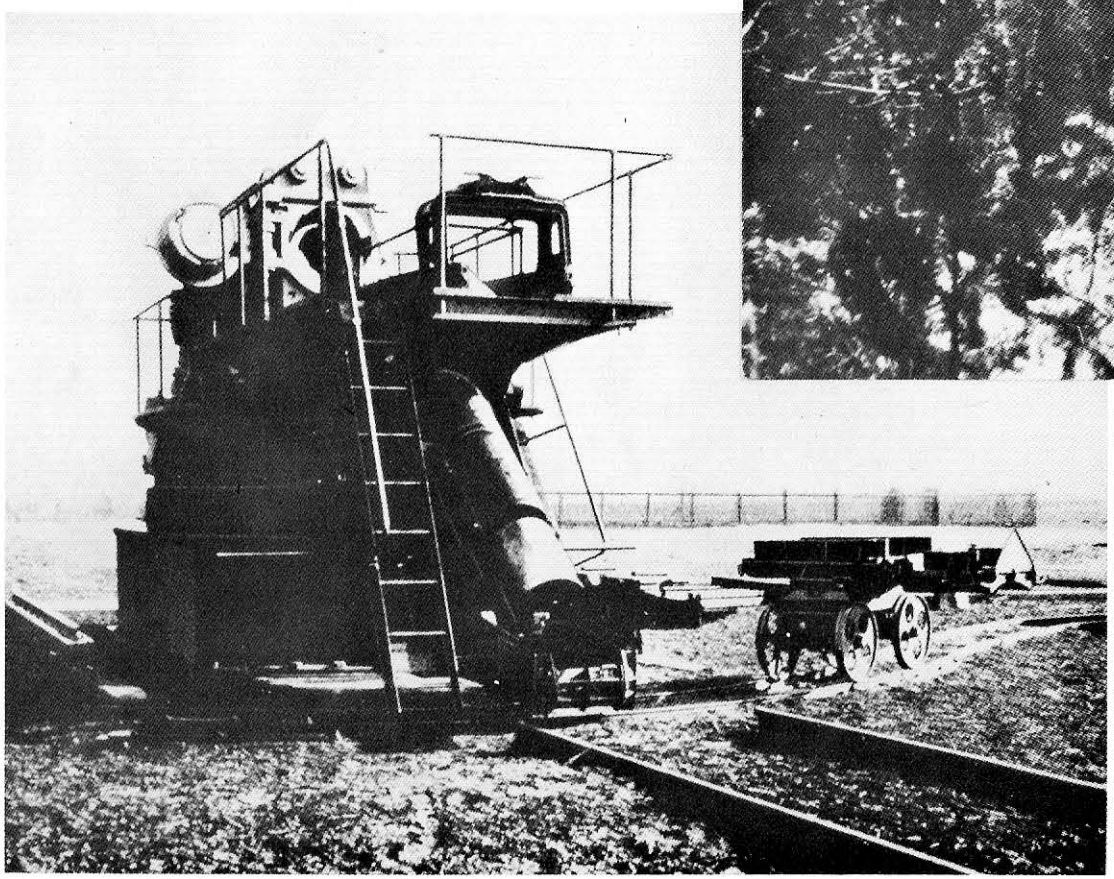




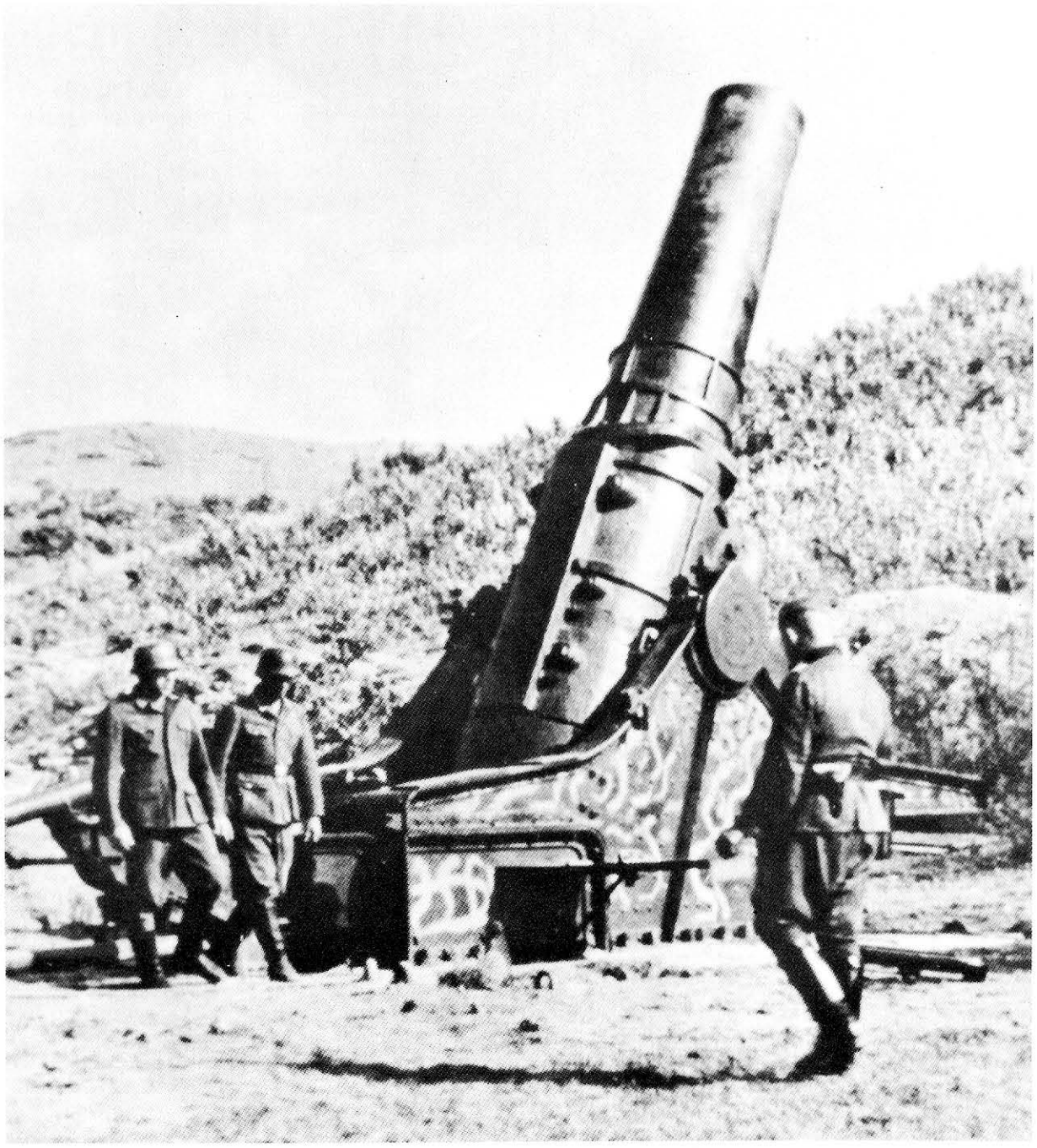
Forward view of a stationary 42cm "Gamma" Gerät L/16, seen at the gunnery range at Meppen. Redesigned in 1937, this was the heaviest high-angle gun. It was transported on nine SS and one Reichsbahn railcars, and was assembled in stages using several gantry and special cranes. Mobility testing was done in 1943 using a Tiger tank chassis. A total of five models of this mortar were built.

Right: 42cm "Gamma" Mörser L/16 firing near Leningrad.

Below: Rear view of a 42cm "Gamma" mortar, showing barrel in loading position with opened breech. Note the ammunition lift with shell and cartridge as well as the hydraulic loading ram.

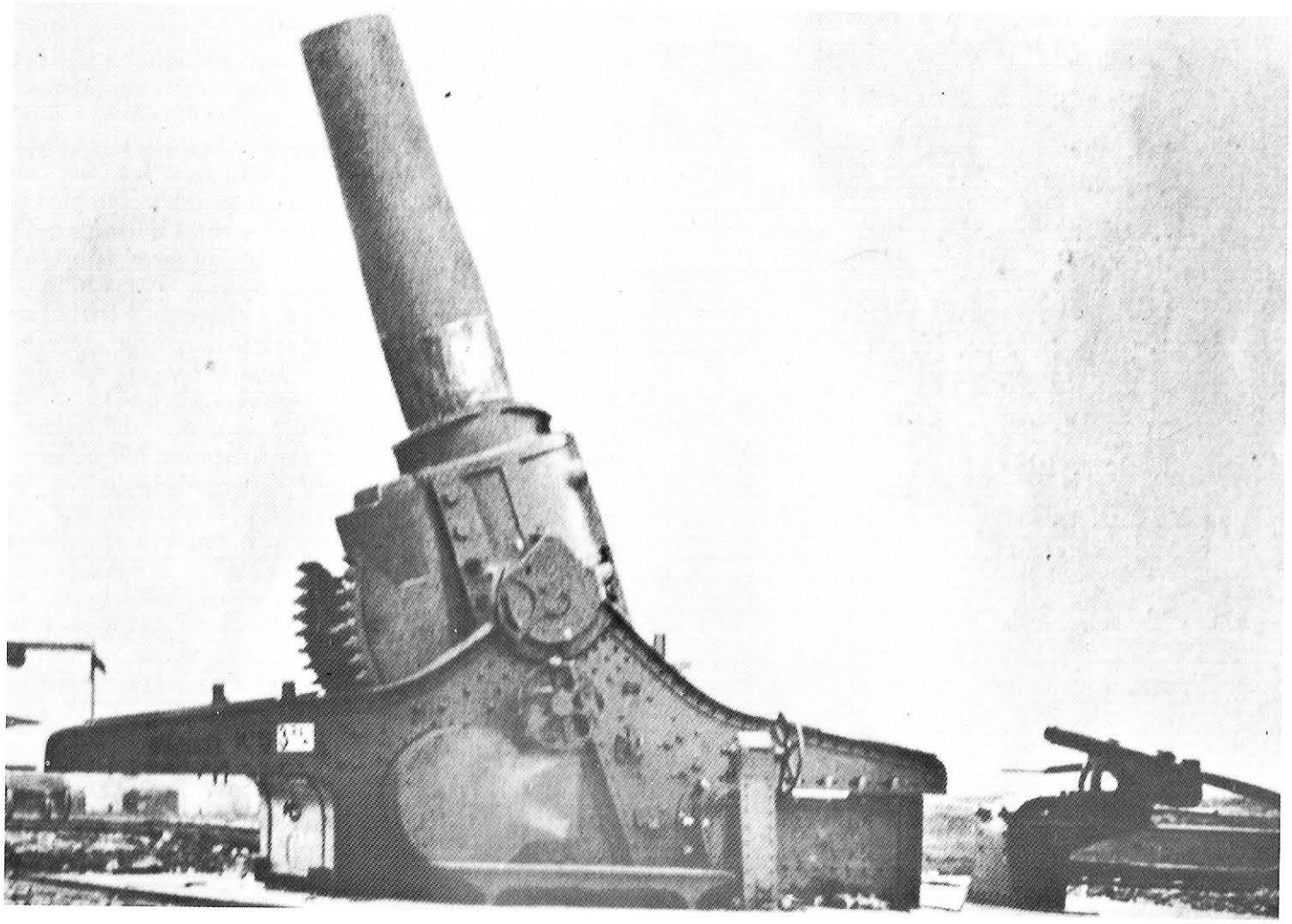


In 1916 there were already 12 batteries with 20 "Gamma" mortars on the German side; in 1914 there were only five guns. The two gun battery consisted of 280 men in the First World War; in 1939-1945 a single mortar formed a battalion. The heavy concrete-piercing shells, weighing over one ton, impacted at one-and-a-half times the speed of sound; an incoming round sounded like a commuter train travelling across a railroad bridge at 90 kilometers per hour. The barrel had a life of over 1000 shots. In spite of its fixed construction, the "Gamma" mortar could still traverse 368 increments.

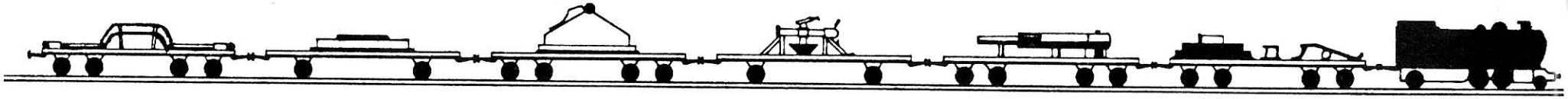


The gun was initially not rebuilt in 1939, but maintained with replacement parts. The support base had a length of 7.5 meters and a thickness of 1.75 meters. The gun, transported in four sections consisting of the 26 ton barrel, the 11.2 ton carriage, the 11.6 ton cradle, and two halves of the support base at approx. 50 tons, was used in the battle of Leningrad. Hitler demanded accellerated developmental work, which led to an improved design at the end of June 1942: with the 35 ton reduction in weight, a barrel shortened by 50cm, and a reduced muzzle velocity to 400 meters per second, it became possible to increase both the overall range and rate of fire. Only one-sixth of the elevation lay in the area of the lower elevation group; there was no doubt as to its mortar capabilities.

Left: Skoda's 42cm Haubitze M16/17 L/15 in firing position near Sevastopol. In 1918 seven guns were in use and gave a good account of themselves in the East, in the Balkans, and in Italy.



Side view of Skoda's 42cm howitzer, clearly showing the typical Skoda undercarriage used on its guns — an example of a clever use of a mammoth weapon only operationally outdated.



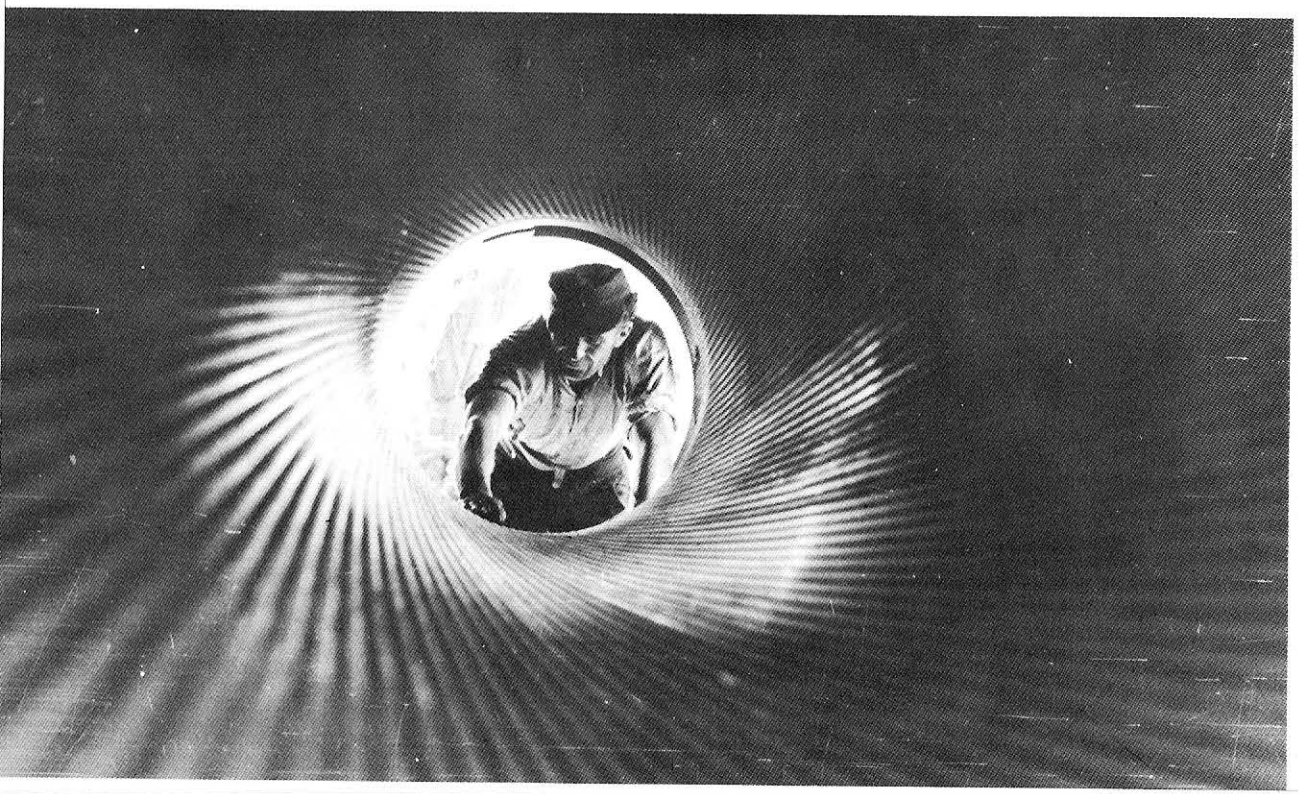
Transport train for a single 42cm gun (from a two-gun battery): locomotive, platform and winch, barrel weighing 22 tons, barrel cradle at 15 tons, carriage at 20 tons, base at 12 tons, 15 ton crane, and four additional cars (total of nine SS and one Reichsbahn cars).

60cm Morter "KARL" L/8.44 Gerät 040

With a total top weight of 120 tons and a 580 hp diesel motor giving it a maximum speed of 10 kilometers per hour, the fully tracked self-propelled carriage moves into position, Russia 1941 (seen here from the rear). It had a ground pressure of only 1.7 kilograms per square centimeter.

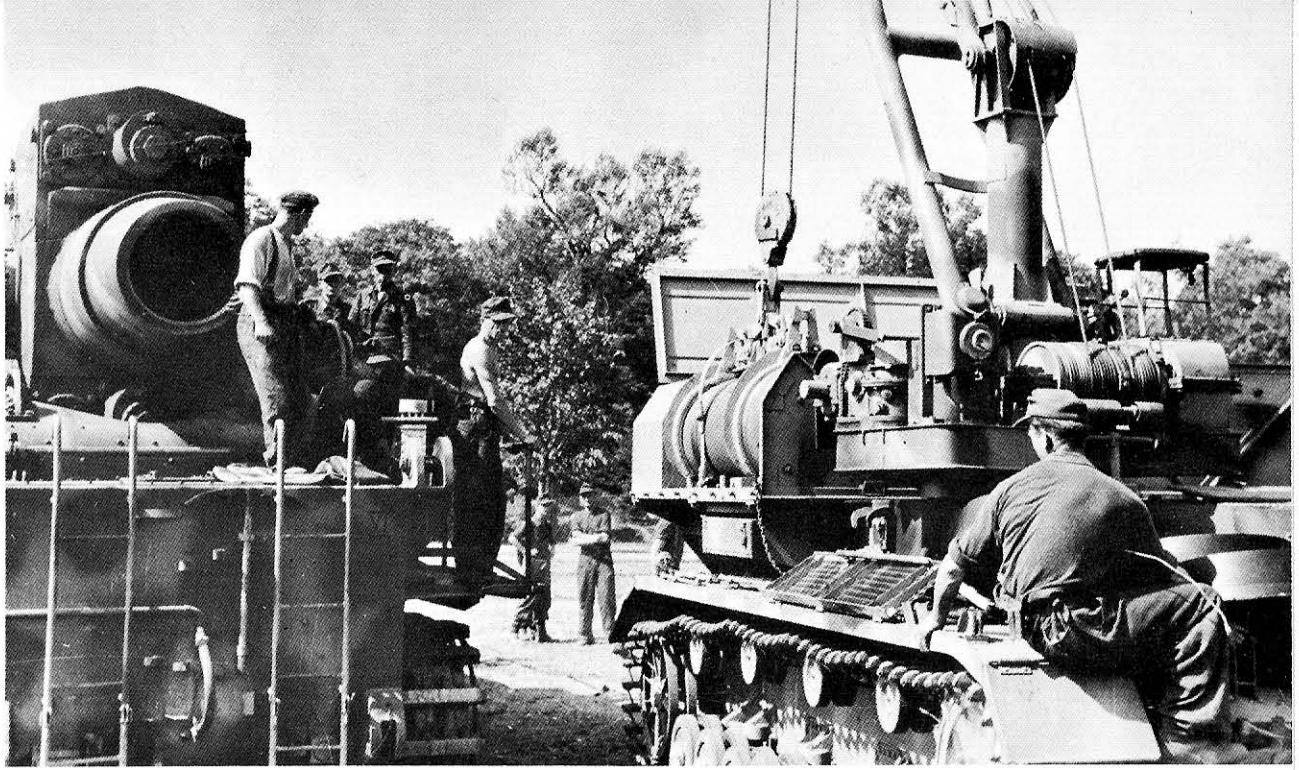
Requested by the OKH in 1937 to be used against heavily armored installations, the "KARL" became available to the troops beginning in 1939. Initial operations were against Brest-Litovsk in 1941, then Sevastopol in 1942, and 1944 in Warsaw. Seven of the mortars were completed. Used on the front were: "Adam", "Eva", "Thor", "Loki", and "Ziu." They had an enormous moral and material effect and were an engineering masterpiece of Rheinmetall/Borsig, Dusseldorf, but possessed somewhat too short of a range.

Above: The carriage has already sunk down onto its eleven return rollers and the ammunition carrier has pulled alongside — within ten minutes the mortar will be ready for firing.

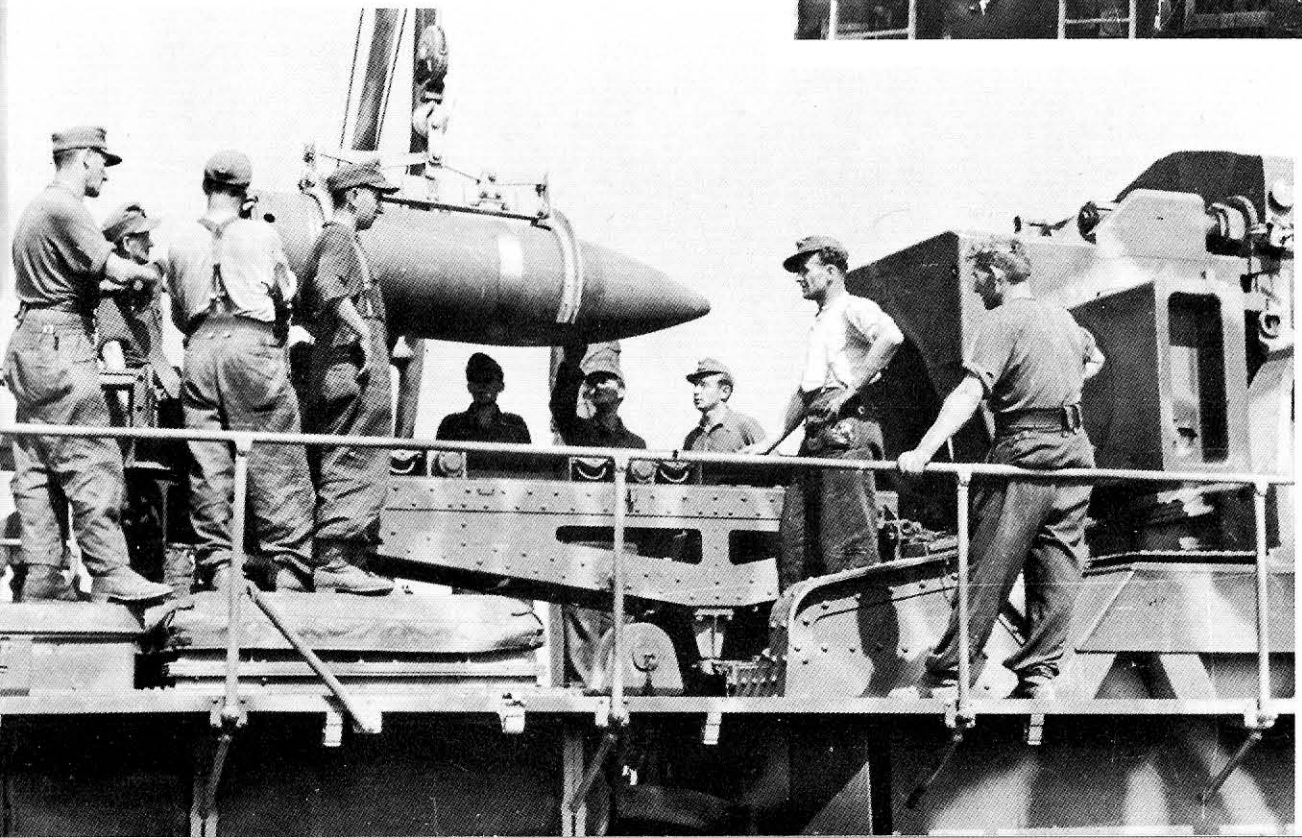


Left: Before and after each shot the 28 ton barrel is thoroughly inspected to see if the 112 rifles with a total length of 5,068 meters have suffered any damage. Here "Ziu" is being checked.

In favor of a doubled range, 1942 saw the barrel lengthened by 1.4 meters, the caliber reduced to 54cm (with Gerät 041), and the shell weight cut in half. The first barrels were delivered between May 31st and August 15th, 1943; on May 25th, 1944, firing trials were concluded with favorable results. The first three series models were manufactured from June 15th to July 25th, 1944. The firing rate was 6 rounds per hour. The ground pressure of the entire gun was only 1.83 kilograms per square centimeter. Because the muzzle velocity was almost half again as much, the improved "KARL" mortar could penetrate concrete 3.50 meters thick.

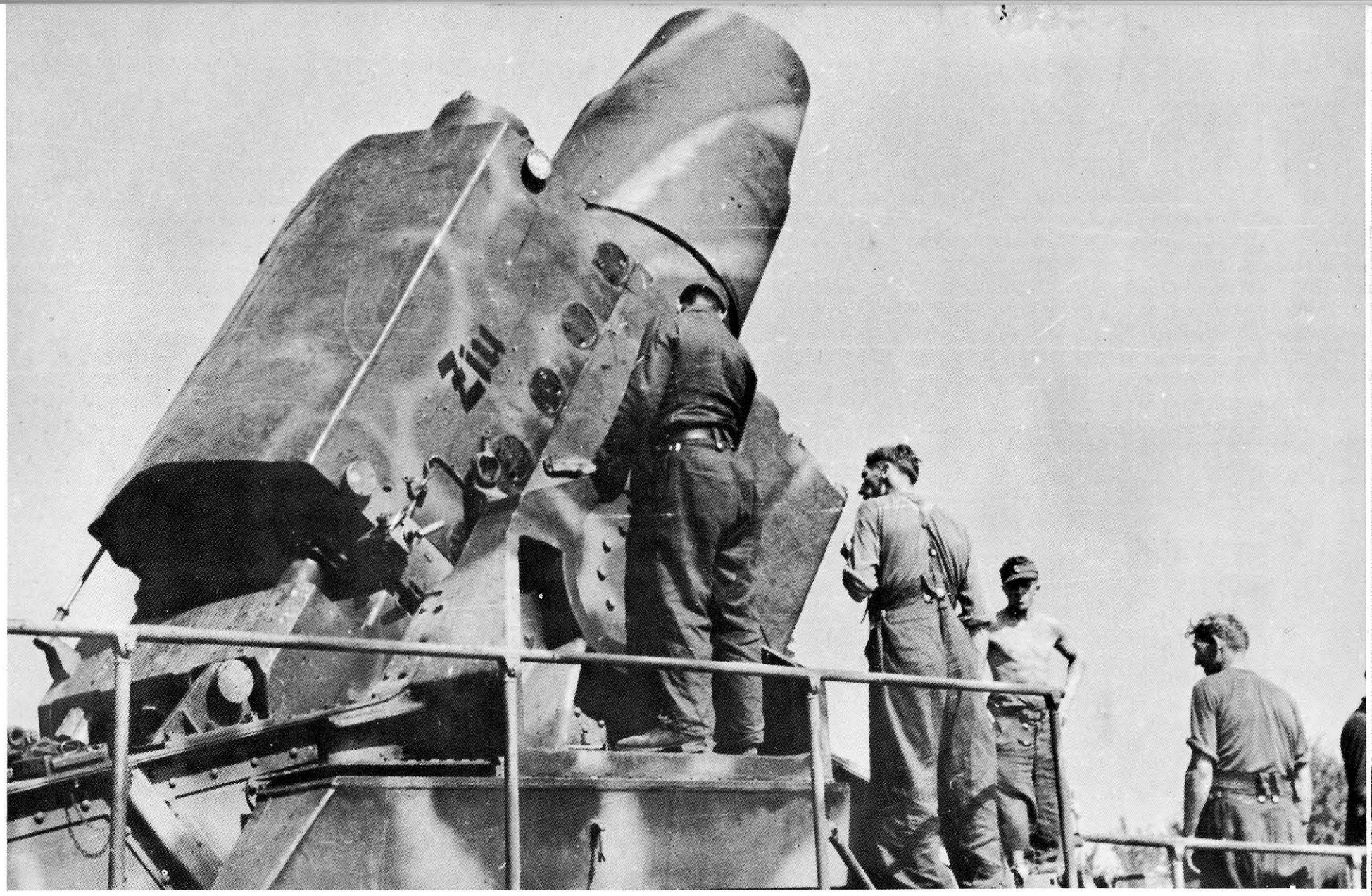


Above: The Mun.Pz.IV uses its winch to offload a 2.117 ton concrete piercing shell, which can penetrate 2.5 meters of concrete or 4 meters of armor plating.

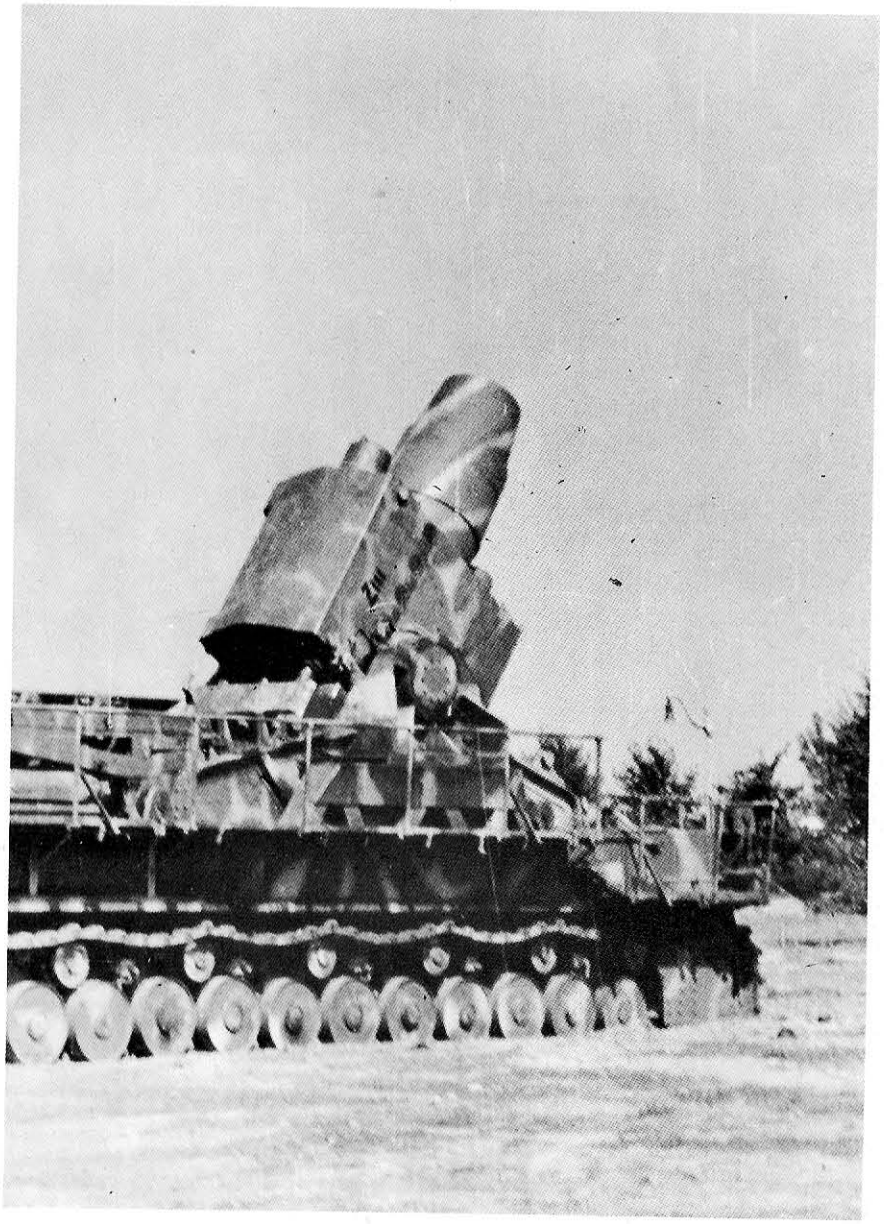


Left: At a height of 3.05 meters the loading winch sets the shell down onto the glide rollers of the automatic loader. Only one-eighth of the shell is pure explosive. The round is 2.5 meters long.

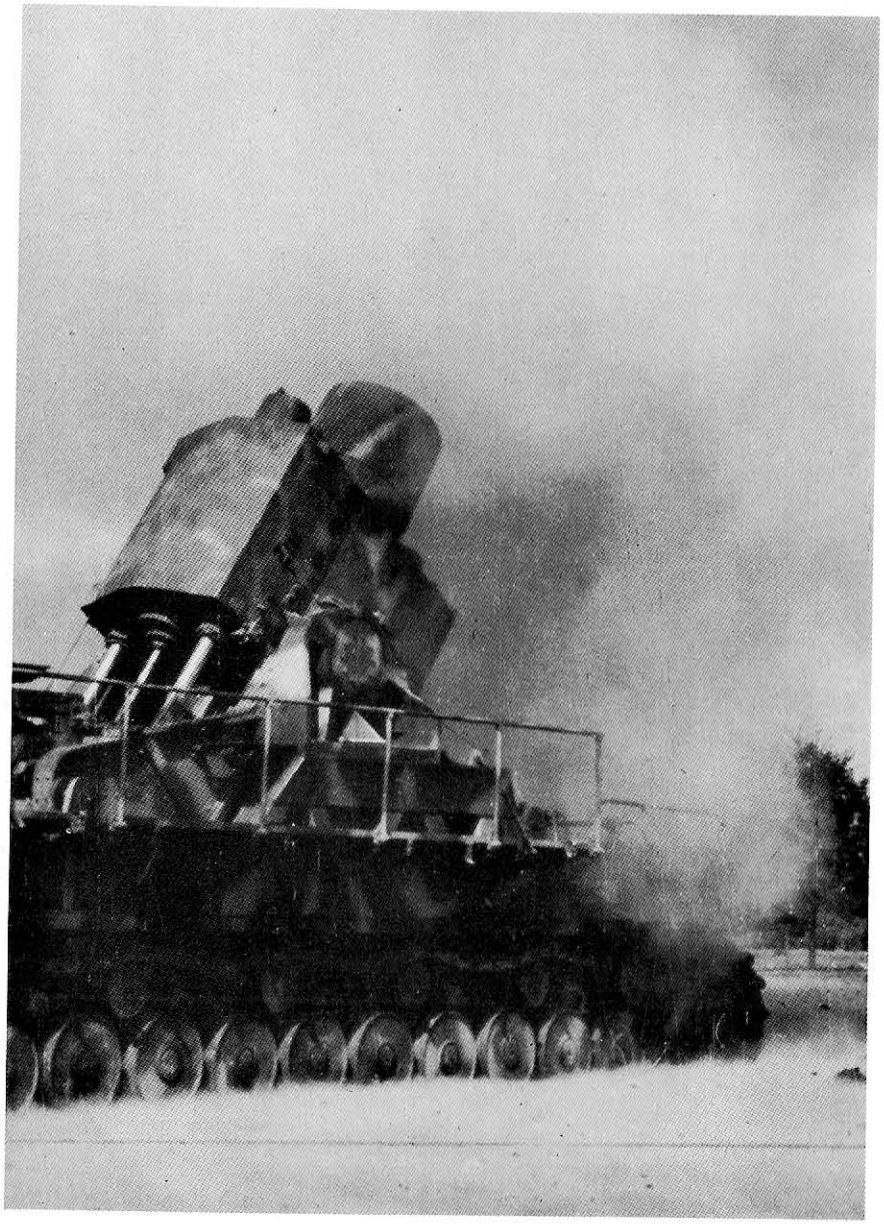
With an opened flat wedge breech the electrically driven mechanical loader pushes the shell into the massive barrel, dropped into its horizontal loading position. Notice the extremely thick base plate, which must withstand gas pressure of 1800 at and a muzzle energy of up to 6950 m/t. ("Ziu", end of August 1944)



Right side of the "Ziu" mortar. The crew is adjusting the mortar's barrel to its maximum elevation of 70 degrees; normally its position is between 50 degrees and 60 degrees. The upper carriage has a double return for the barrel and the carriage, which have a respective movement of 92 cm and 78 cm. The four barrel recoil braking mechanisms develop a braking pressure of 580 t; the two braking mechanisms for the carriage build a pressure of 104 t. The barrel and the carriage each have two counterrecoil mechanisms, which pressure increases from 60 at to 138 at.

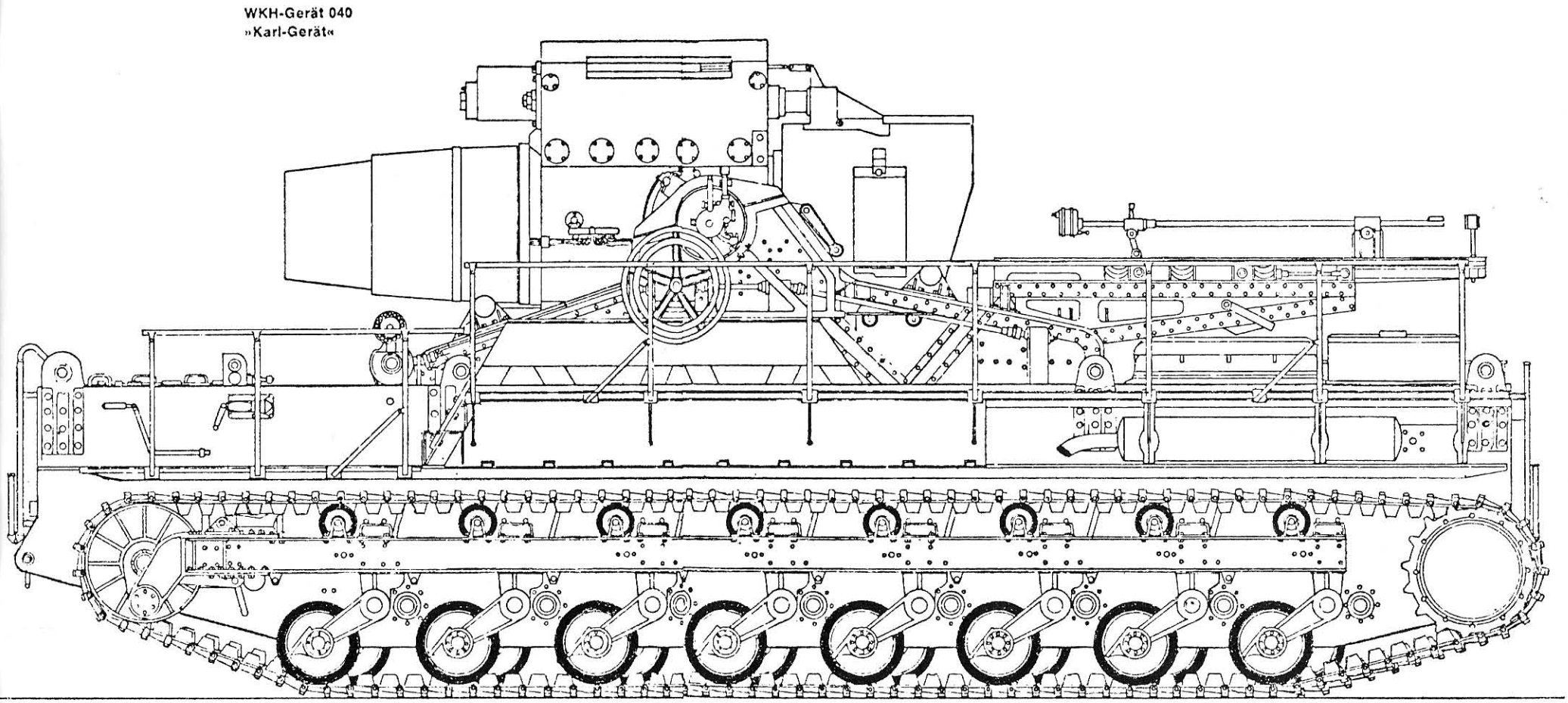


The mortar is ready for firing, the ammunition vehicle has driven off, the crew has left the gun. Each barrel has a life of no more than approximately 60 shots.

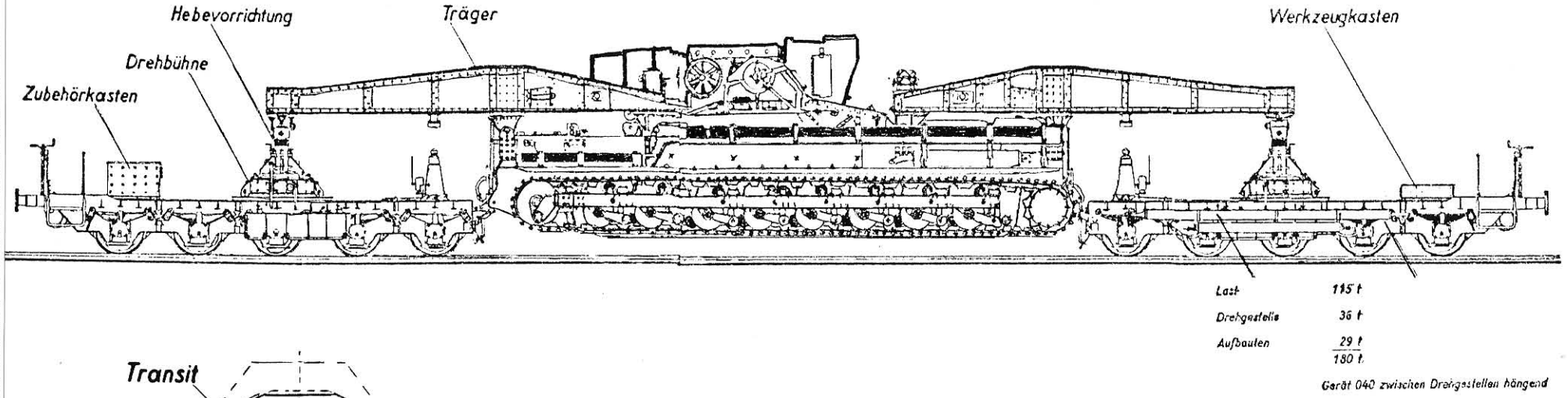


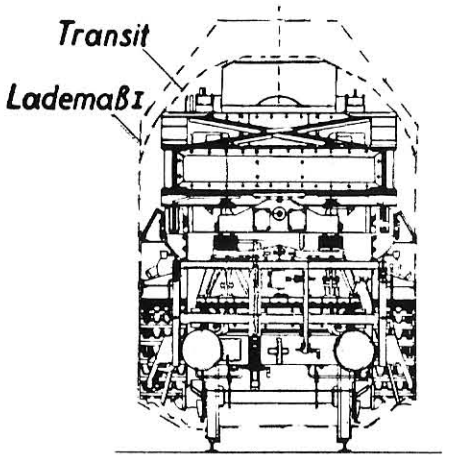
The heaviest German mortar — and the heaviest in the world — during firing. The cylinders of the barrel counterrecoil are clearly visible. Firing is initiated electrically. The recoil pressure is 700 tons.

Right side view of the 60 cm "Karl" gun.



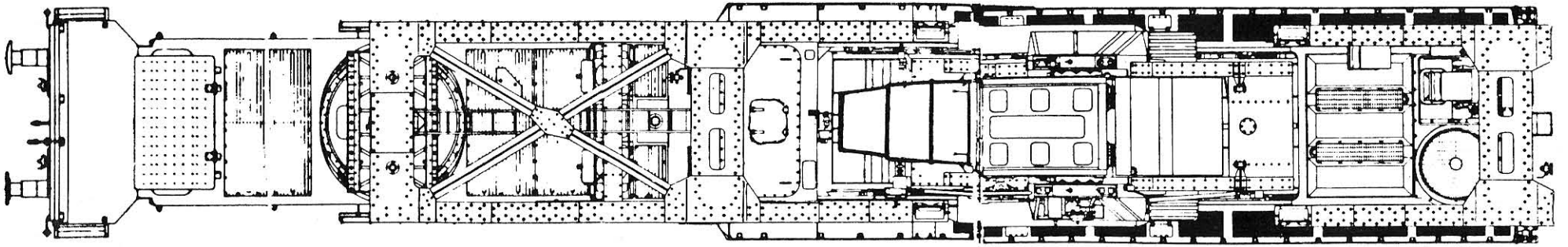
The total length of this gun was 11.15 m, the width from track to track 2.65 m, ground clearance 0.35 m, total width 3.15 m, total height 4.78 m, track length was 7 m and track width was 0.5m. The gun itself weighed 68 t, the chassis 52 t, and with a total weight of 120 t the "Karl" was, in all probability, the heaviest German tracked vehicle. The setting up of the gun in its firing position required the use of a 35 t crane and two 7 t cranes, which were part of the "Karl's" entourage.





Cutaway view of the 60 cm mortar as it appears for rail transportation, carried as a single unit on two five-axle pivoting trucks. The gun was suspended between the two cars with the aid of telescoping jacks (see below). When it wasn't feasible to move the gun under its own power (such as over longer distances or over bridges which couldn't support the gun's weight), it was broken down into four separate loads and moved on Culemeyer transporters: a barrel transporter at 42 t, a transporter for the upper carriage and cradle at 41.8 t, platform and loading assembly carrier at 21.6 t, and the self-propelled chassis transporter at 82.3 t.

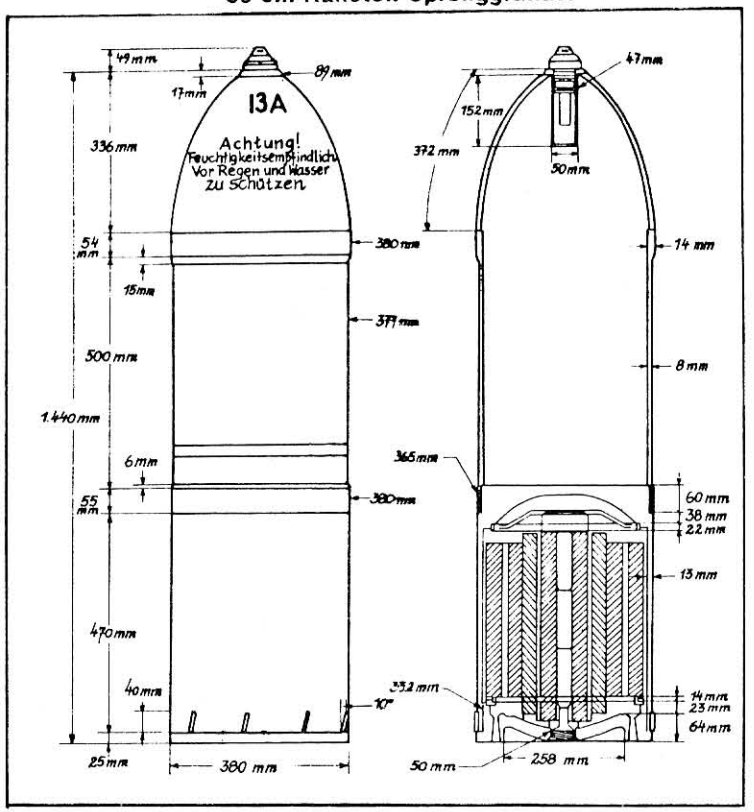
Teleskop-Hebebock



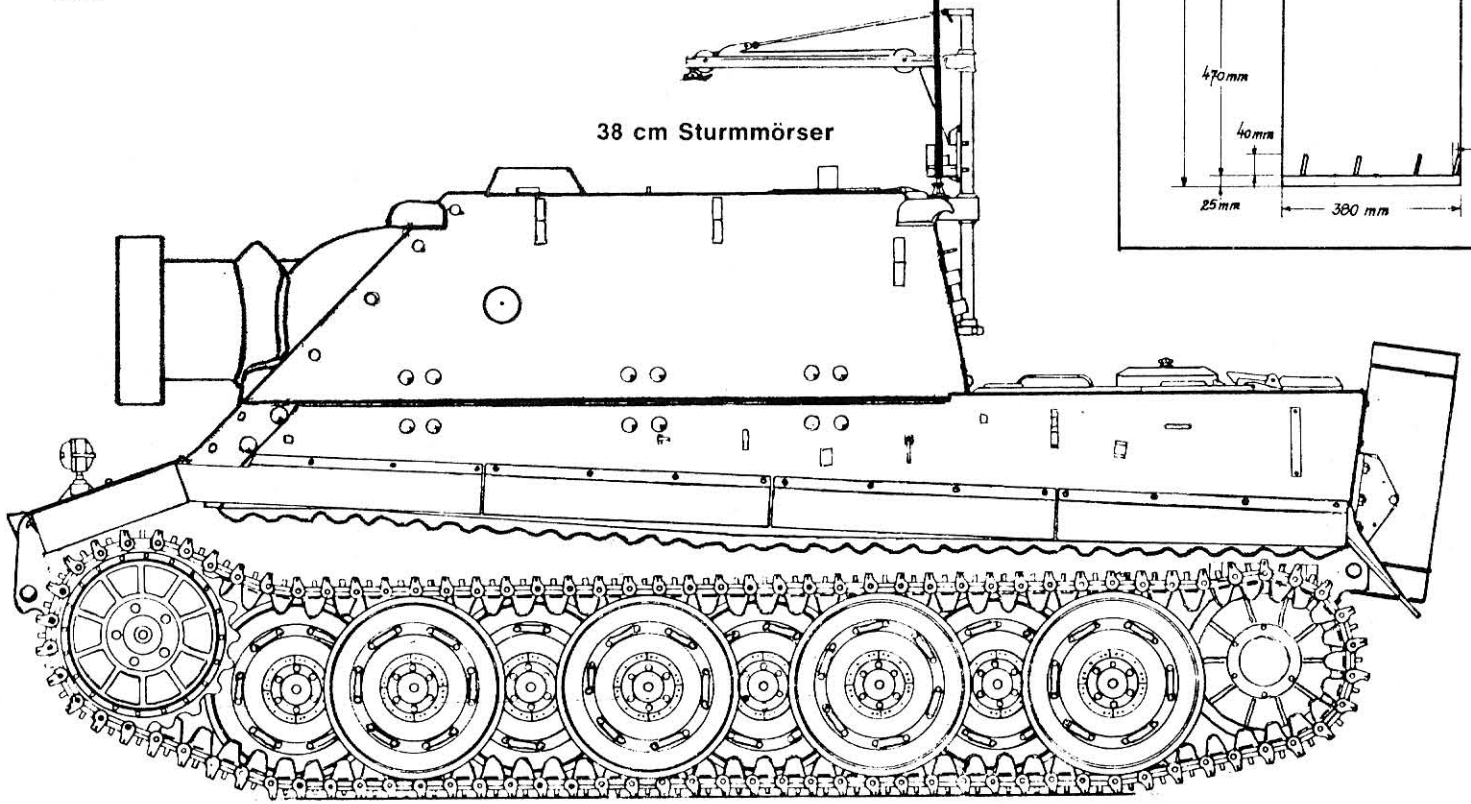
38 cm STURMMORSER

The mortar, which had a length of 6.28m, a width of 3.57m and a heigth of 2.85m, had a crew of five and carried 14 rounds. These shells could be fired in a very short period of time with the automatic self-loader. The weight of each shell was 350kg, of which 125kg was explosive (almost 36%!). Frontal armor was 15 cm thick, side armor 8cm. Top speed was limited to 40km; the gun had a range of 120km on roads and 85km over terrain. It was able to cross trenches up to 2.3m wide and other obstacles up to 0.8m high. It took 119.8t of raw materials to produce a single mortar. It was a dangerous weapon, an outstanding combination of chassis and mortar, but too late to change the course of the war.

38 cm Raketen-Sprenggranate



38 cm Sturmmörser

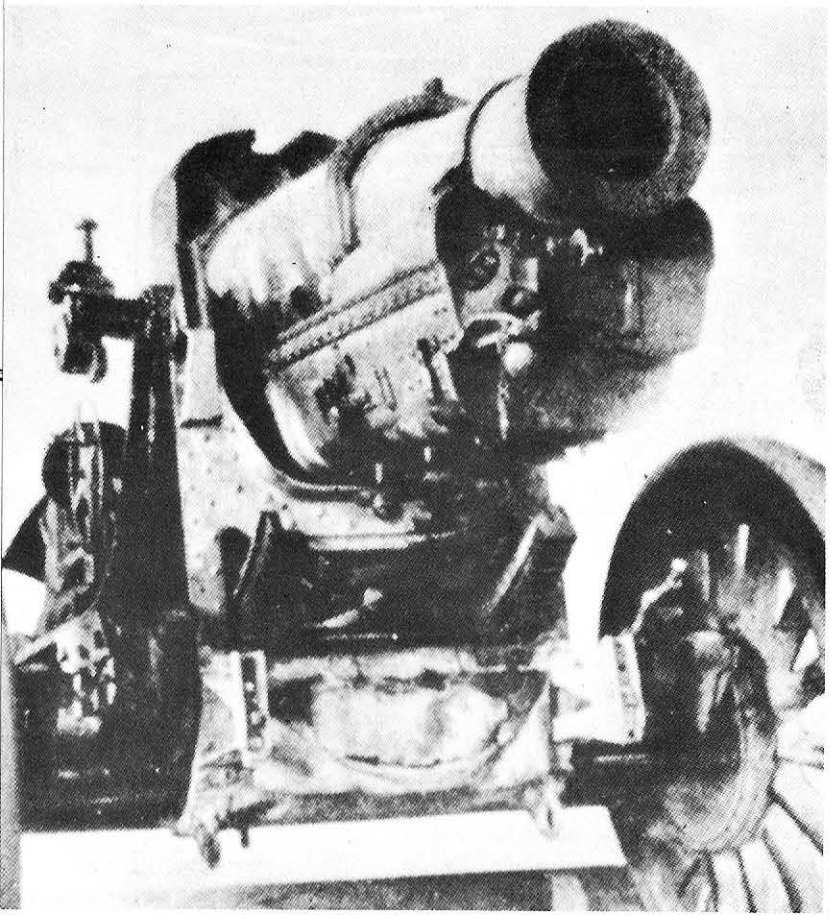


Within the 14 month period between August 1943 and October 21st, 1944, the Alkett Company produced this effective new weapon using reconditioned "Tiger I" (Sturm-Pz VI) chassis and Borsig's Rak.Wfr. 61 naval rocket launcher, used to attack submarines. Through this combination, Alkett was able to create a weapon which utilized the effectiveness of the heavy mortar in a close combat support role. A total of 25 mortars were manufactured, which were used as infantry support weapons against selected targets.

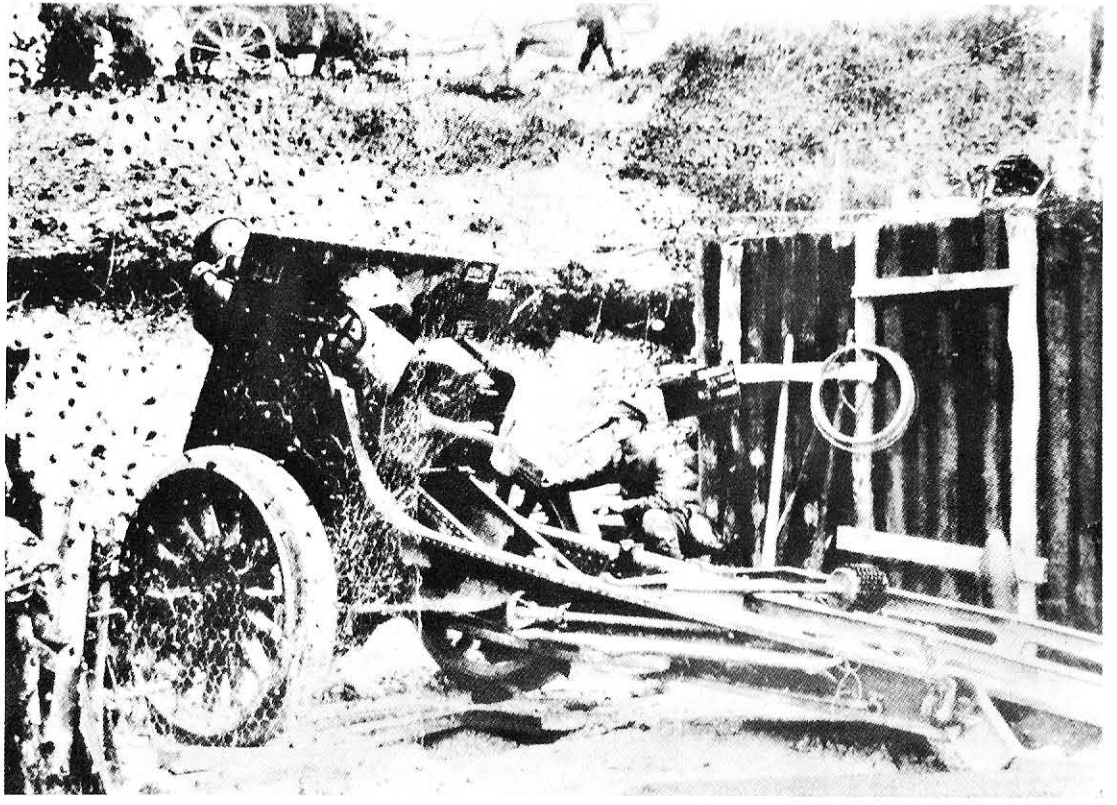
PRIZE WEAPONS

22cm Mörser (f) M 14

This four-ton French mortar, battle-tested in the First World War, fired shells weighing 100.5 kilograms up to 7.1 kilometers. Beginning in the summer of 1942, it was used on the northern and central Russian Front in groups of two- or three-gun fixed batteries, which supplemented the firepower of the operational artillery battalions. For years they provided an effective means of harassing the enemy.



Above: The French 22 cm Mörser M 14 as seen from the front, minus its shield. This gun is easily recognizable due to its squat carriage and the barrel, only 2 m long (L/9).



Right: 22 cm Mörser in a camouflaged hide, seen here from the rear and sporting the protective shield.

28cm Mörser (f) M 16 L/10.5

Above: Seen here just after assuming the firing position, this mortar has had its protective covering removed. To the right can be seen the ammunition crane and the loading cart, still minus a round.

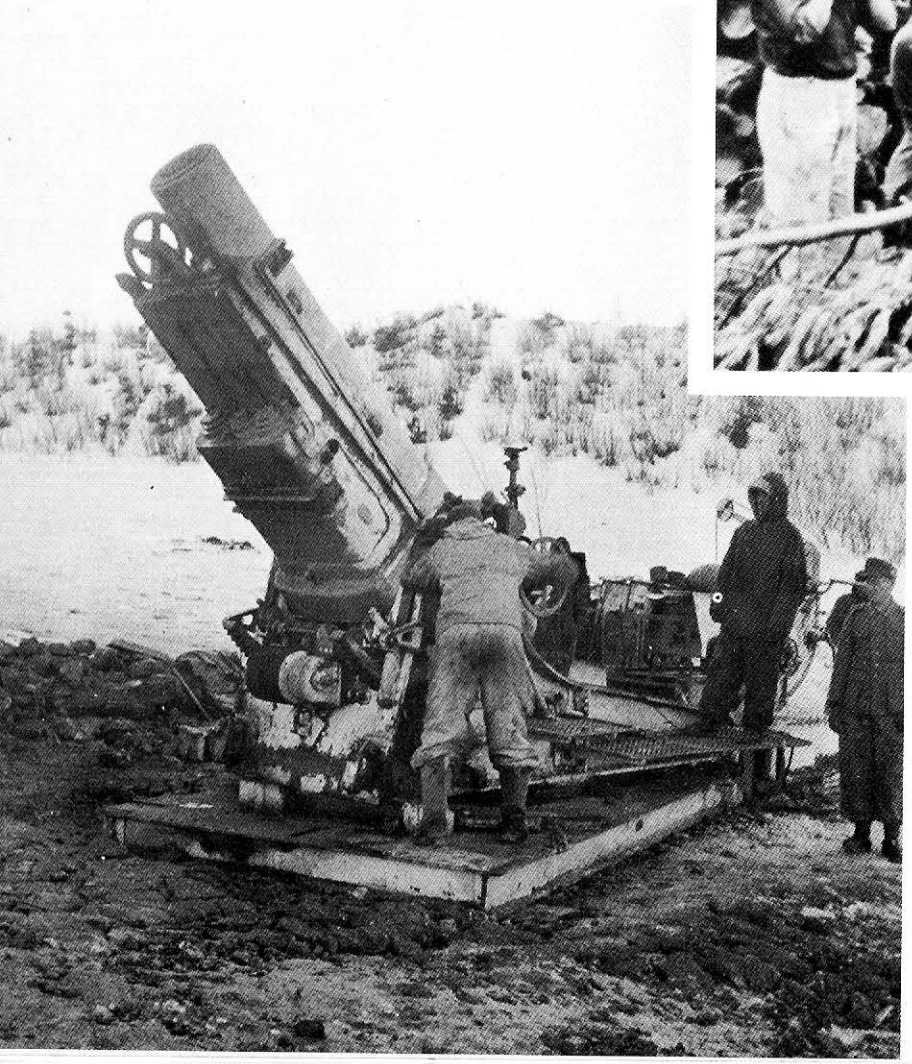
Right: Frontal view of the mortar during sighting; the shell is ready to be loaded, the straw camouflage has been thrown aside.

Designed by Scheider-Creuzot at the beginning of the First World War, it was built on a base plate without a wheeled carriage. This permitted a reduced weight and greater traverse, while at the same time permitted improved mobility (through the use of a transporter) for the 18.2 ton heavy mortar.

With the screw breechblock open, the 200 kg shell is loaded into the horizontally positioned innner barrel using a hand-driven mechanical winch. The cartridge (in the hands of a soldier) will follow shortly.

As mentioned on the preceeding page, the cartridge is then loaded. The breechblock is then immediately closed by the K 2 (breech mechanism handler) so that the mortar can be reported as "ready to fire."

Below: One more check of the azimuth and the mortar is ready for firing, with an initial velocity of 415 meters per second.



Above: The crew is covering their ears in anticipation of the powerful concussion. Maximum range of this gun was 11.2 km, and the elevation could reach almost 80 degrees.

Hilly and especially forested terrain demonstrate the effectiveness of the mortar's steep trajectory, as other types of weapons often cannot be used to their full potential in such areas.

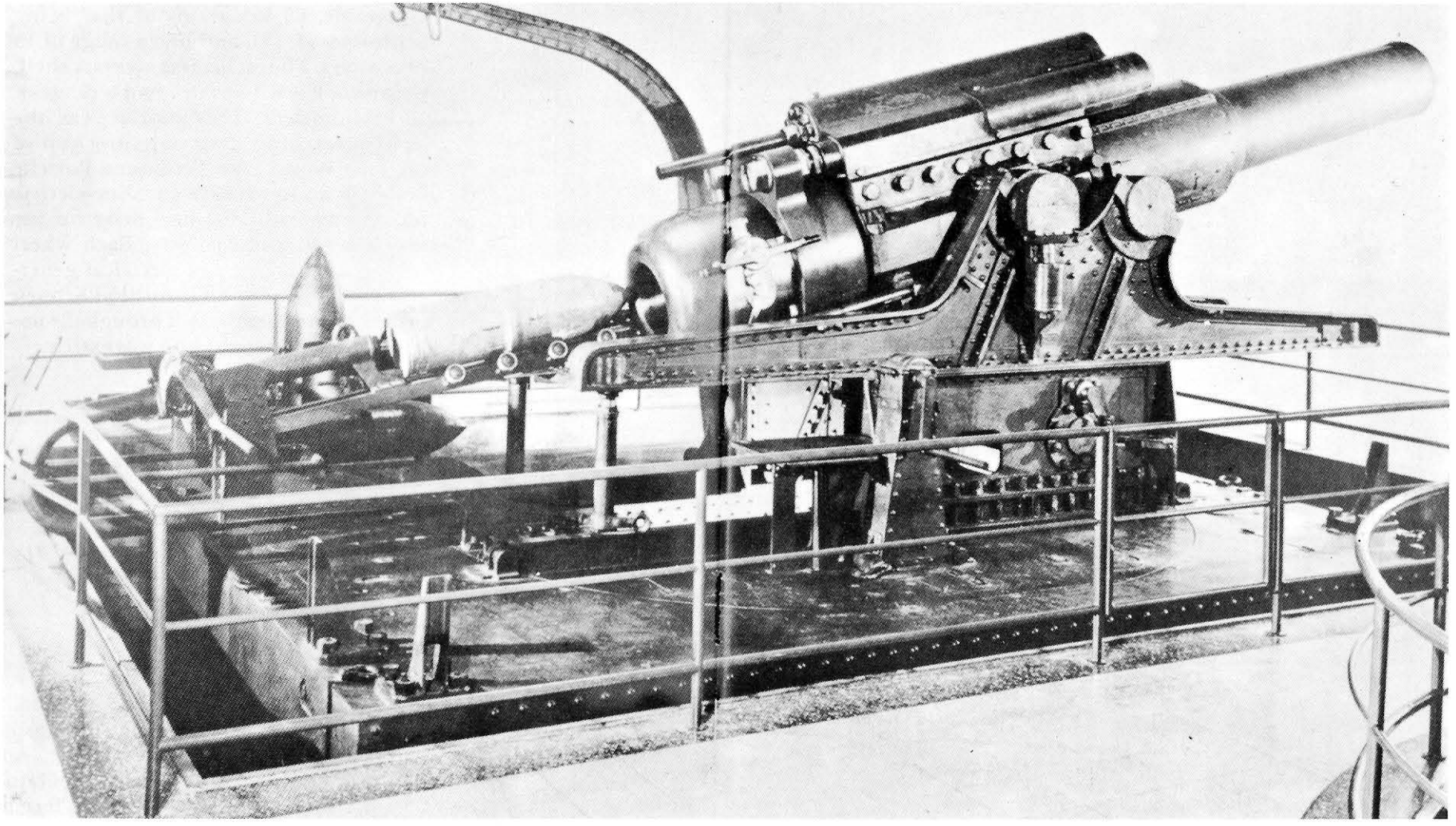
The dazzling fire of the gun casts an eerie glow over this winter scene on the northern Russian Front.

Russia, winter of 1943/4 the barrel of a 28 cm Mörser (f) M 16 recoils after firing. Note that the elevation is at the lower end of the upper elevation group. A pile of shells lies ready to be fired.

The carriage of the 37cm Mörser (E) (f) was similar to the 37cm cannon (E) (f). It had a total weight of 130 tons, a range of 15 kilometers, a muzzle velocity of 475 meters per second, and a shell weight of 710 kilograms. Aside from the 37cm Filloux mortar the 40cm Mörser M 15/16 (f) L/25.5 was also used as a field mortar.

38cm Mörser
M 16 (ö/t) L/17

This mortar was also called the "Auto-Haubitze" (auto-howitzer), but because the barrel elevation was restricted to the upper elevation group it was clearly a mortar.



38 cm "Auto Haubitze" M 16 (ö) Skoda, Number 6 gun from the First World War, seen here in the Heeresgeschichtliches Museum in Vienna. This mortar is the gem of the art of Austrian engineering and gun design. It was also known as "Barbara" and "Gudrun" by the soldiers of that time. By the spring of 1918 there were seven of these mortars in use.

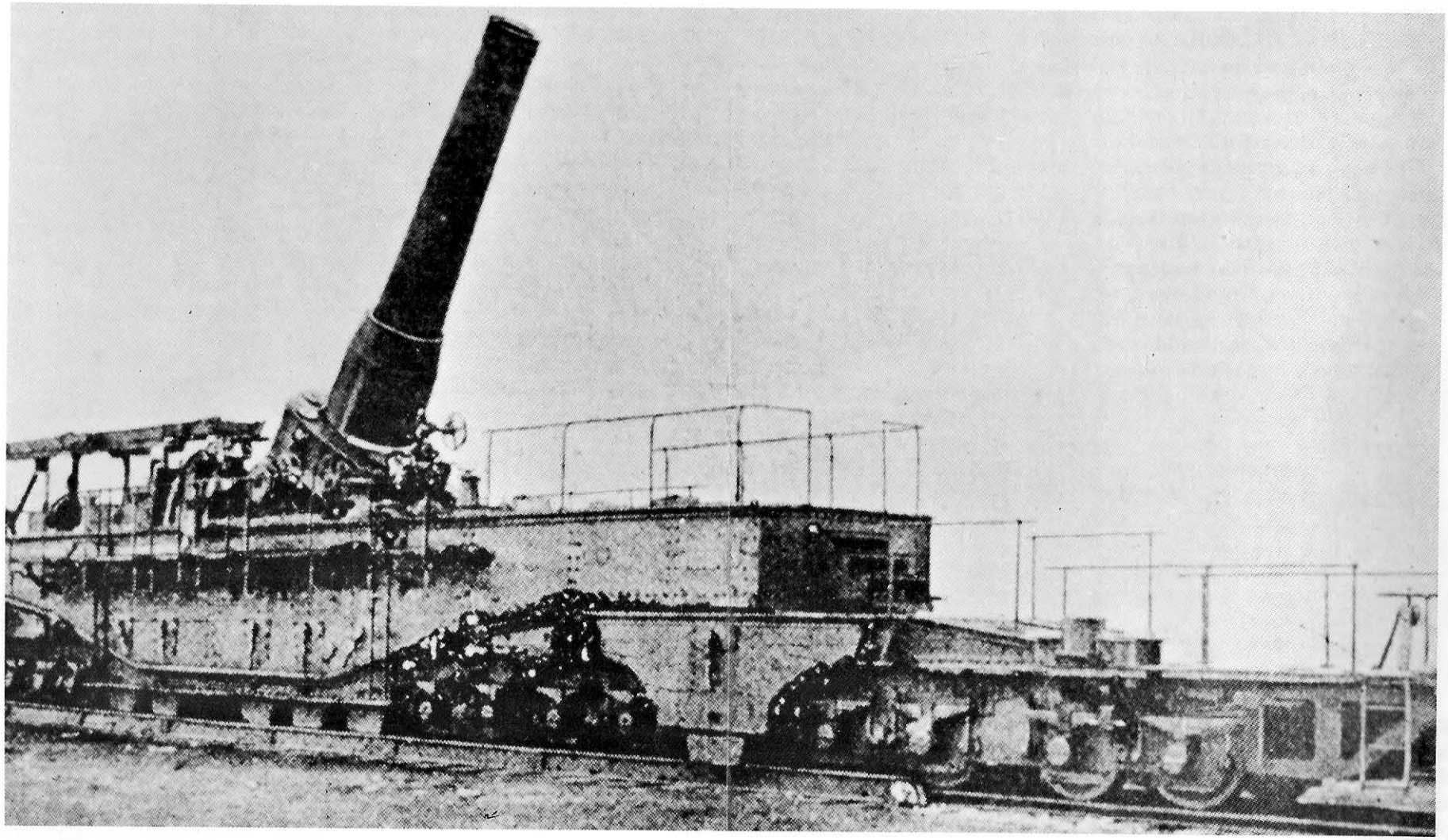
Carriage and platform were the same as on the 24cm Skoda L/40 cannon, i.e. a rotating plate with ball bearings. Total weight was 81.7 tons; carriage with cradle weighed 17.6 tons. The shell weighed 740 kilograms, 68 kilograms of that being explosives (1/11), and had a range of 15 kilometers. The earlier fragmentary shell, weighing 600 kilograms, had a range of 16.3 kilometers. This mortar was the farthest reaching steep trajectory gun of the First World War. Ferdinand Porsche designed an innovative gasoline-electric transporter with all-wheel drive for use on both rail and roadway. Each wheel had its own motor and electrical generator. Total price — 1.119 million Kronen (minus the rubber tires). Through the use of this transporter, the gun was extremely mobile.

Left: The mortar in the summer of 1941, firing somewhere in Russia. With a thunderous explosion, the shell is launched from the 6.46 m long and 20.7 t barrel. Even the covers on the base plate fly open.

Firing was done mechanically by a lanyard; the muzzle velocity was 459 meters per second, muzzle energy was 8,000 metric tons, figures similar to the 35.5cm Mörser M 1.

Right: After firing, the barrel is dropped into the loading position, another cartridge picked up and loaded. This was back-breaking work, given that the mortar's rate of fire was 12 shots per hour.

52 cm Morter (f) M 18 L/16

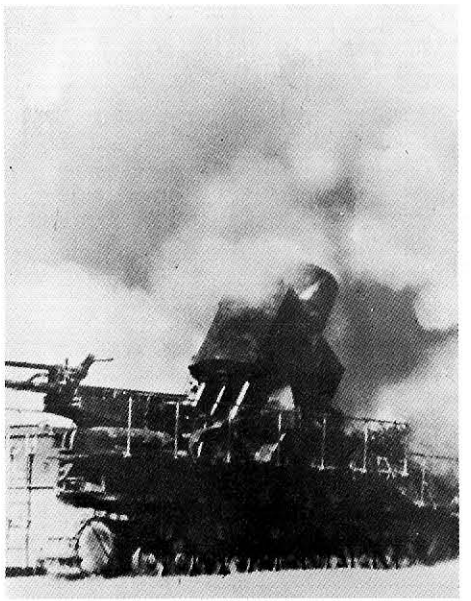


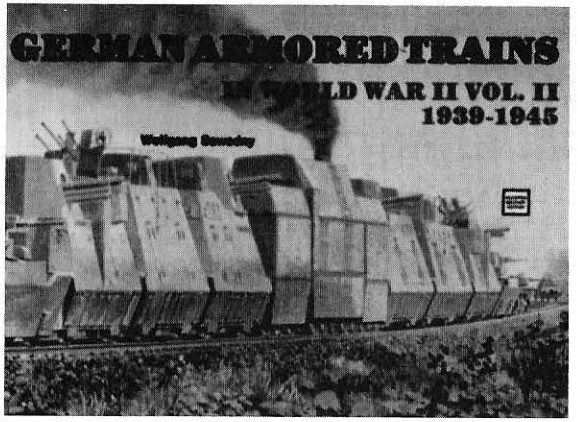
All four copies of the 52cm mortar were used in the siege of Leningrad. These guns were manufactured by Schneider-Creuzot of France in 1918 and appropriated by the Germans in 1940. The gun, which was 30m long and weighed 265t, had an 8.35m long barrel weighing 45t. With an initial velocity of 500 m/s, HE shells weighing 1,370 kg could reach 17.5km and those weighing 1,420 kg could reach 18 km; a 1,654 kg armor-piercing shell had a range of 15 km. Despite their capabilities, these giants were never fired during the French Campaign of 1940.

Heavy German Mortars of the Second World War

	21 cm Lg Mrs	21 cm Mrs 18	30.5 cm Mrs (t)	35.5 cm Haub M 1	38 cm Sturm Mrs
Caliber (cm)	21.1	21.09	30.5	35.56	38 Barrel
length (m)/caliber	3.063 L/14.5	6.51 L/31	3.65 L/12	10.265 L/28	RakWf 61 2.052 L/5.4
Elevation (deg)	-6 to 70	0 to 70	-4 to 75	-5 to 75	-4 to 75
Rate of fire (shots per hr)	30	30/50	12	15	6/8 (per minute)
Travel weight (tons)/transport components	8.9/1	22.7/2	38.5/3	123.5/7	65/1
Weight in firing position (tons)	9.22	16.7	23.15	78	65 Initial
velocity (m/s)	393	565	448	570	–
Range (km)	11.1	18.7	12.3	20.85	6 Shell
type	Spr 113	Spr 113	AZ 289	Be/BeStg 575	RakSprGr
4581 Shell weight (kg)	Be 121.4	Be121.4	MinGr 384	RöGrBe 926	350
Charge	7	6	8	4	1
Year of service	1916	1939	1917	1939	23 September 1944

	42 cm Gamma Mrs	42 cm Haub (t)	54 cm Mrs)41	60 cm Mrs Karl 040
Caliber (cm)	42	42	54	60 Barrel
length (m)/caliber	6.723 L/16	6.29 L/15	6.24 L/11.5	5.108 L/8.44
Elevation (deg)	43 to 75	40 to 71	0 to 70	0 to 70
Rate of fire (shots per hr)	10	12	6	6
Travel weight (tons)/ transport components	300/10	160/4	124/self-propelled: 1, rail: 4	124/self-propelled: 1, rail:4
Weight in firing position (tons)	140	105	124	120 Initial
velocity (m/s)	452	435	387	CP 220/HE 283
Range (km)	14.2	14.6	10.4	CP 4.5/HE 6.7 Shell
type	Heavy CP	Heavy CP	HE/Light CP	Light/Heavy CP
Shell weight (kg)	1020	1020	1250	Light CP: 1700/Heavy
CP:2170 Charge	4	4	1	1
Year of service	1911/1937	1917/1942	1943/1944	1939/1940





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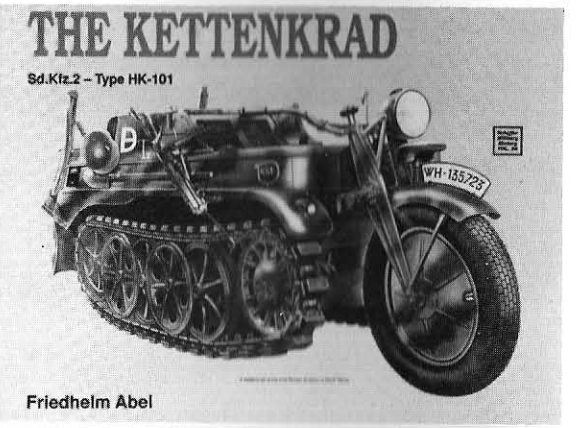
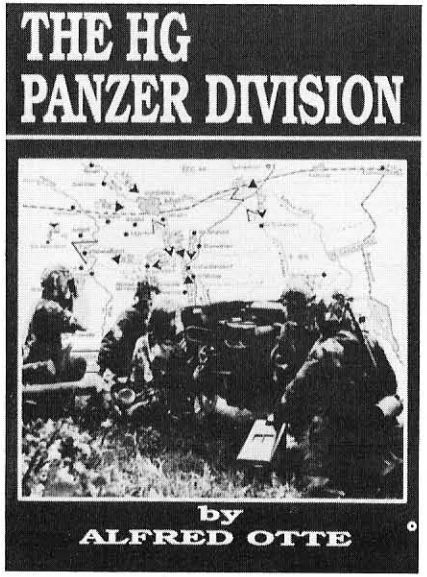
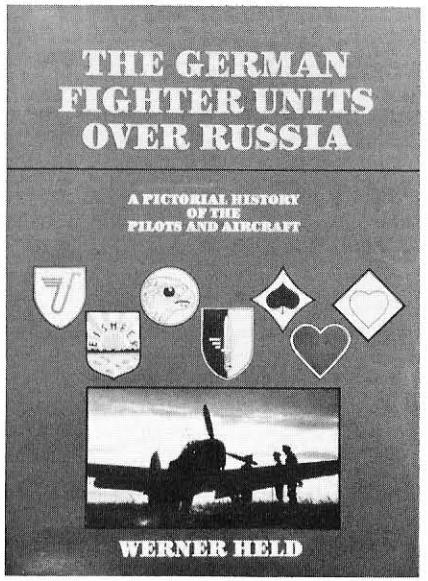
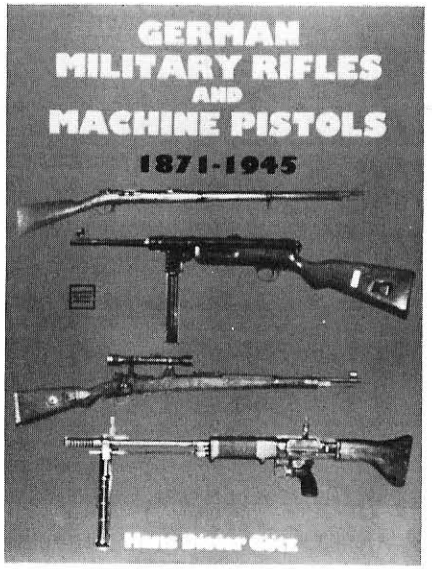
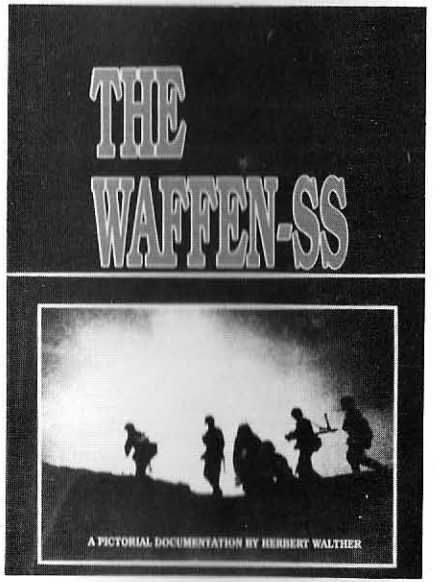




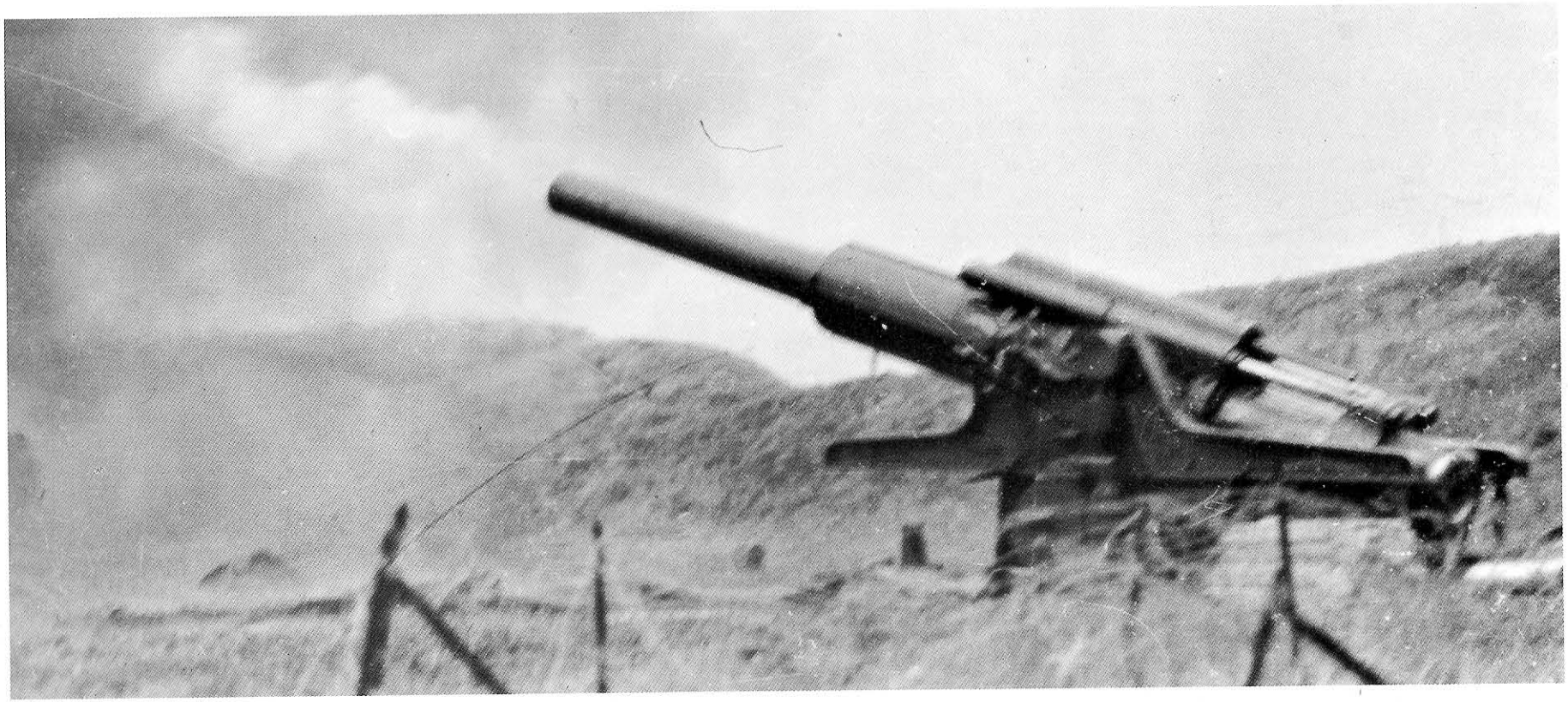






Beutemörser of the Second World War

	22 cm (f)	28 cm (f)	37 cm (f)	38 cm (ö)	40 cm (f)	52 cm (f)
Barrel length(m)/caliber	2 L/9.09	2.94 L/10.5	9.25 L/25	6.46 L/17	10.2 L/25.5	8.35 L/16
Weight (tons)	4.215	18.2	130	81.7	132	265
Initial velocity (m/s)	–	415	475	459	530	500
Range (km)	7.1	11.2	15	15/16.3	16	15/18 Shell
weight (kg)	100.5	200	710	740	641	1370/1654
Year of service	1914	1916	1915	1916	1915/1916	1918
Transport	vehicle	vehicle	rail	vehicle	rail	rail
Manufacturer	–	Schneider	Filloux(L/15)	Skoda	Schneider	Schneider



Firing of a 38 cm Mörser (ö). The 740 kg shell had a range of 15 km.

60 cm Mörser
"Karl"
L/8.44 Gerät 040

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GERMAN HEAVY MORTARS