Notes on German Obstacles & Field Works

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No. 974

N-6947

UNCLASSIFIED

NOTES ON GERMAN OBSTACLES

No. 1

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M.I. 10
The War Office
August, 1943.

0160/2436(M.I.10)

Distribution List E.

[redacted]

INTRODUCTION

This publication is graded SECRET because of its comprehensive nature. This grading is NOT intended to prohibit the dissemination of this information to those who should know it and it is hoped that full advantage will be taken in this respect provided the complete document is safeguarded.

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GERMAN OBSTACLES

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PART I. - WIRE.

1. TRIP WIRE.

The German name for this obstacle is Stolperdrahthindernis. Instructions given in German manuals are as follows:- These obstacles should be at least 30 ft. in depth. They consist of irregular rows of wooden pickets, 2 ft. long x 3 in. diam., and plain or barbed wire stretched at a height of 4 - 8 in. between pickets. The interval between pickets in rows should be 10 - 13 ft. and interval between rows 7 - 10 ft. The freshly cut heads of pickets should be painted to tone with the surroundings. Rusty wire should be used if possible and the obstacle may include snares (see para 5).

Trip wires are frequently laid in front of main obstacles. They are to be found between high water mark and the first continuous fence or in fields covering the main defensive position and obstacles. Examples noted have had the following approximate dimensions:-

Height	4 - 6 in.
Length of diagonal of diamond - shaped section	4 - 6 ft.
Width of obstacle	12 - 20 ft.

In the fields between road approaches to DIEPPE, the following type was reported by Ps/W:- A quadruple framework, each frame being approximately 1 yard square with diagonal strands. The depth of the obstacle was 15 ft.

Details of alarm devices attached to trip wires are given in para. 9.

2. APRON TYPES.

These may be single, double, or a series of double apron fences employing angle iron or screw pickets, the former usually embedded in concrete to a depth of about 18 in. A coil of dannert - type may be found under the double apron and sometimes another coil is fixed on the top of the fence. For one double apron fence the following are approximate dimensions:-

Height of obstacle		4 - 5 ft.
" " "	(with coil on top)	7 - 8 ft.
Width " "		up to 9 ft.

The standard German obstacle in depth is shown in Plate 1. The obstacle consists of simple wire fences about 5 ft. apart connected by criss-cross wires, the spaces between them filled with barbed wire in spirals secured to each other and to the points of intersection of the criss-cross wires. Aprons are provided on the front and rear faces.

A type of apron fence erected, it is believed, somewhere in West Germany is shown at Plate 2. The similarity between the wire here and that described in para. 10 will be noted.

3. CONCERTINA.

There are two types of standard concertina, the S-rolle (barbed) and K-rolle (plain). These are often referred to as dannert - type. Single, double or triple coil are used with angle iron or screw pickets. Triple coil is often fixed on promenade railings (Plate 3). Sometimes coils may be found supported on and wired to concrete posts, interwoven between concrete dragons teeth and fixed on top of walls, quays etc.

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4. "BRUN" OBSTACLE.

A number of reports have been received that the Germans have erected this obstacle, which is of French design (Reseau Brun). The following details have been supplied by the Fighting French in this country.

(a) Dimensions.

diameter of unit, extended	3 ft. 7 in.
length " " "	65 ft. 7 in.
weight of unit	40 lb.
" per metre	2 lb.
" " foot	9.5 oz.

The above two sets of figures include 0.2 kg./metre for binding wire.

The following are the approximate dimensions for a triple concertina fence:

height	6 ft. 7 in.
width	7 ft. 3 in.

(b) Description.

This obstacle is designed to barricade roads against the attack of light enemy A.F.Vs. The wire stops the vehicles by wrapping itself round tracks or wheels which are thus immobilised. An obstacle is composed of identical units extended across the road and placed parallel to one another in depth. The unit is a hollow cylinder or spiral, the surface of which is composed of large mesh wire netting of 0.75 mm. (0.03-in) steel wire (grade A.C. 54). Each spiral comprises 60 coils, connected in pairs at seven points.

(c) Erection.

To place the obstacle in position, two men take hold of a unit, one at each end, and draw it out by walking backwards away from each other. The unit should be laid loosely across the road to be barred, the ends being free, and should extend well beyond each side.

An effective obstacle against single wheeled vehicles, and tracked vehicles of nine tons or less, consists of 40 coils placed in depth touching each other and in one layer. Six men can erect such an obstacle in half-an-hour. The total weight of wire required is 720 kg. (1590 lbs.)

The obstacle, which is put in position very quickly, is almost equally easy to remove; it therefore should be covered by M.G. fire to prevent the crews of attacking vehicles from removing the obstacle from the road.

The obstacle should be placed at defiles on the road where they cannot be by-passed, i.e. roads in woods, bridge approaches, roads in cuttings or on embankments, villages, etc.

The depth of the obstacle is considerable, of the order of 50 m. (164 ft.). If a bottleneck of this length cannot be found on the road, or if the M.G. which is supposed to cover the obstacle cannot do so for such a depth, it will be necessary to place the coils in two layers one above the other. This arrangement, although it may halve the depth of the obstacle, requires more time for erection, and definitely causes the obstacle to lose some of its efficiency, above all when it is attacked at speed, so that it should only be adopted as a last resort.

When/..

When the width of the road to be barred allows the barrier to be attacked by several vehicles side by side, it is necessary to raise the number of coils in the obstacle to 50.

(d) Strengthening.

If the obstacle is likely to be attacked by powerful tracked vehicles, such as tanks, the simplest method of making it capable of effective resistance is to place on the near edge a certain number of light infantry mines, carefully camouflaged.

5. WIRE NETTING.

The use of this is mentioned in a German manual and called "Maschendrahtzaun". The netting is intended as a hasty obstacle against infantry. The document states that it should be secured lightly to the ground with wire and pickets. The standard height is probably 6 ft. 6 in. for this type of material.

It was encountered in front of barbed wire in clefts in the cliffs (DIEPPE raid) and was probably intended to prevent the quick employment of bangalore torpedoes.

6. SNARES.

The Germans recommend the use of snares (Drahtschlingen) in all types of country as anti-personnel obstacles, owing to the ease with which they can be concealed. The diameter of the wire used should be 0.04 - 0.08 in. and it should form a loop about 1 ft. diam. Two or three snares may be secured to a single wooden picket 1 ft. 8 in. - 2 ft. 0 in. long, or a single snare attached to a 12-in. bar driven into the ground at 45° and pointing away from the direction of attack. Snares should be set at intervals of approximately 2 ft. 6 in. in several rows.

While no mention of snares has been made in reports from Occupied Europe, their existence is to be expected.

7. KNIFE RESTS.

These are constructed of angle iron or timber frames. Long lengths of wooden knife rests have been seen on the beaches above high water mark (Plate 4). Photographs show that in some cases such fences may consist of four wooden knife rests connected together by a cross-bar. Other photographs show two irregular rows of knife rests, one behind the other with the space between varying to a considerable extent. The approximate dimensions of timber knife rests are as follows:-

Height of obstacle	about	4 ft.
Width " "	"	4 ft.
Distance between trestles	"	4 - 5 ft.
Length of 4 - trestle unit	"	12 - 15 ft.

There appears to be considerable variation in the distances between trestles.

Timber knife rests are in use on a large scale for closing vehicle and pedestrian gaps in walls and inland to block roads.

The angle iron type of knife rest appears to be little used in Occupied Europe, recent reports have referred to them vaguely, but it probably exists in some quantity in Germany from which it is believed the photograph at Plate 5 was taken. The heavy gauge wire, described in para 10, can be seen on this photograph.

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8. WIRE IN COASTAL AREAS.

Although there is a certain amount of standardised construction there are many departures therefrom. The following must be considered only as a guide to what is to be expected.

(a) Vertical fences.

One type of vertical barbed wire fence is illustrated at Plate 6. The site is probably the entrance to a works or other restricted locality and this kind of barricade is to be found round one railway station which is a fortified Hy. Bty. position.

In dune country and quiet parts of the coast two or three of the fences may be found together, from 4 to 8 ft. apart, each with 5 or 6 strands of wire. The space between is sometimes filled with a wire entanglement and/or mines. The wire is supported by wooden posts, angle-iron or screw pickets. The height of the fences is 4 - 5 ft. Some of these fences may have been erected by landowners and farmers and therefore have no particular military significance.

Plate 7 shows two parallel fences with back struts and Plate 8 shows three parallel rows of wire fence in dune country. In the latter note the single wire fence running at right angles near the point marked 'X'.

A new type of vertical fence has been reported. It consists of steel pickets, embedded in the top of a sea wall, standing about 4 ft. high. The pickets are about 8 ft. apart and have 5 strands of barbed wire and 3 strands of plain wire. From the bottom, the 2nd, 4th and 6th strands are plain. The tops of the pickets are bent back and each bay of fence has two barbed diagonals from the 6th strand to the foot of the picket.

At one bridge of minor importance the staggered walls of the road block are supplemented with three barbed wire fences on each side of the block. The sketch provided by source indicates that only pedestrian traffic can negotiate the wire and then by walking to and fro between the parallel lines of the fences.

At one place round bars, looped to resemble long screw pickets, have been let into the top of a sea wall and then bent forward towards the sea and hang down the face of the sea wall. Barbed wire is fixed to the bars, horizontally, vertically and diagonally.

(b) Other types.

A rough wire obstacle is shown in Plate 9. Note the wire hanging down the face of the sea wall and the gap between the O.P./Pillbox and the promenade railings.

A wire obstacle on the western edge of a mole is believed to consist of a four-strand fence, supported on steel pickets at about 12 ft. intervals embedded in the concrete wall and with a single coil of barbed wire woven into it.

In places, the sea has beaten down wire fences and maintenance work is being constantly carried out. Iron pickets are reported to have been provided with a 1 ft. 4 in. square base on certain exposed stretches of the coast.

The type of wire obstacle, shown in Plate 10, is near a pillbox and sited on a promenade.

(c)/...

(c) Wire in cliffs.

In gullies and clefts in the cliffs the wire is laid in a dense entanglement. The wire is often continued as a single fence up to the cliff-top on either side of such feature. About half-way up the side of these gullies it has been noticed that the wire is a little easier to pass through. The use of wire netting is mentioned in para 4.

(d) Siting on beaches and sea walls.

The wire is usually straight and roughly parallel to the shore in front of strongpoint localities. In between these localities the wire juts out towards the sea. The length of the arms of one 'dog-leg' may be over 100 yards; elsewhere, wire generally follows an irregular course.

In addition to the more standard types mentioned elsewhere in this chapter the Germans have erected barbed wire in a variety of ways. A selection of these are described below.

(i) Plate 10A shows wire fixed to the top of a sea wall. The report states that iron pickets, 1½-in. square, are let into the wall and the wire fixed as shown. The vertical pickets also carry horizontal strands of barbed wire along the top of the sea wall.

(ii) Plate 10B is a sketch of a wire obstacle reported on quay walls. It consists of long rolls of wire, attached to ropes which can be let down over the sides of quays to prevent scaling by landing troops. It is probably some kind of wire netting nailed to slats.

(iii) A reliable report mentioned the construction of an inclined wire obstacle between the top of a wall and a river bed on one of the principal estuaries of FRANCE. Between the toe of the obstacle and the sea wall wooden posts were erected to take the weight of wire at about mid-span. This obstacle is now reported to have proved a failure because of tidal influences in the estuary and that it has been replaced by a simple "cattle" fence along the top of the sea wall.

(e) Depth of wire.

The distance between the outer and inner wire perimeter of a strongpoint varies with the topography and importance of the site. It may be as small as 30 - 60 yards, in others it may be between 70 and 130 yards, or even as much as 200 yards. In general, the distance from the outer edge of wire to the nearest pillbox or other firing post is not less than 30 yards.

(f) Combined fences.

A typical example is as follows:- A trip-wire, immediately behind it a trestle fence, and some 10 to 20 yards further back an apron fence; the total depth of the wired area may be 30 - 60 yards. On the sea-front of towns there is generally an apron or trestle fence on the beach and a dannert type (or apron) fence on the top of the sea wall and promenade.

(g) Wire with minefields.

Wire is normally used to fence off all sides of a minefield. Generally speaking these fences consist of a single row of posts with 5 or 6 strands of wire. One P/W described a fence which he said was standard for surrounding minefields and that men were taught to recognise it as such. It consisted of 3 horizontal strands with diagonal wires between pickets or posts. The fence was 4 - 5 feet high. The diagonal wire bracing may be the "clue" to what is behind the fence.

(h)/...

(h) Wire with road blocks.

Some road blocks consist of a wire entaglement or fence on each side of the road with the gap between closed by movable gates of various types. The use of wire as the principal material for road blocks has now been superseded at all places which are seriously defended except on minor obstacles connected therewith.

(i) Wire with ditches.

There is generally a thin belt of wire on the outside of the ditch. There is no information that the Germans have laid wire in ditches, this may be a little surprising since official documents stress the use of wire to make the obstacle anti-personnel as well as anti-tank.

(j) Wire with walls.

Concrete walls in some instances are provided with hooked bars for lashing wire to the coping of the wall. Wire is to be expected on or near most of these walls.

(k) Wire under water.

There now appears good evidence of underwater beach obstacles. On BELGIAN beaches, oblique photographs seem to show wire at low water mark. Other sources of information also say that it exists. There is no information available on the design of the obstacle.

9. ALARM WIRE

There have been a number of reports of wire being charged with electricity. One P/W source who had worked on the Siegfried Line said that in these cases there were two plain copper wires carried on glass insulators and his impression was that the top wire was electrically charged and the bottom wire was connected with some kind of electrical warning device. The P/W further stated that a certain number of stretches of wire had not been provided with copper conductors, presumably for the benefit of their own troops. It is not known if these electrified fences exist to-day. So far as the occupied countries are concerned this type of obstacle might be encountered on very special installations and is not to be expected elsewhere.

It is now established that the enemy uses a warning device, consisting of floodlights actuated by tripwire, in front of beach strong-points. At one point the trip-wire is sited about 15 ft. outside the wire perimeter and is supported on short pickets 6 - 8 in. above the ground. Immediately the trip-wire is touched the entire area is floodlight; the source was unfortunately NOT able to discover the type of lights used or their location.

One type of standard trip-wire alarm (ALARMSCHUSSGERAT) is as follows:-

(a) Description.

The equipment is illustrated at Plate 11. Although a detailed description of the equipment is not available, it appears that the device consists of a box (1) with a neck at the top into which the alarm cartridge (2) (Alarmschusspatrone) fits. Through the bottom passes a striker, with a T-shaped head (3) by which it may be pulled down, against a spring, for cocking.

A/...

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[illegible]

A spring loaded, right angle lever (4), pivoted at the top (5) is forked on the horizontal part which passes beneath the box and holds the striker pin in the cocked position. To the centre of this lever is fastened a clamp (6), whose jaws grip the wire used to raise the alarm. This wire may be a strand of the existing wire defenses, a special wire trip, one of the wires used in binding together an obstacle such as an abattis, etc.

The alarm cartridge (2) is of signal cartridge type, 83 mm. (3¼-in.) long and 27 mm. (1 1/16-in.) diameter, weighing 70 gm. (2½ oz.). The body is painted black. Its recognition by feel is made easy since its sealing disc (7) extends over the outside and the rim (8) of the base is half smooth and half serrated.

(b) Setting up the device.

A picket (9) of T cross section is driven into the ground near the wire. The device is well lubricated and slipped over the picket to which it is then fastened by the clamps (10). By positioning the retaining ring (11) the equipment is held at such a height that the clamp (6) engages easily with the wire.

The wire is placed between the jaws of the clamp and locked in such a position that the wire is not under any tension and therefore does not tend to move the lever. Slight pulling or pushing of the wire should, however, be sufficient to operate the device.

The alarm is tested by cocking (that is by pulling down the T-shaped head (3) underneath until the cocking stop engages with the fork of the lever (4)) and moving the wire slightly when the striker pin should rise.

The alarm is loaded by pulling down the retaining spring side wall (12) and sliding the alarm cartridge in from the front, over the striker pin. The device is then cocked as before, after which the trip wire must not be touched.

(c) Action on firing.

When the alarm cartridge is fired a flame about 6 ft. high and lasting for 10 seconds is produced. During darkness, this flame will illuminate the surroundings within a radius of 50 ft.

(d) Safety.

Although the alarm cartridge closely resembles signal cartridges fired from the standard signal pistol, it must on no account be used with that weapon.

10. HEAVY GAUGE WIRE.

At Plate 11A are details of a heavy gauge wire probably known as Simplex - Stacheldraht. The wire consists of a single square-section centre strand of 3 x 3 mm. cross section (1/8 x 1/8 in.), twisted once in approximate 2-inches. The barbs are twisted on only. Vickers hardness is 197. This type of wire has been found on the coast of France; the extent to which it has been used is not known but since it is of standard manufacture no surprise need be occasioned if further information revealed it to exist on an appreciable scale.

The Vickers hardness of British wire are as follows:-

Concertina	380 - 400
Barbed wire	120.

[redacted]

11. STANDARD TYPES OF IRON PICKETS.

Plate 11B figs. 1 to 4 show the four types of standard German pickets for the erection of plain and barbed wire fences. These types are:-

(a) Screw pickets (Fig. 1)

German designation; "Hindernisschraubpfahl". Used in soft ground.

(b) Tubular steel pickets (Fig. 2)

German designation; "Hindernisschlagpfahl aus Stahlrohr". Used in medium ground.

(c) T-section pickets (Fig. 3)

German designation: "Hindernisschlagpfahl aus T-Eisen". Used in hard ground.

(d) Stand Pickets (Fig. 4)

German designation; "Hindernisplattenpfahl". Used in sandy ground.

All four types are made in three sizes, with lengths of 1.00, 1.75 and 2.00 metres (3 ft. 3 in., 5 ft. 9 in., and 6 ft. 7 in.). Weights of these pickets are as follows.

Type	Length	Weight	
		Metric	British
Screw	1.00 m.	1.90 kg.	4.2 lbs.
	1.75 m.	4.90 "	10.8 "
	2.00 m.	6.70 "	14.8 "
Tubular	1.00 m.	1.95 kg.	4.3 lbs.
	1.75 m.	4.50 "	9.9 "
	2.00 m.	5.00 "	11.0 "
T - section	1.00 m.	4.40 kg.	9.7 lbs.
	1.75 m.	7.70 "	17.0 "
	2.00 m.	8.80 "	19.4 "
Stand	1.00 m.	8.0 kg.	17.6 lbs.
	1.75 m.	10.3 "	22.7 "
	2.00 m.	11.0 "	24.3 "

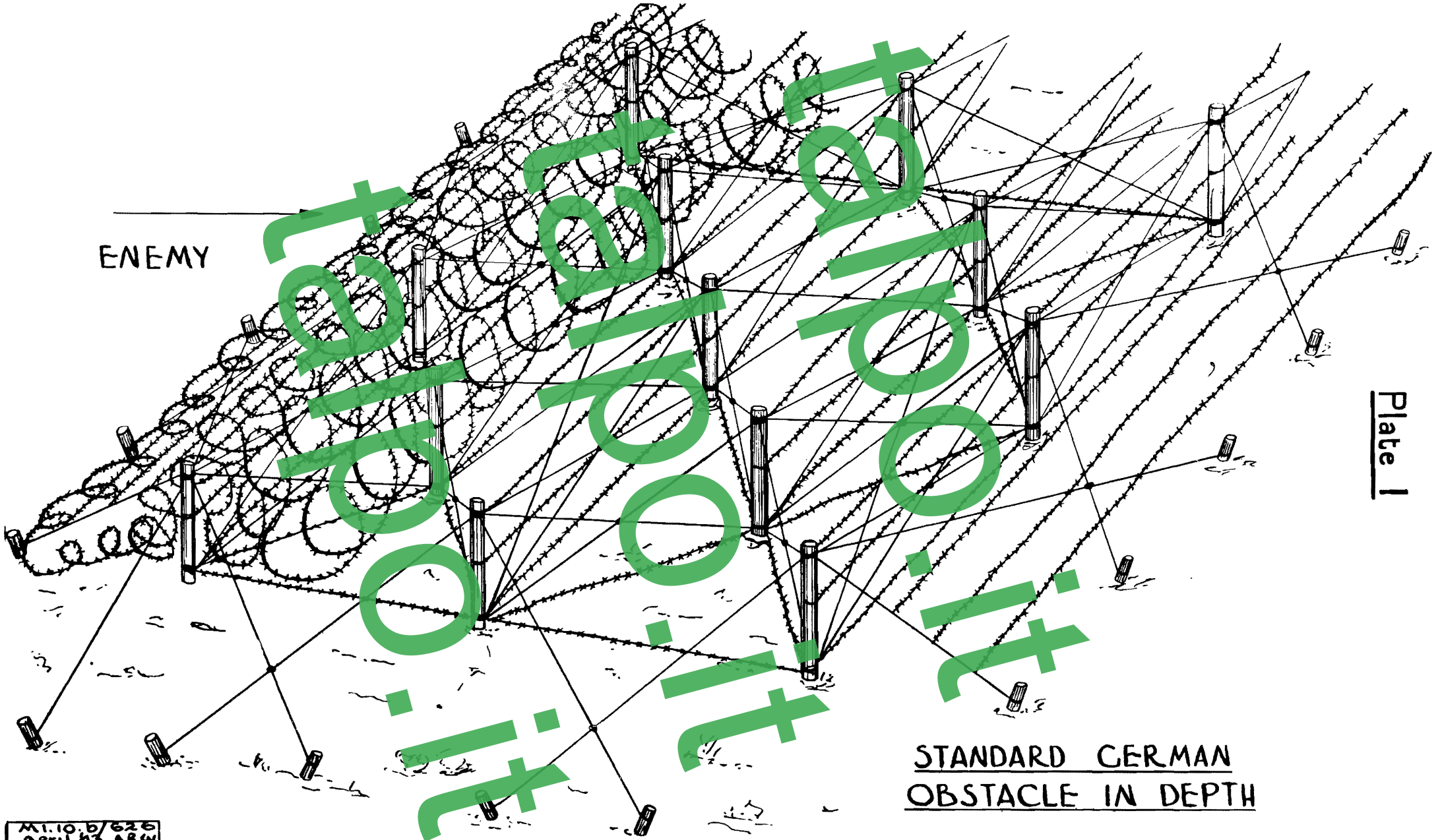

Plate I

STANDARD GERMAN
OBSTACLE IN DEPTH

M1.10.b/626
April 43 ABW

PLATE 2

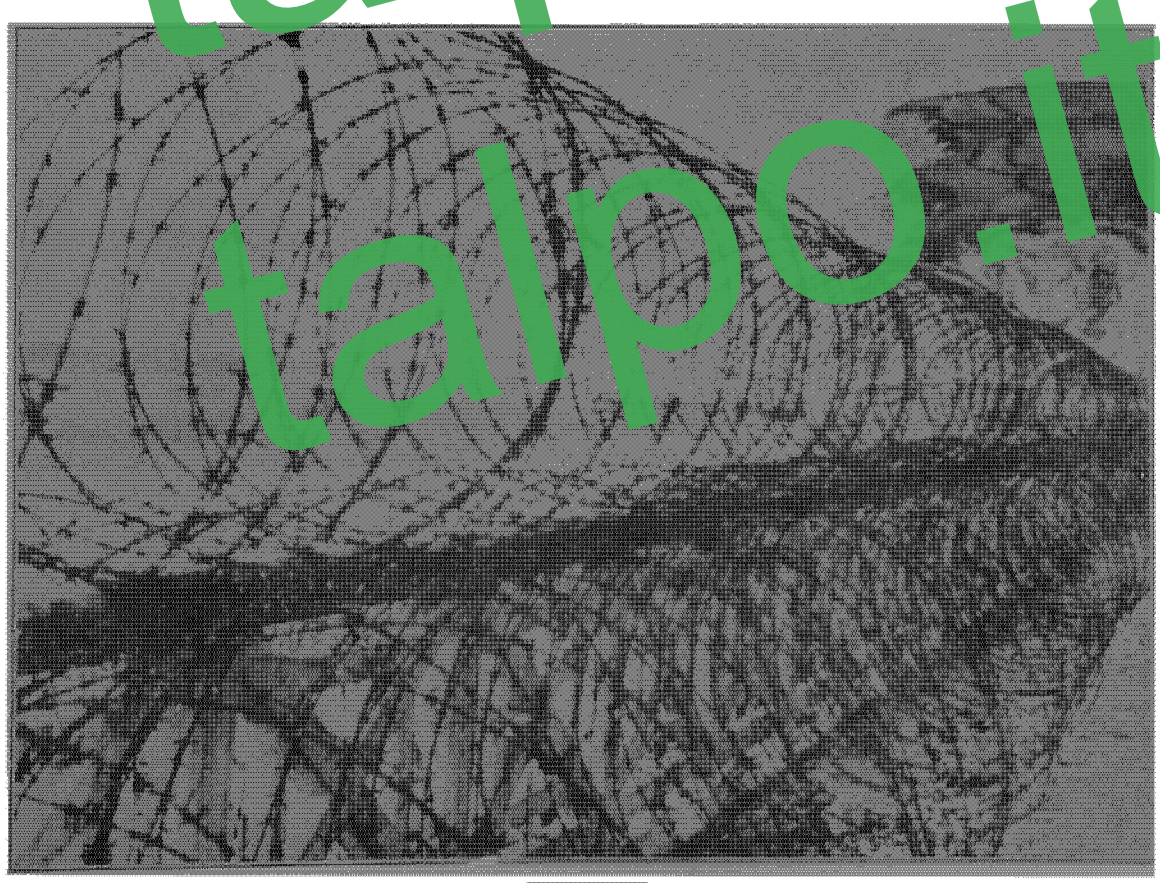

PLATE 3

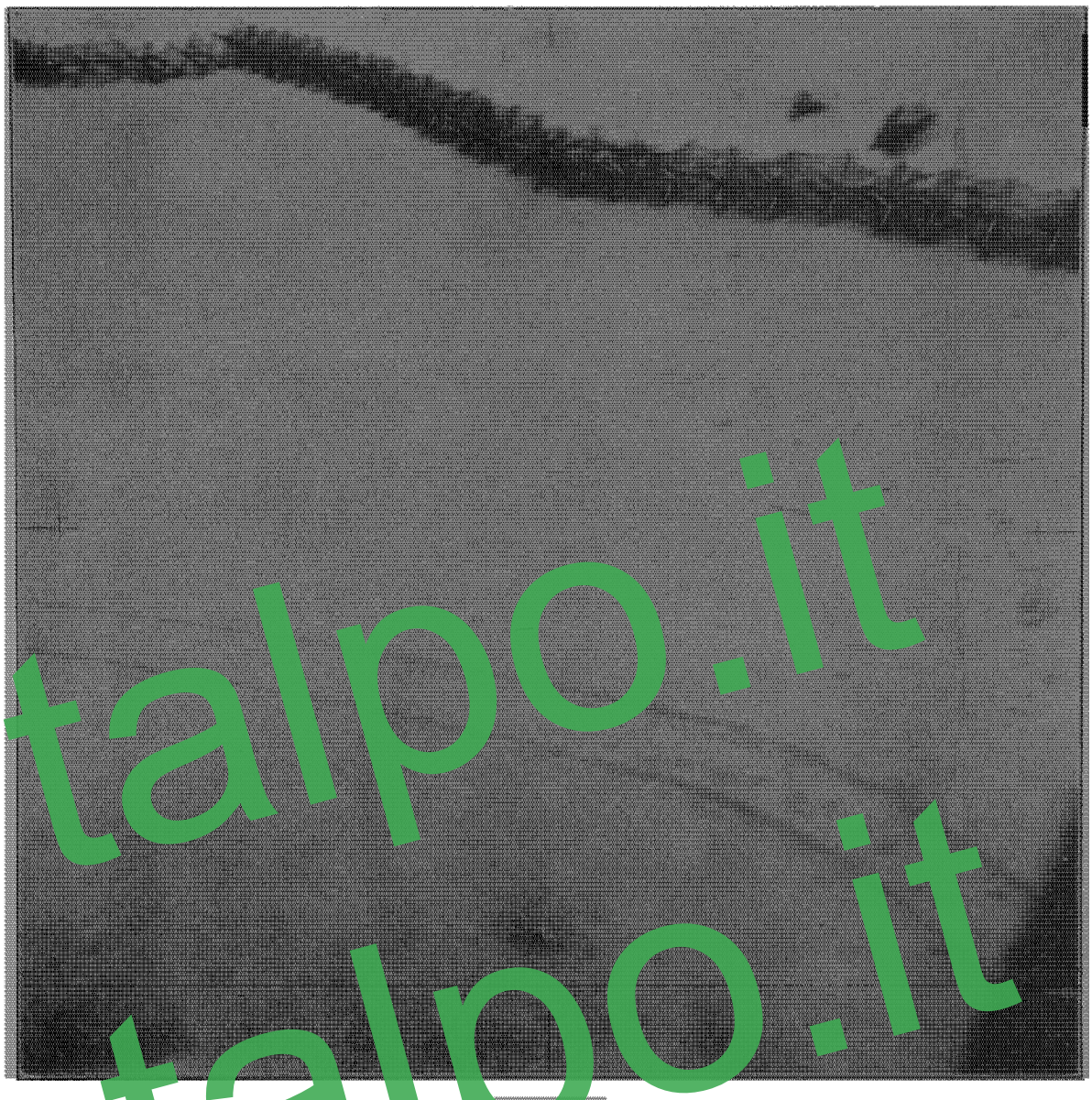

PLATE 5

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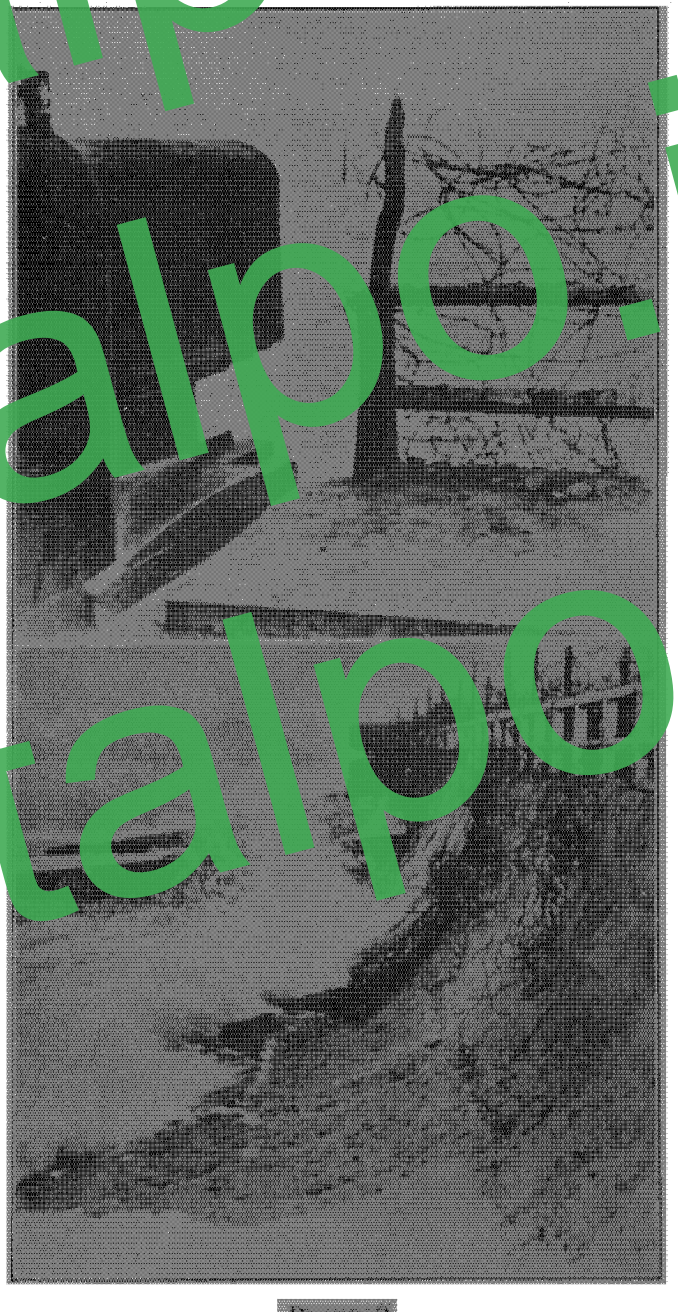
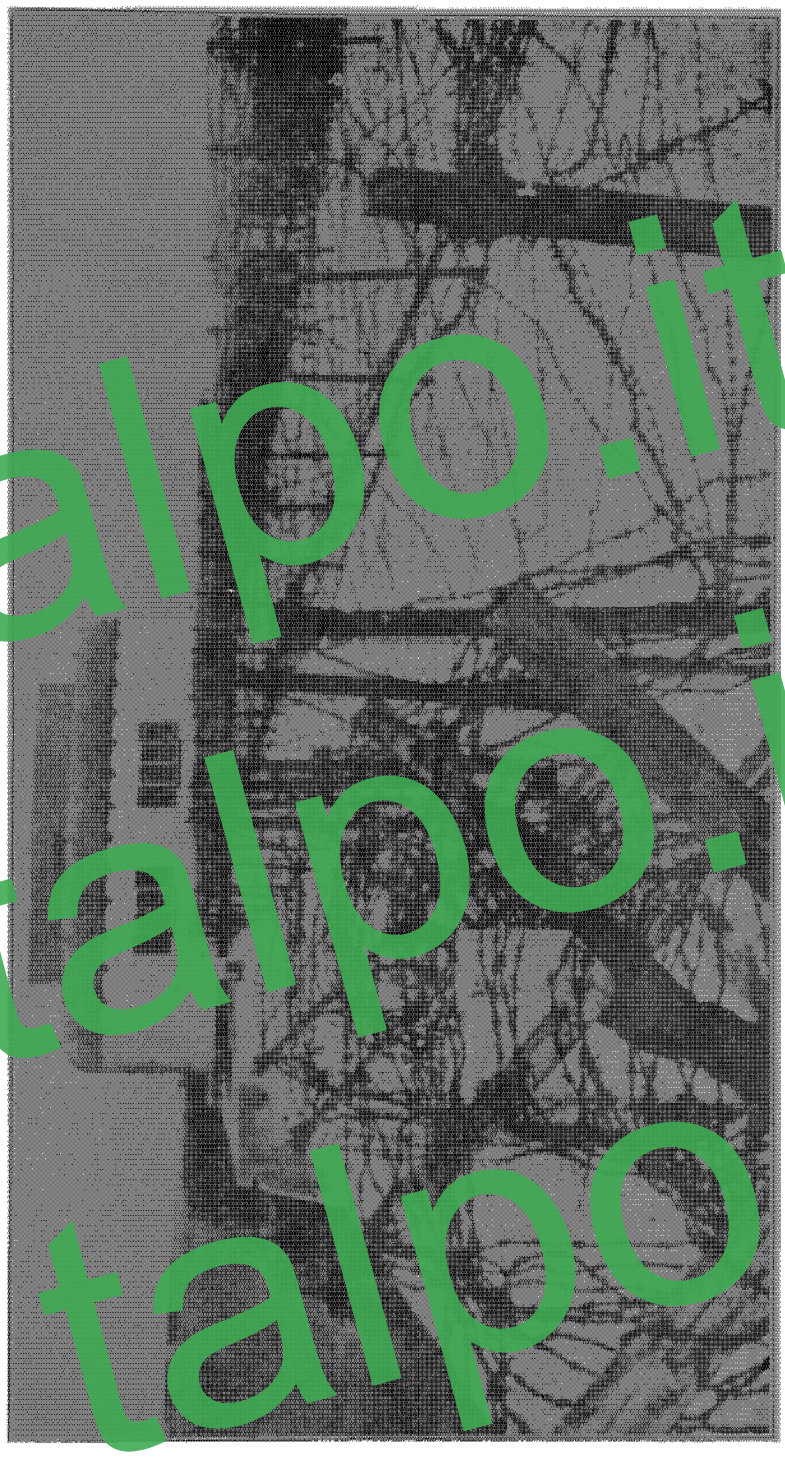


PLATE 9



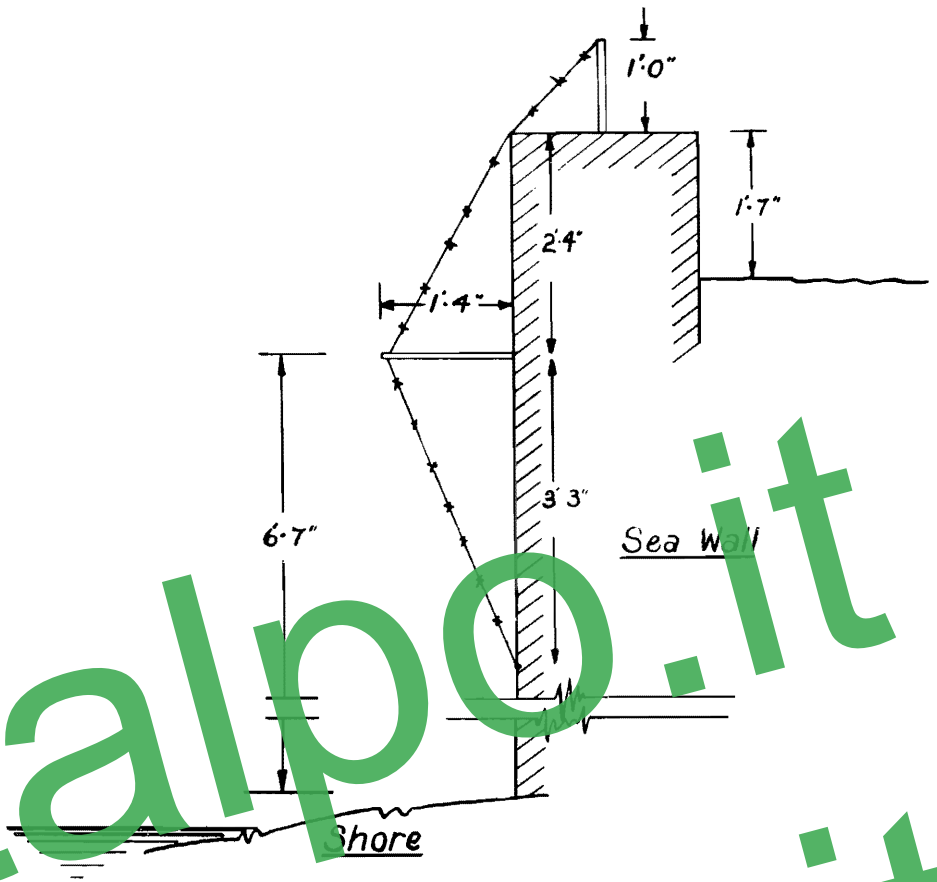


Plate 10 A

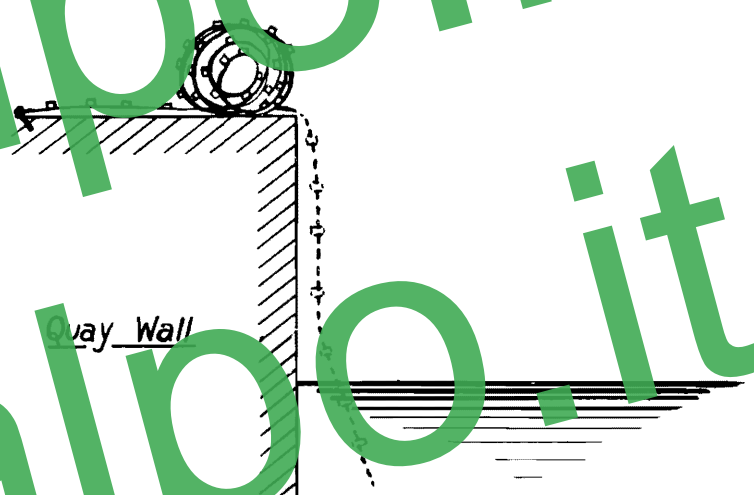
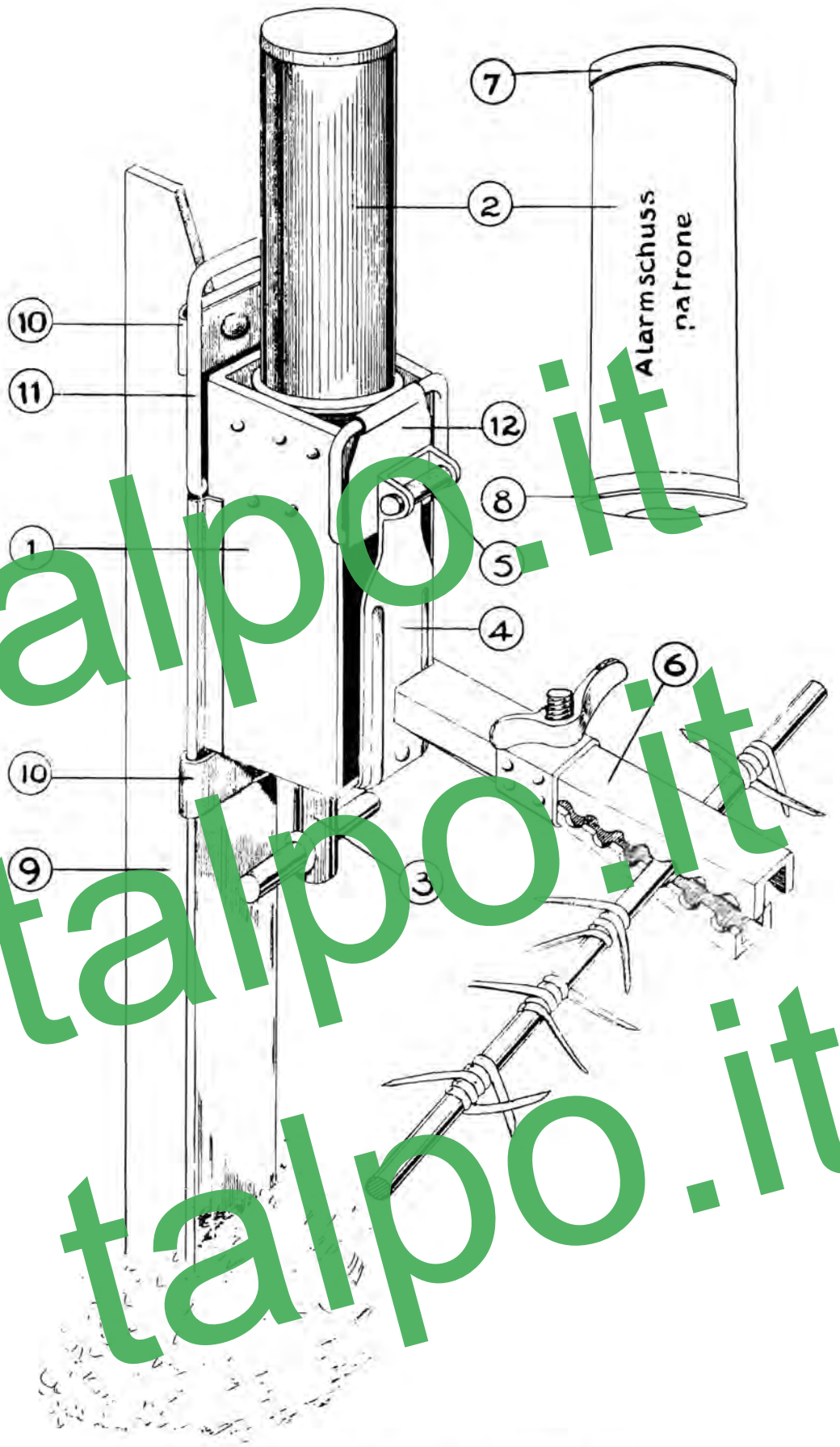


Plate 10 B

Mi.108/782
Aug. 43 J.E.P.

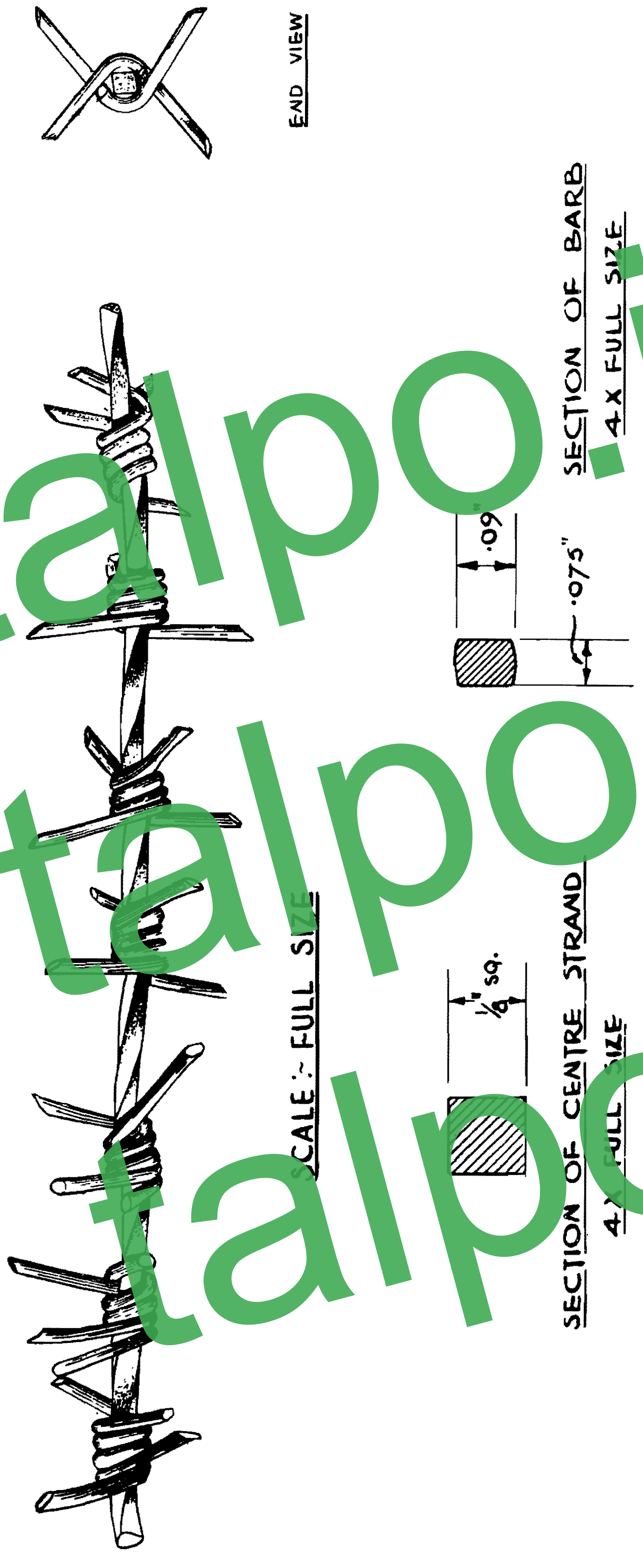


TRIP WIRE ALARM

Plate II

MI. 10 b/749
June '43 ABW

Plate IIA



GERMAN BARBED WIRE

M.I. 10 b/759
June '43 ABN

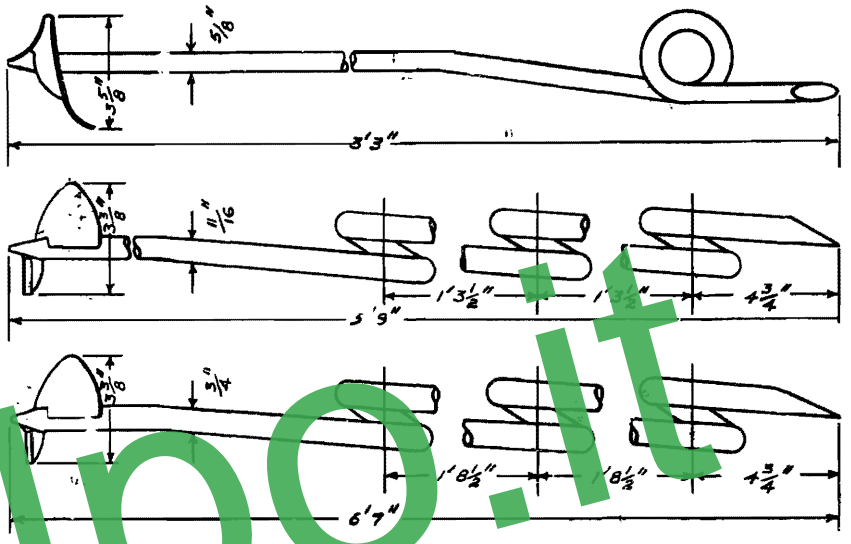


FIG. 1.

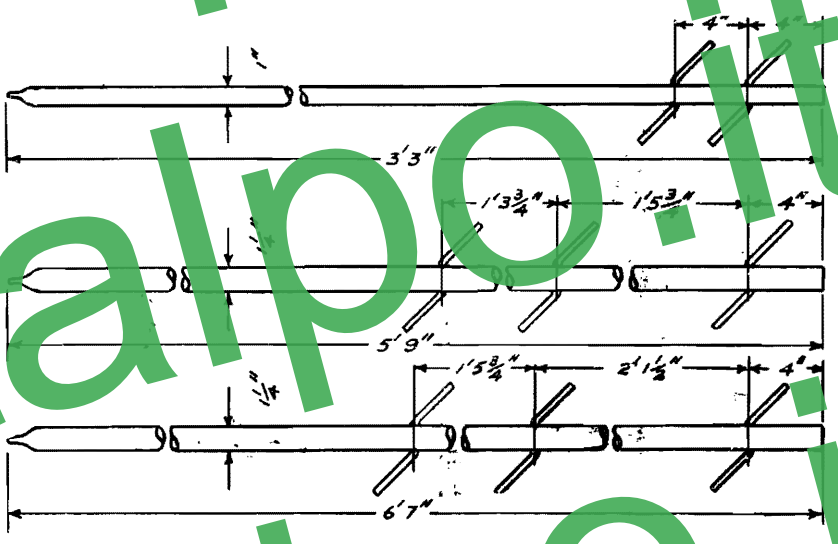


FIG. 2.

GERMAN PICKETS FOR WIRE OBSTACLES

Plate IIB

MI. 10b/743
June '43 ABW

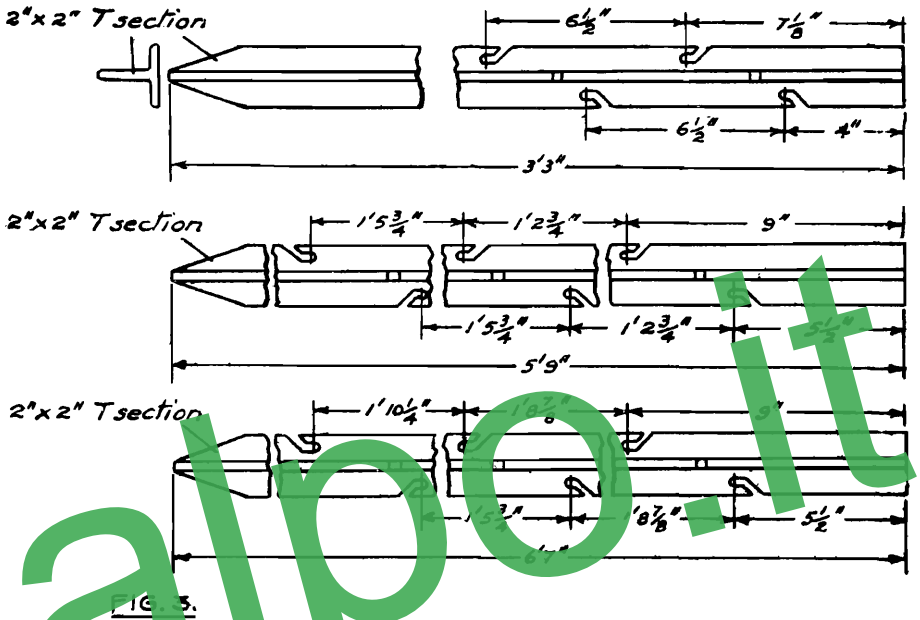


FIG. 3.

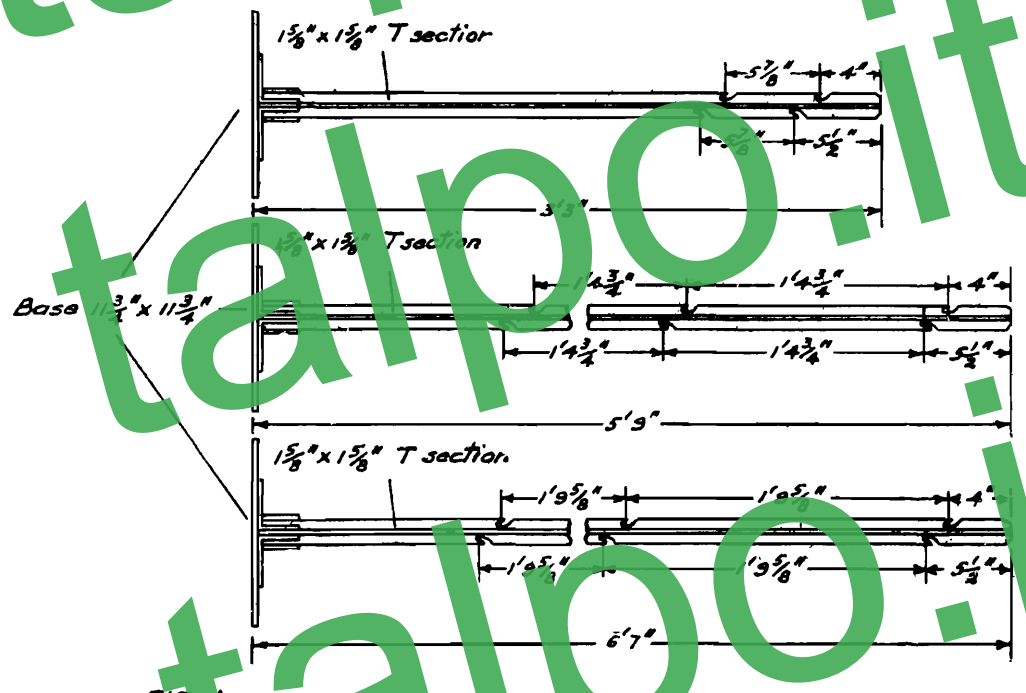


FIG. 4.

GERMAN PICKETS FOR WIRE OBSTACLES

Plate 11B

MI. 10 b/744
June '43 ABW

PART I - CONCRETE AND BRICKWORK

1. GENERAL.

The following information principally concerns types of contruction in HOLLAND, BELGIUM and FRANCE

The use of concrete in the construction of walls in all strongly defended areas is common. Walls are used to block streets and roads in coastal towns, at the approaches to key points, and on the outskirts of towns generally. Access to a built-up area from a beach is often blocked by a continuous wall along the entire sea front and where the wall is sited along the building line the ground floor window and door openings are filled in with brickwork. The wall is sometimes in front of the building line.

From a study of the avialable photographs the standard of workmasnship on these walls appears to vary from good to fair. Timber shuttering is used almost exclusively, in fact, there has been no evidence of the use of steel shuttering. The timber shuttering has, on some sites, been very roughly fixed and badly strutted against slip when the concrete is poured; this is particularly noticeable in the South of France.

The proportions of the concrete mix are not known, although every effort has been made to obtain them. It is very probable that local materials have been used whenever available including large quantities of shore gravel and sea sand. The placing of large stone or "plums" particularly in the foundations, has also been reported from good sources. The use of "plums" is not likely in the reinforced sections of walls. The use of "plums" in mass concrete retaining walls is common engineering practice but they are of doubtful value in walls designed to resist A.P. shot and explosives. The quality of the cement used in the various districts is not known. One sample obtained from the CHERBOURG area (Notes on German Fieldworks No. 2) indicated that, in this locality at any rate, the quality of the cement was not equal to normal British portland cement. A number of reports have mentioned the use of a "wet mix" concrete, which implies a high water/cement ratio and therefore, correspondingly a lower strength in the finished concrete.

The use of steel reinforcement in walls and other concrete obstacles is now established beyond doubt. Although earlier reports made no mention of the use of steel, and it was believed that little, if any, was used it is by no means certain that the earlier works are entirely mass concrete construction. The use of second-hand railway rails in three rows of close spacing has been mentioned by a source who is considered fairly reliable and observant. Hooked bars have been seen projecting through the top of the walls and these may be intended for holding wire concertinas as well as reinforcing the concrete. In several localities it has been reported that broken glass has been cemented into the top of concrete walls, especially road-block walls.

In connection with the construction of these walls, it should be noted that ditches are being excavated along the toes of walls to improve the effectiveness of the obstacle, or alternatively, a tank-trap may be constructed in the form of a pit covered with planks, vaulted in brickwork, road metal or netting. In areas where large quantities of stone are readily available from quarries, road blocks are often constructed of stone and not concrete.

2. WALLS.

Typical types of wall are as follows:-

(a) Continuous walls

Thickness minimum	5 ft.	(1.5m.)
"	frequently reported	6 ft. 7 ins. (2m.)
"	frequently reported	8 ft. 3 ins. (2-5m.)
"	max. to be expected	10 ft. (3m.) to 11 ft. 6 ins. (3.5m.)

[redacted]

Height above ground level

minimum	6 ft. 7 ins.	(2m.)
most likely	8 ft. 3 ins.	(2.5m.)
max. to be expected	10 ft. (3m) to 11 ft. 6 in.	(3.5m.)

Height, including ditch in front

probable minimum	15 ft.
probable maximum	25 ft

Plate 12 shows one of the largest walls yet seen. The curved section of the wall is formed by straight shuttering in narrow widths; there is also a substantial toe and the back face of the wall is inclined towards the front. The centre of gravity of this wall is probably within the front third of the foundation width. A number of dark marks on the end of the wall were noticed on the original photograph, some of which are to be seen on the illustration. These may be wood blocks left in the concrete, to be cut out later when the next length of wall is bonded to the old work. If steel reinforcement is used in this wall no provision has been made to bond the reinforcement (if any) of new work to the steel, if any, in the wall illustrated.

A vertical concrete wall with splayed projecting section of about 2 ft. 6 ins, is shown in Plate 12A. The height of the wall is estimated as 9 ft. 6 ins. The wall constructed in brickwork may have a building behind it.

On another wall of similar shape, where the splayed projection was deeper, the steel bars near the face of the wall had been cut long enough to project through the top of the wall. The bars appear to be $\frac{1}{2}$ in. diam. at 9 in. centres, with hooked ends and having a loop bent in the bar about half way between the top of the wall and the end of the hook. The bars are bent forward to overhang the walls and may be intended for barbed wire to prevent scaling by landing troops.

Another type of projection, reported recently, consisted of a plain cantilever 1 ft. 8 in. long at the top of a 10 ft. wall; the thickness of the cantilever was not given.

Another type of concrete wall is shown in Plate 13. This has a rounded top, curved face and a ledge on the back of the wall. The purpose of the ledge has not been determined.

The type of wall shown in Plate 13A has, up to date, been the most common form of continuous construction. This wall is probably 6 ft. 7 ins. thick x 9 ft. 0 ins. high above ground level.

(b) Walls with gaps.

The gap is usually sufficient for one vehicle to pass at a time. A number of reports have mentioned the use of steel rails and reinforced concrete beams for closing the gaps; the former being the most common.

Plate 14 shows a wall 7 - 8 ft. high, 5 - 6 ft. thick at its base, built across a road, but having two gaps, one for road traffic, the other for a light gauge railway. The ends of the walls facing the railway are slotted to take rails or other material for closing the gap. The two sections across the road are built on the skew and may overlap so that a long distance view of the obstacle would tend to give the impression that there is no gap.

Plate 14A shows a typical wall of the rounded top type. This wall is probably 6 ft. 7 ins. thick x 8 ft. 3 ins. high. Reference is made to the steel hedgehogs in Part III, para. 3.

/ Plate 14B

Plate 14B shows a straight through type of road block with walls slotted for some kind of barrier.

Plate 15 fig. 1 shows a type of road block between AMSTERDAM and HAARLEM. The two outside blocks are 6 ft. cubes and the centre block is 13 ft. long, 6 ft. high, 6 ft. wide. Between the blocks there is just sufficient space for one car to pass. It will be noticed that the cycle track and the tramway on either side of the road are left unobstructed.

Plate 15 fig. 2 shows the layout of a large road block near THE HAGUE. It is said to consist of a wall 10 - 12 ft. thick with the gaps askew to the line of the road. From a distance, these gaps may appear to be very narrow. Large concrete pyramids are kept at the side of the road ready to block the openings. On the banks of the road there are a number of wooden posts 9 ins. diameter standing 1 ft. above ground level. Beyond these posts, barbed wire fences continue across the fields. The widths of the openings left for traffic are estimated dimensions.

Plate 15A fig. 1 shows a type of "skew" road block at ST. NAZAIRE. Where minor roads are completely blocked the main thoroughfares have a gap sufficient for one vehicle to pass through.

Plates 15B, C and D show the types of concrete road block reported from CHERBOURG. Fig. 4 of Plate 15D is an illustration of the design used but this may have been superseded by a heavier and higher wall in more recent construction.

(c) Reinforcement.

While information on the use of steel in walls is very limited one refugee source has given some details regarding one particular wall at SANTEC. A sketch is given at Plate 15A, fig. 2. The wall is reinforced with 3/8 to 1/2 inch bars at 12 ins. centres. Good sources from HOLLAND have constantly mentioned "light profile reinforcement" as standard, and this agrees well with an earlier account of the SANTEC wall.

(d) Loopholes.

In the CANNES locality a source has mentioned loopholes 12 in. wide x 8 in. decreasing near the centre of the wall and then expanding to 24 in. wide x 16 in. on the target side. Pillboxes are known to be built into walls at the HAGUE and MARSEILLES and A.tk. and M.G. emplacements behind walls are very common.

3. CUBES.

These are used in the same way as "dragons' teeth" but are also to be found across hollows in dunes which might provide an exit for vehicles. They are used in 1, 2 and possibly 3 rows, not always staggered. In dune country they are generally on a forward slope near a crest. Where the pillars are rectangular, they measure about 3 ft. on each side by 4 ft. high and the cylindrical types are 3 - 4 ft. drain by 4 ft. high.

4. DRAGONS TEETH.

These are used to block streets, exits from quays, and well defined beach exits particularly where the level of the beach approximates the level of any road or track. This type of obstacle consists of 3 or 4 staggered rows, 6 - 8 ft. apart, the distance between teeth in one row being 6 - 8 ft. Of the types on which information is available they appear to be regular pyramids between 2 ft. 6 ins. and 4 ft. 6 ins. high. It is probable that the teeth are connected at their base, from front to rear, by a concrete

/ beam

beam which would prevent immediate overturning on impact from a tank.

Plate 15 shows approximate details of a reinforced concrete dragons tooth at one particular locality. Source who gave this information indicated that the dragons teeth were built in three sizes, the one illustrated being the largest, one behind the other with their foundations touching. Apart from the slope of each tooth there was no gap between them. The spacing, centre to centre, between sets of three across the road, may by 6 to 8 ft. No details are available of the intermediate and smallest sizes but it may be assumed that the same method of construction was used throughout.

Plates 17, 18 and 19 show this type of obstacle somewhere in Germany. It has been reported that the barbed wire has been removed for use in other areas. The teeth are almost certainly connected by continuous beams in reinforced concrete. The four row type has been reported to have teeth varying in a straight incline, from 1 ft. 8 ins, to 4 ft. 7 ins. high constructed on a continuous beam 2 ft. 8 ins. thick.

5. TETRAHEDRA.

These are described in German documents as being about 3 ft. 3 ins. high and consisting of three reinforced concrete beams forming a tripod and connected at their apices by a concrete cap. Each tetrahedron is secured against overturning by a basal cross-piece (Grundplattenkreuz), the exact design of which is not known, and is secured in the ground by concrete piles. There are no reports of their use in occupied Western Europe.

6. HEDGEHOGS.

These consist of three reinforced concrete beams connected at right angles at their centres, and stand up to 5 ft. high. There are no reports of their use in occupied Western Europe.

7. CONCRETE POSTS.

A training document dated 1940 states that concrete posts may be pre-cast between double-channel sections and may be fixed upright or pointing towards the enemy, and are generally arranged in chequer-fashion in up to 7 rows. Reports state that obstacles of this type, 2 ft. to 2 ft. 6 ins. in height and 1 ft. 6 ins, in width, have been used as roadblocks in N.W. coastal districts of France.

8. STARS.

Stars have not been reported for some years. They consist of four reinforced concrete legs, radiating from a centre, each set at 120° to each other, and each leg is about 2 ft. 6 ins. long. The effective width of each is 5 ft. 3 in, and the standard lay-out is three rows with up to 16 ft. between rows.

9. BRICKWORK.

A number of brick walls have been constructed but the use of this material is, with few exceptions, confined to the blocking of subsidiary highways. The quality of the bricks is not expected to be high and certainly not equal to the best pressed engineering brick produced in this country. The height of these walls may be up to 9 ft. high and 2 ft. 3 in. thick. Plate 20 shows a brick wall built across a subsidiary street having three piers and a plinth; the thickness is not known. Many of these walls are built to protect harbour areas from trespassers and observers.

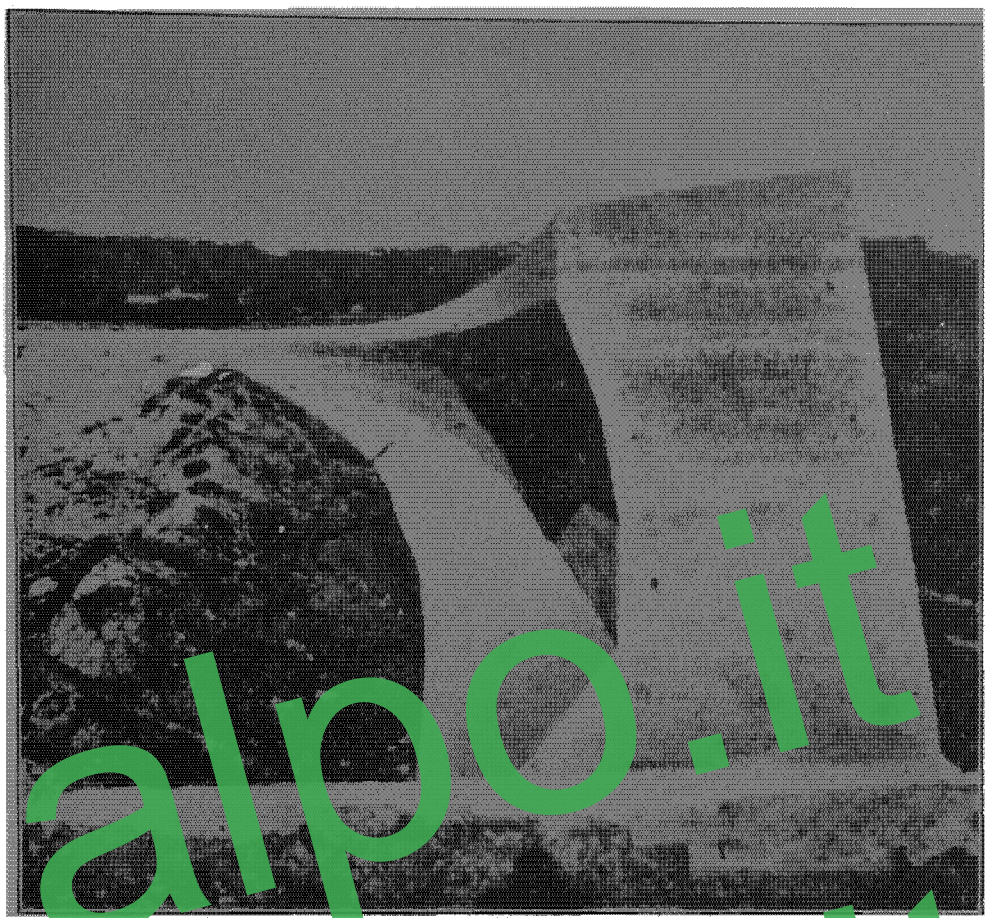
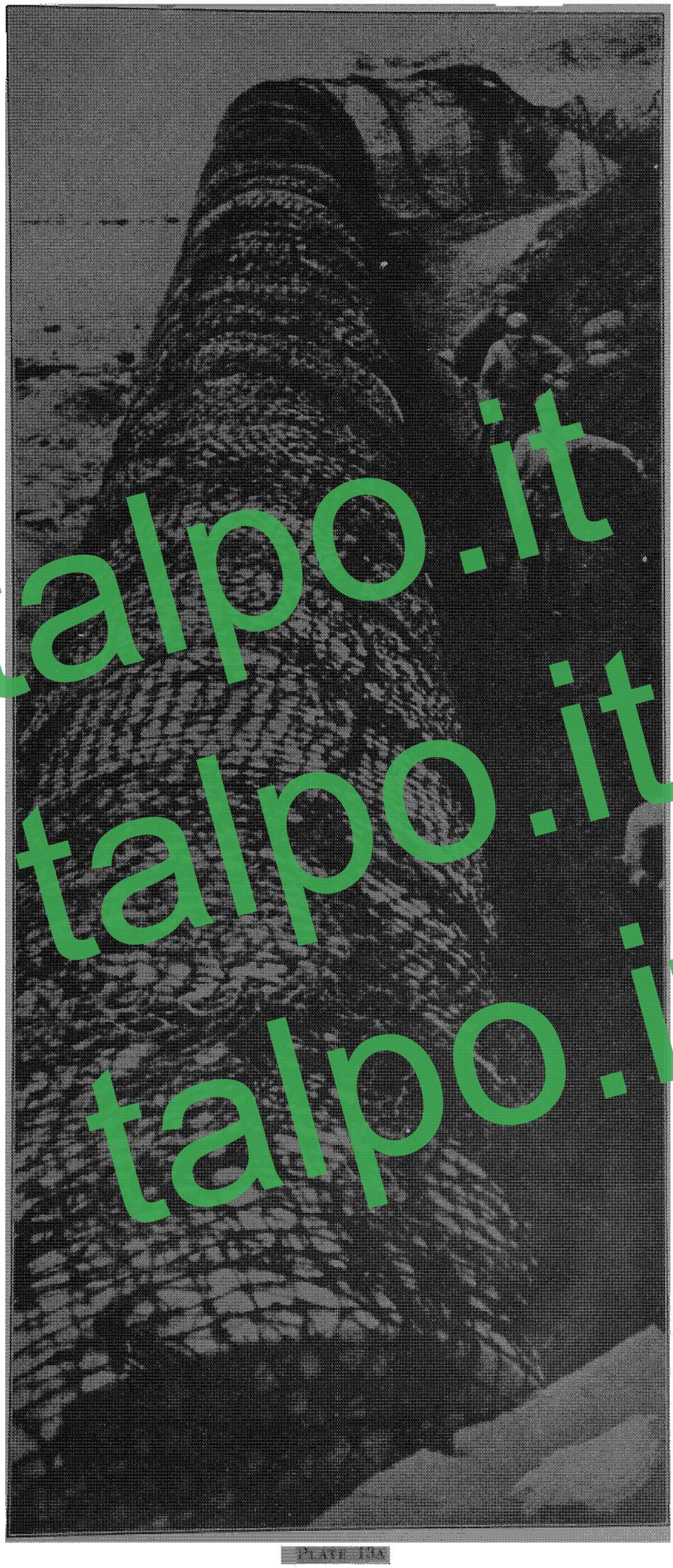


PLATE 12

PLATE 13

PLATE 12A



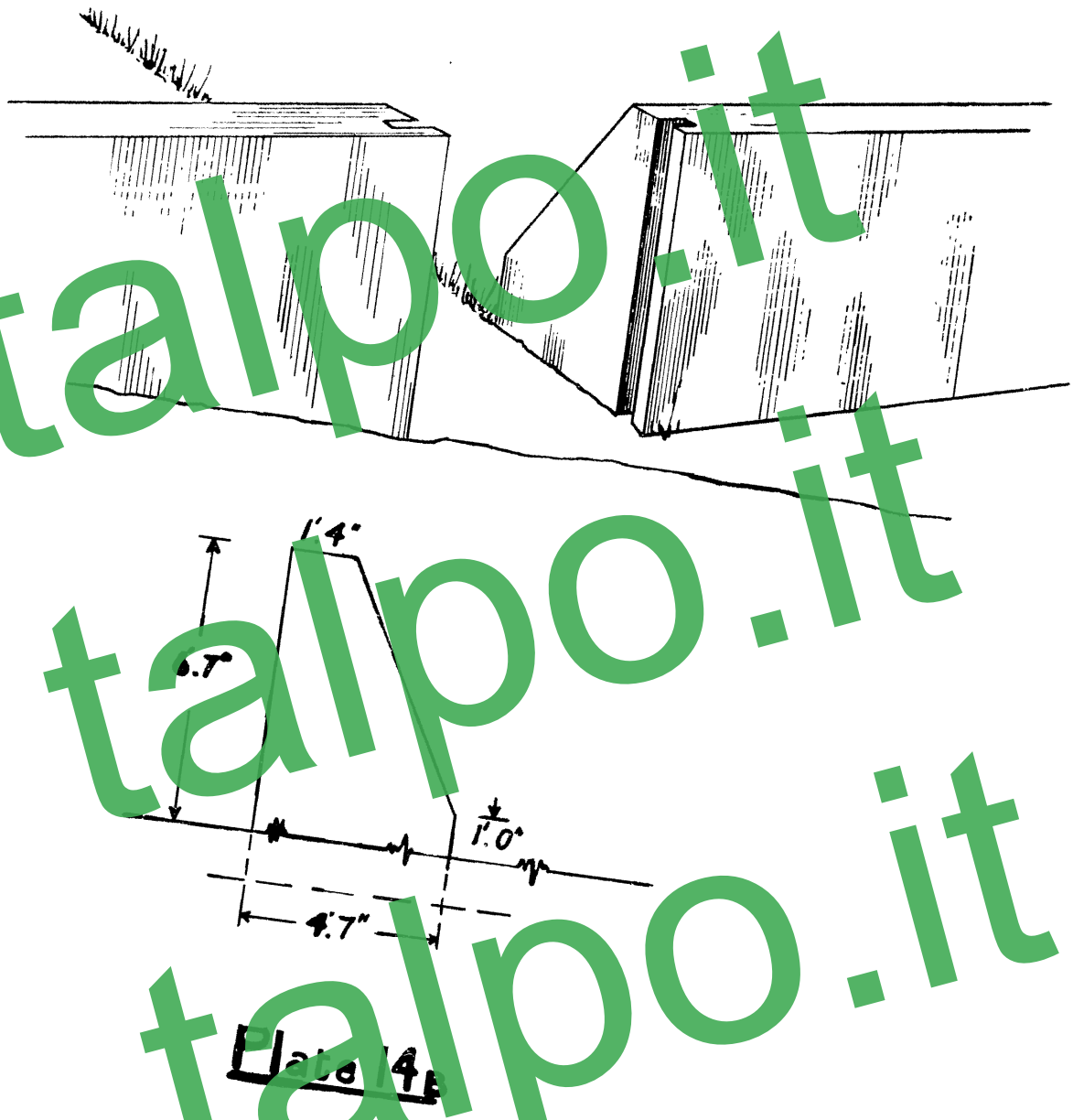


Plate 14B

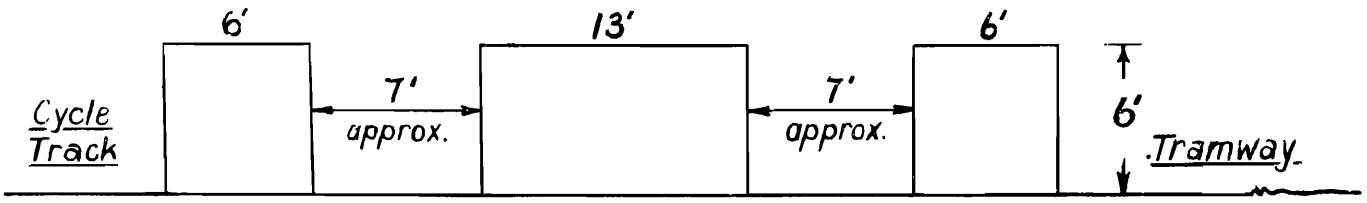


Fig. 1

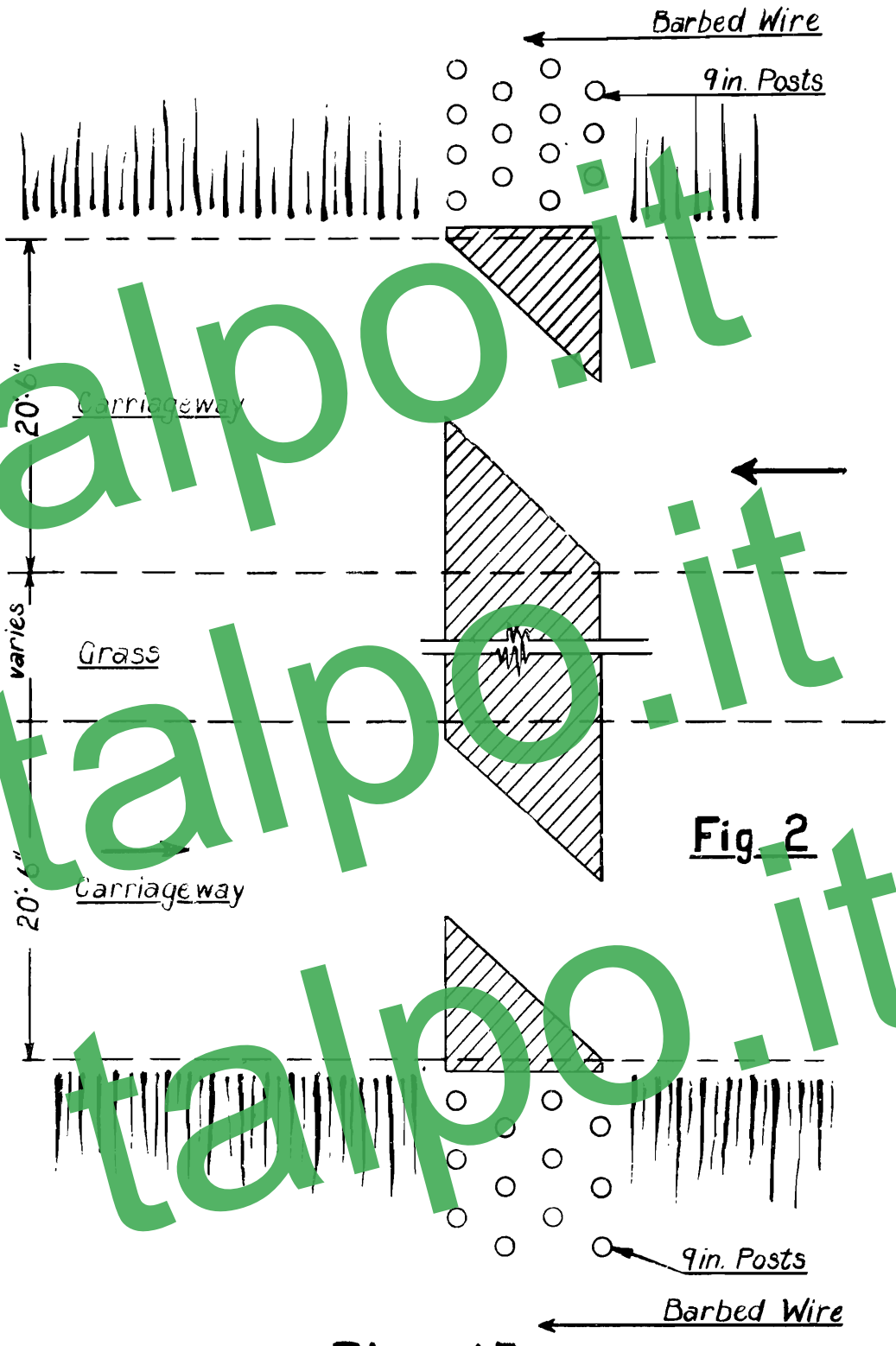
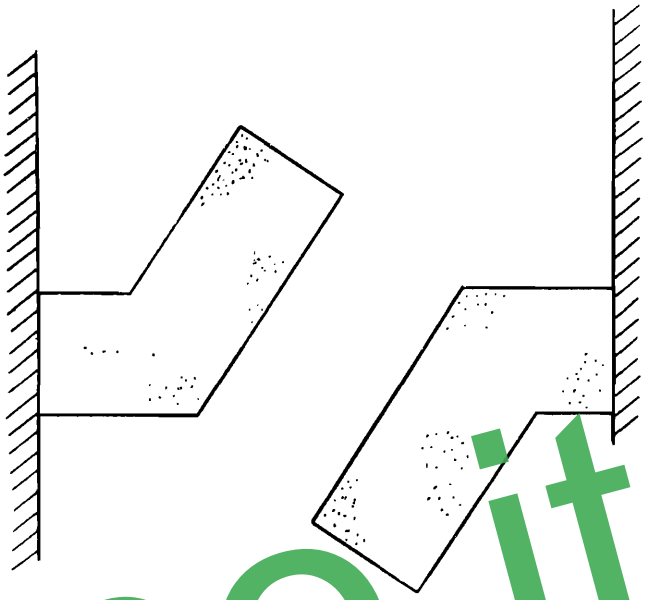


Fig. 2

Plate 15

M1.108/T84
Aug 43J.E.F.



Dimensions assumed - Scale 10 ft = 1 in

Fig. 1

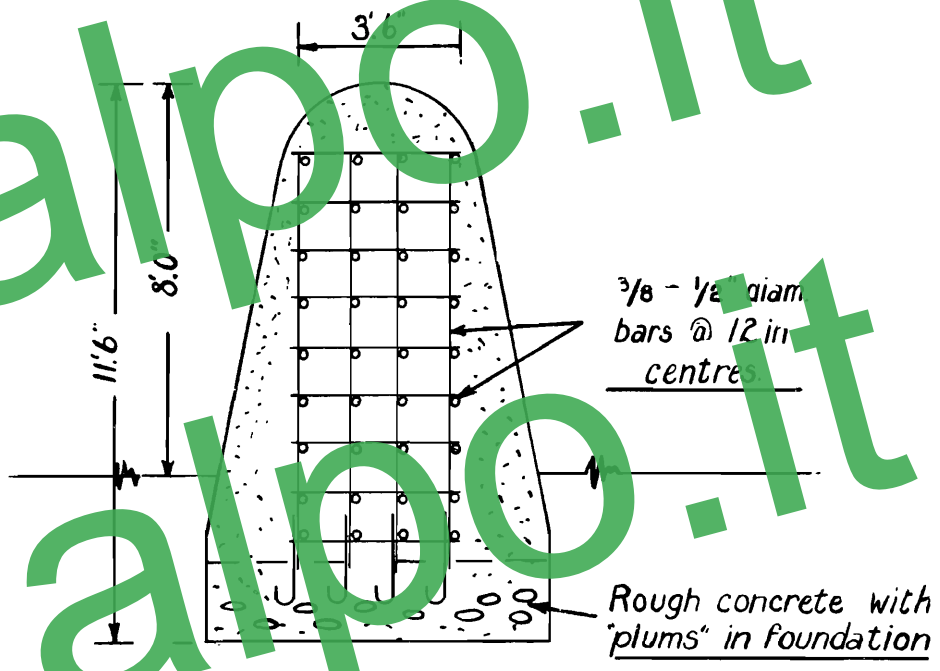


Fig. 2

Plate 15A

M1.10B/785
Aug. 43 J.E.P.

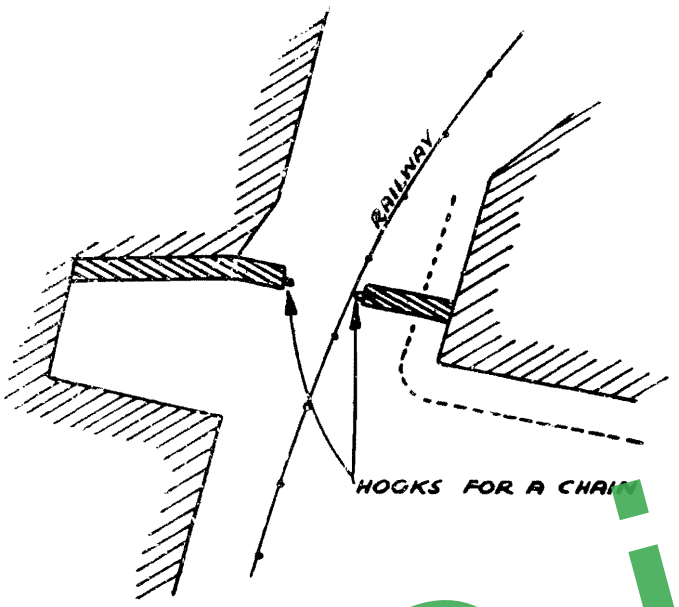


FIG. 1

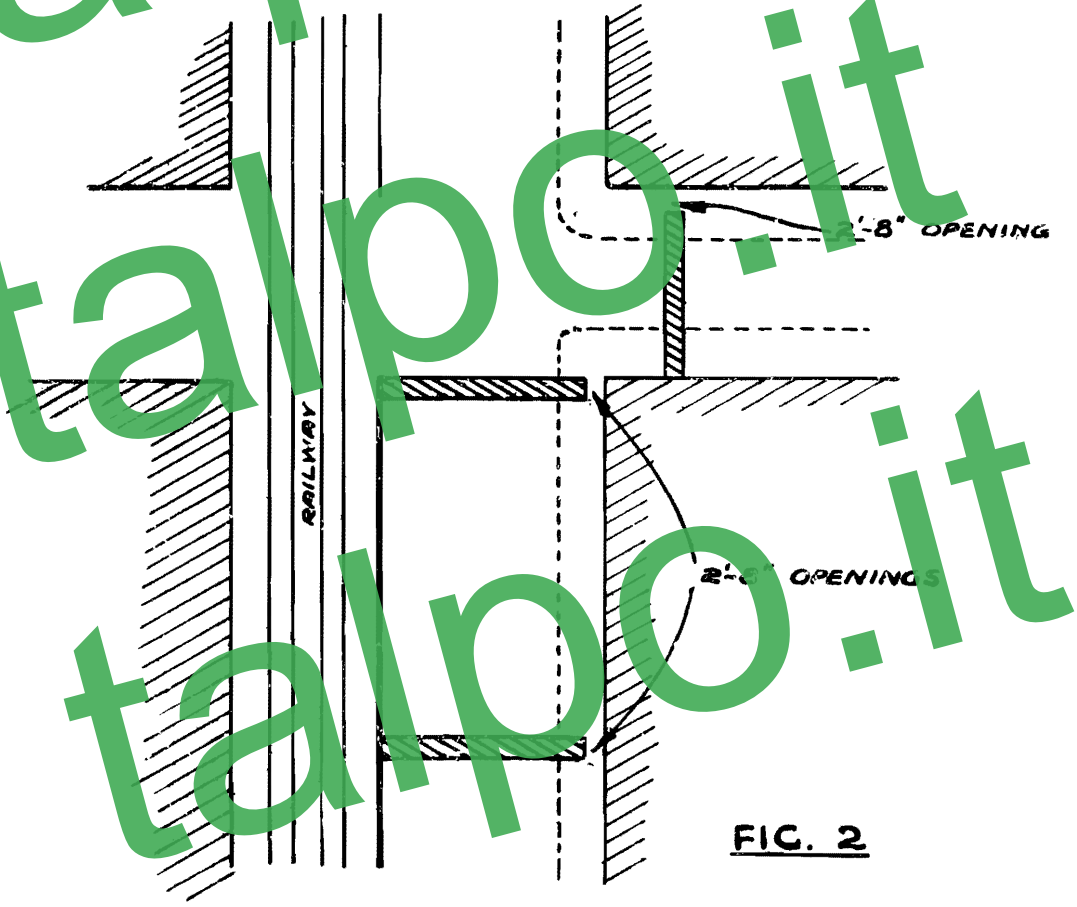


FIG. 2

PLATE 15 B

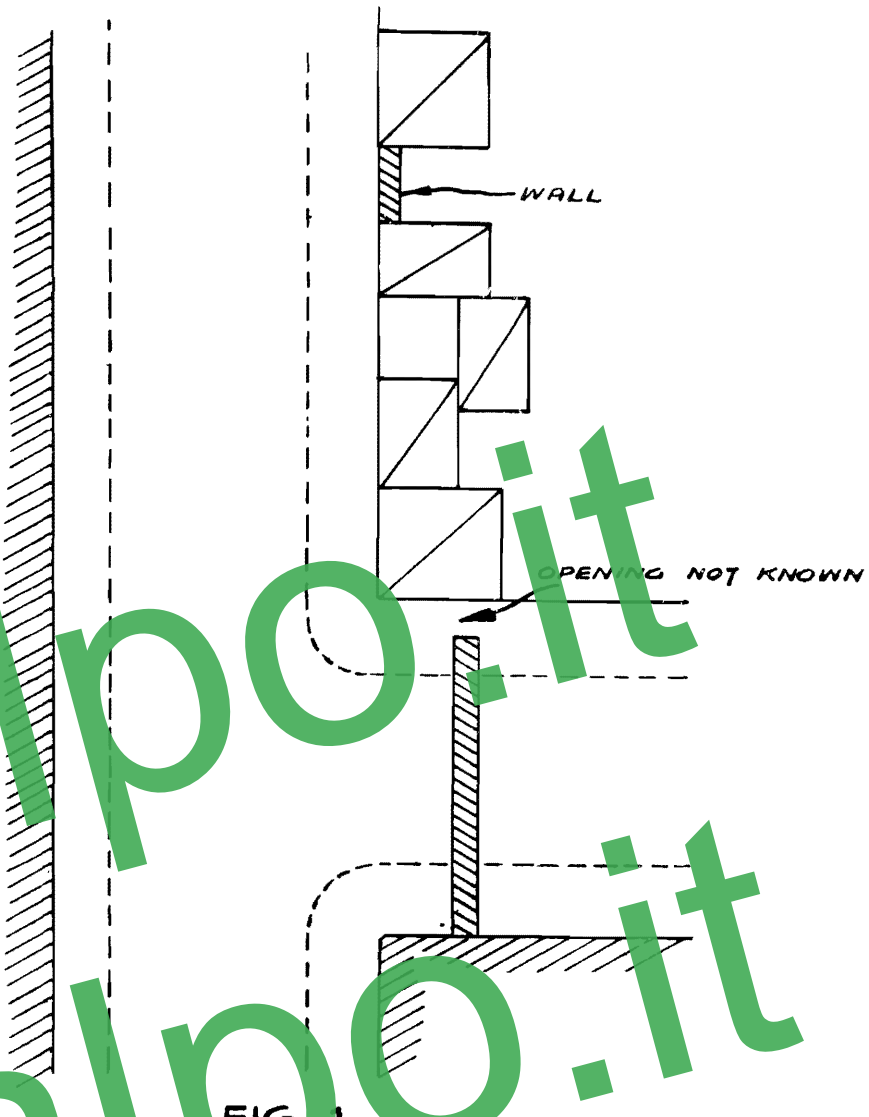


FIG. 1

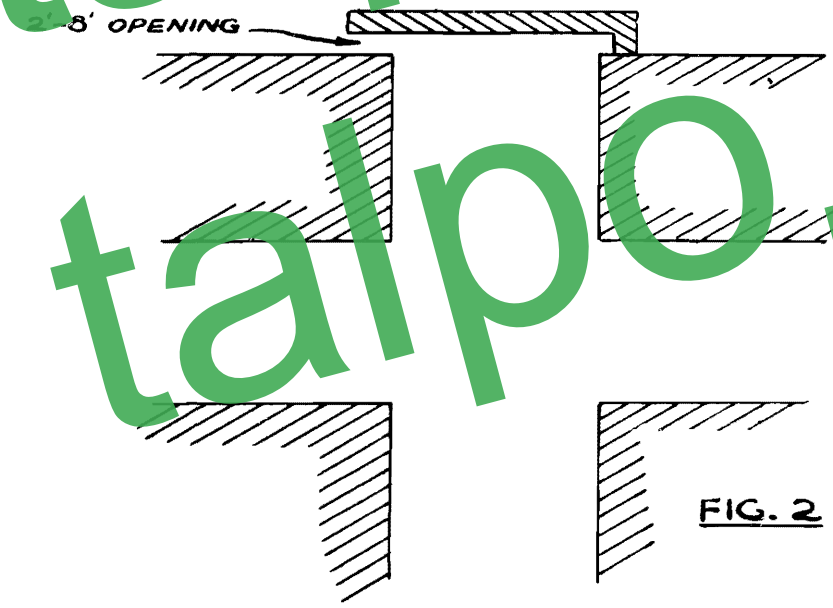


FIG. 2

PLATE 15 C

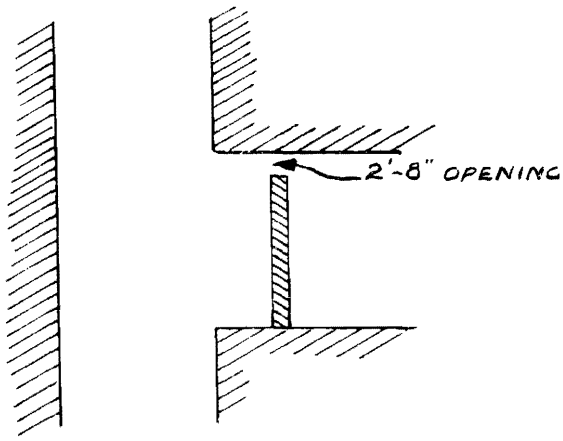


FIG. 1

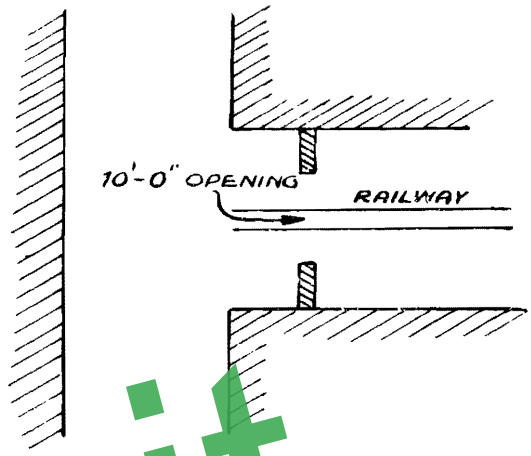


FIG. 2

FIG. 3

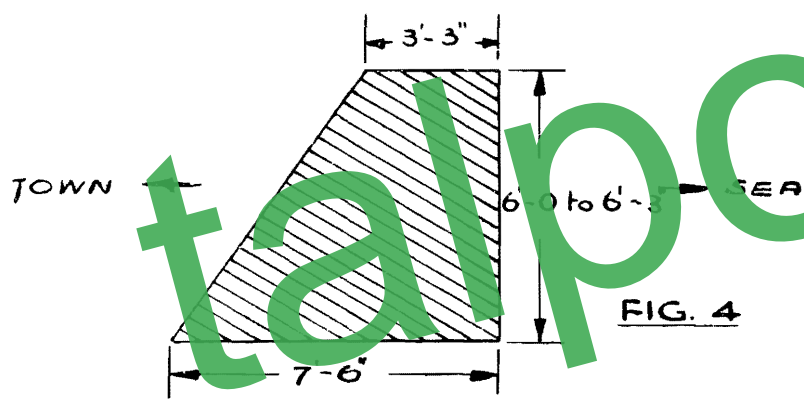
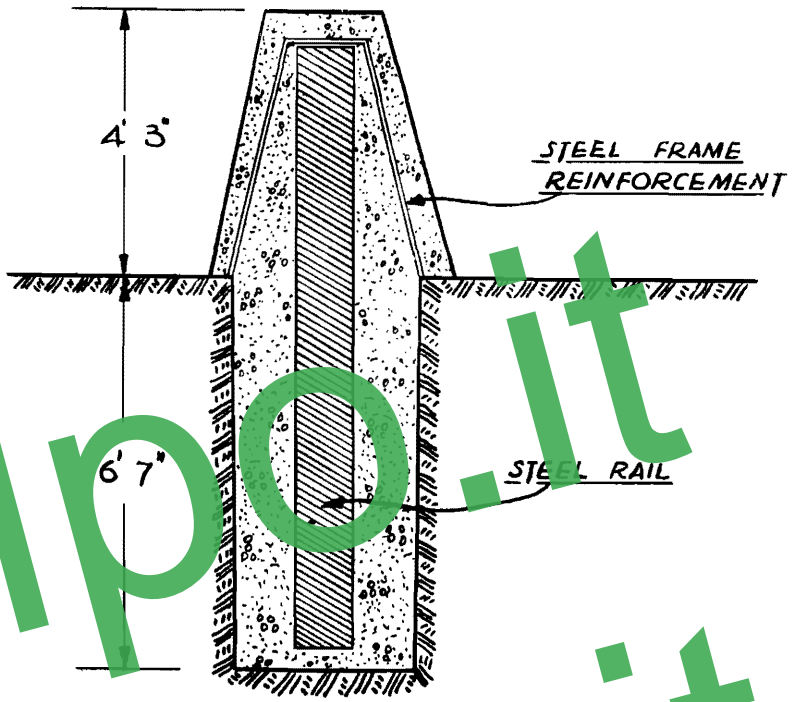


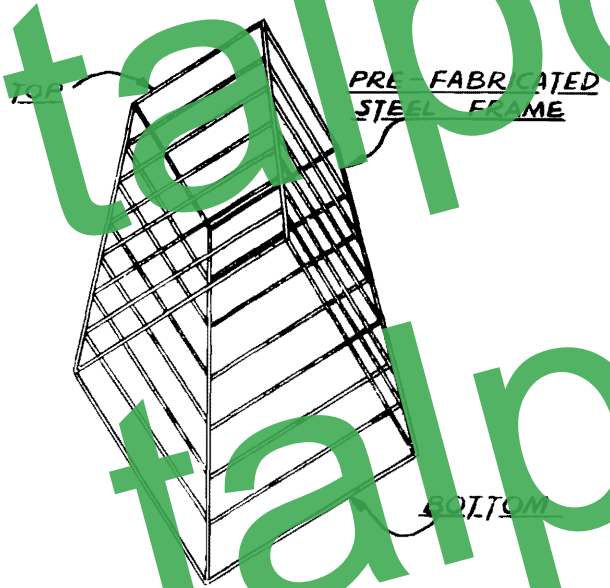
FIG. 4

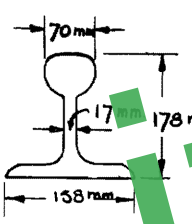
PLATE 15 D

M1.10 b/789
Aug '43 ABW

Plate 16







TYPICAL SECTION OF FRENCH RAIL

REINFORCED CONCRETE DRAGONS TEETH

M1. 10 b/797
June '43 ABW

Plate 15

PLATE 19

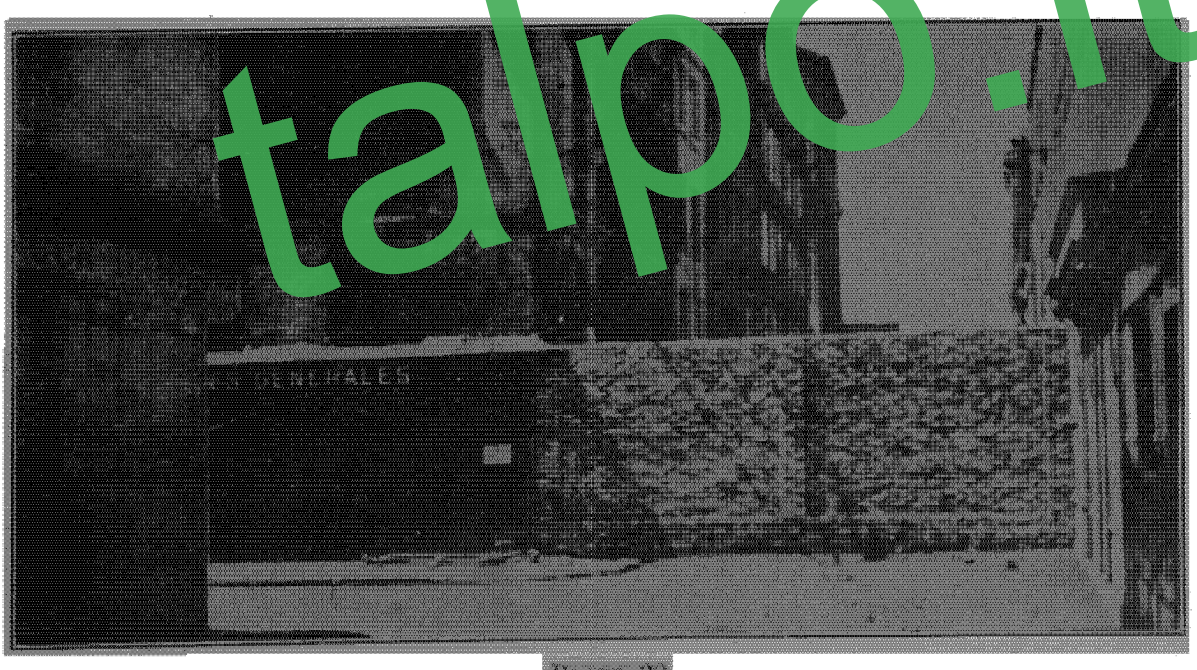


PLATE 20

[redacted]

PART III - STEEL

1. CURVED RAIL.

This type of obstacle was, apparently, first introduced by the Germans prior to 1940. Plates 21 and 22 were probably taken about 1937, Plate 23 is reproduced from a photograph captured in North Africa, and Plate 24 shows the obstacle forming part of beach defences. Full details are not available but a reconstruction from available photographs and sketches is given at Plate 25.

2. DE COINTET.

This is more generally known as the Belgian Elements "C" and is found:-

(a) Along open beaches, occasionally in stretches over a mile long, sometimes across the estuaries of small streams.

(b) In front of and at flank approaches to defended localities.

(c) As a temporary obstacle until concrete walls are completed.

(d) In sections as movable barriers for streets, bridges, quays, jetties, and possibly a modified design for railways.

Plate 26 shows a side view, the steel rollers being partly obscured by long grass. Note the towing hooks at the rear and the steel loops on the side of the front vertical member which are for taking the locking bars.

Plate 27 shows the sections fixed in position.

Plates 28 and 29 show the approximate dimensions of this obstacle.

3. HEDGEHOGS.

These consist of three lengths of angle iron connected at right angles at their centres by welding or gusset plates. The latter method is the more usual. It is a standard obstacle (Stahl - Igel) and may be up to 6 ft. high and are commonly used in continuous rows. Plate 30 shows the official German design taken from documents (Bildheft Neuzeitlicher Stollungsbau dated 1st Sep. 42) and it is interesting to compare this illustration with Plate 14A.

In addition to the movable type of hedgehog, they may be found embedded in concrete or prepared holes made in the roads to receive one leg from each section when the order is given to close the road. It is well known on beaches of the French channel coast. It seems very probable that this obstacle is now superseding the timber knife rests on important approaches to defended localities.

4. TETRAHEDRA.

These are made principally of angle section steel to block beach exits, ramps, promenades and streets leading from the beach. They consist of three or four pieces of steel embedded in concrete with the apex welded or bolted. Plate 31 shows these, of varying heights, embedded in concrete with small in-situ concrete blocks to assist in exposing the belly of A.F.Vs to fire. There have been no reports of these being constructed in more than one row.

There apprear to be three types:-

(a) 2 ft. 6 in. high approx.

(b) 4 ft. 0 in. " "

(c) 4 ft. 6 in. " , bolted 3 ft. 3 in. above ground level, with the ends projecting above the join.

/ 5.

[redacted]

5. ROLLED STEEL JOISTS.

In recent months R.S.Js appear to have been used on an increasing scale A photograph of one of these obstacles is given at Plate 32. The official type given in German documents is shown at Plate 33 and it will be seen to compare well with that actually constructed in occupied territory. The official German term for this obstacle is Schienensperre.

Behind the walls blocking the seaward end of streets leading to the promenade in Belgian coastal towns, rows of upright rails 3 to 5 ft. high are reported only 6 to 7 ft. from the walls.

Another type seen on the coast of HOLLAND is shown at Plate 34. The rails are set at an angle of approximately 50°, pointing seaward, in a continuous concrete in-situ slab. One report gave the thickness of concrete for this type as 6 ft. 7 in. and said that the maximum height of the rail above the finished concrete was 1 ft. 8 in.

Early in the war the French reported a type of inclined steel obstacle which seems to consist of pre-fabricated joists. Plate 35 is believed to be a photograph of this somewhere in the VOSGES.

PLATE 21

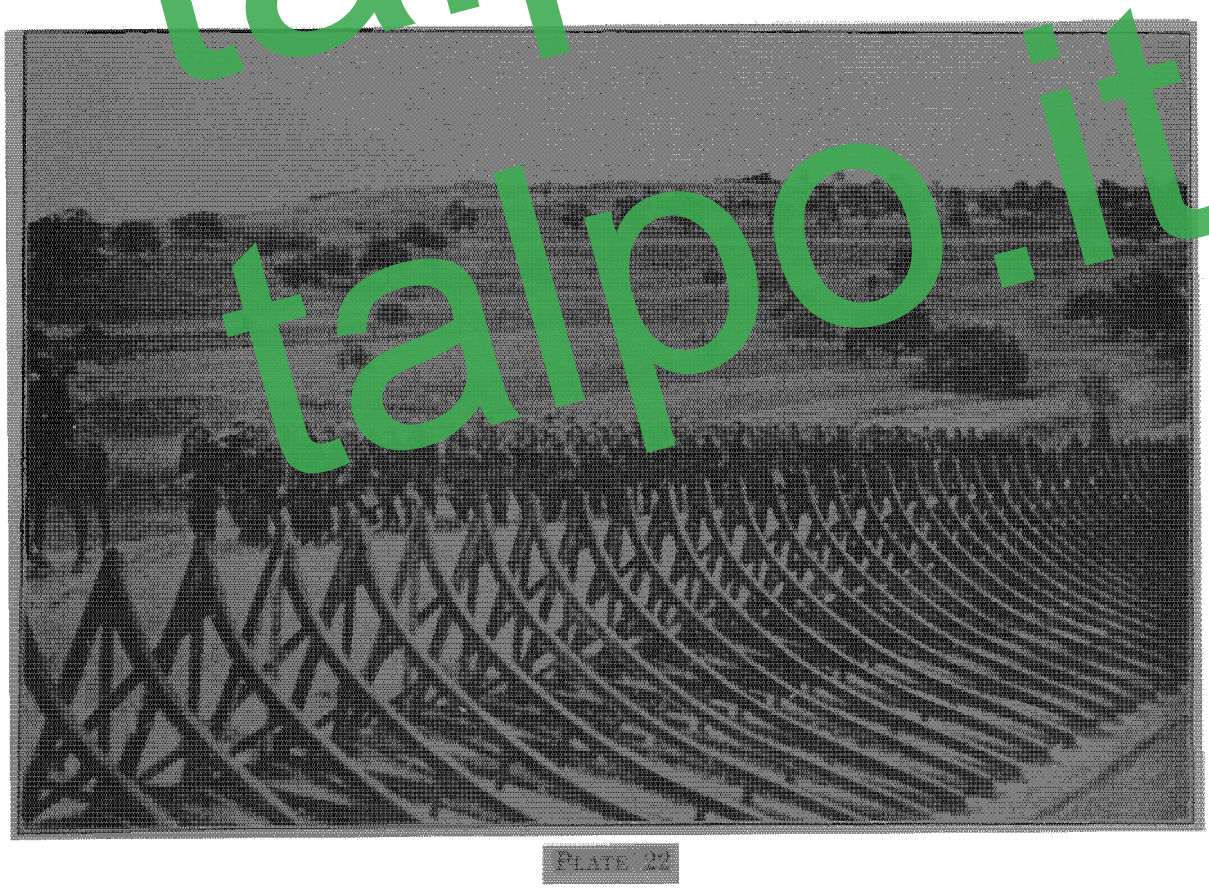


PLATE 22

PLATE 24

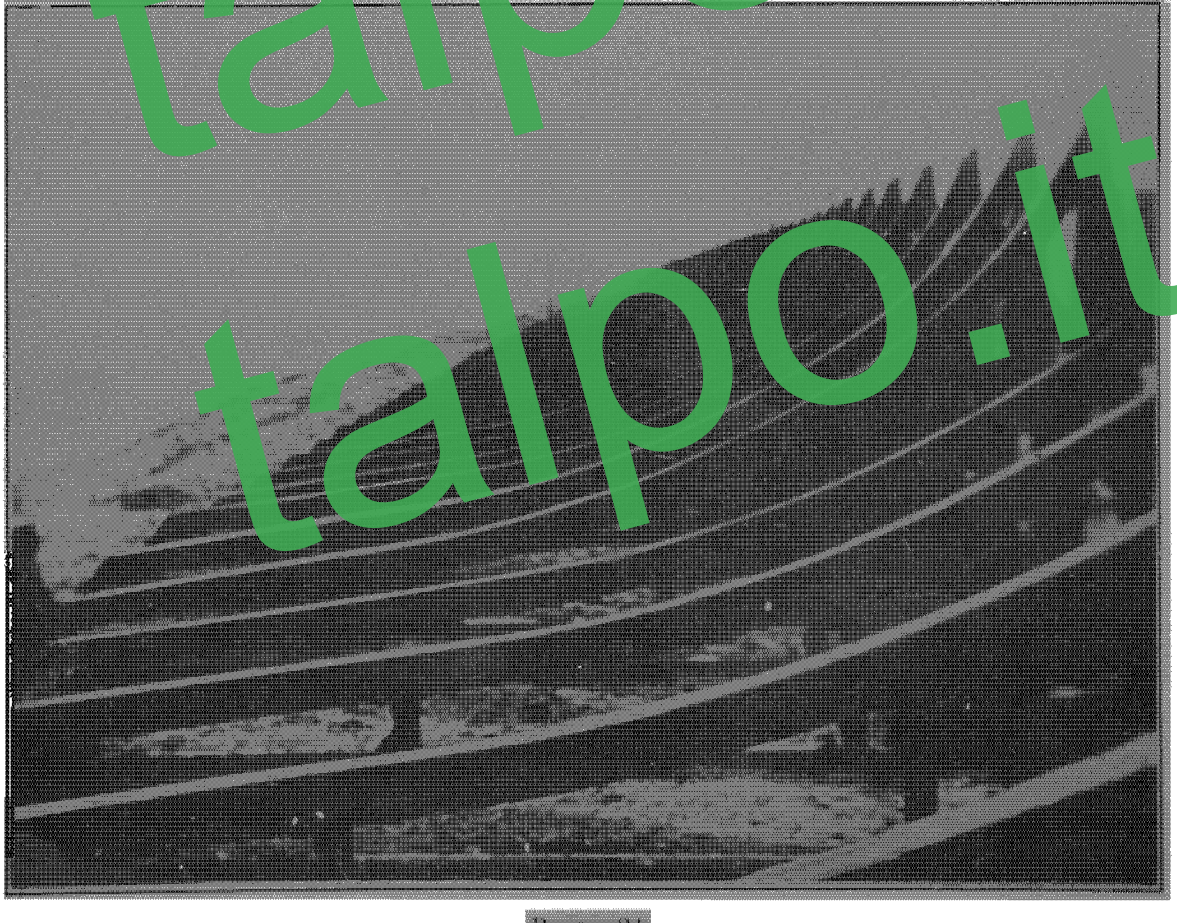


PLATE 24

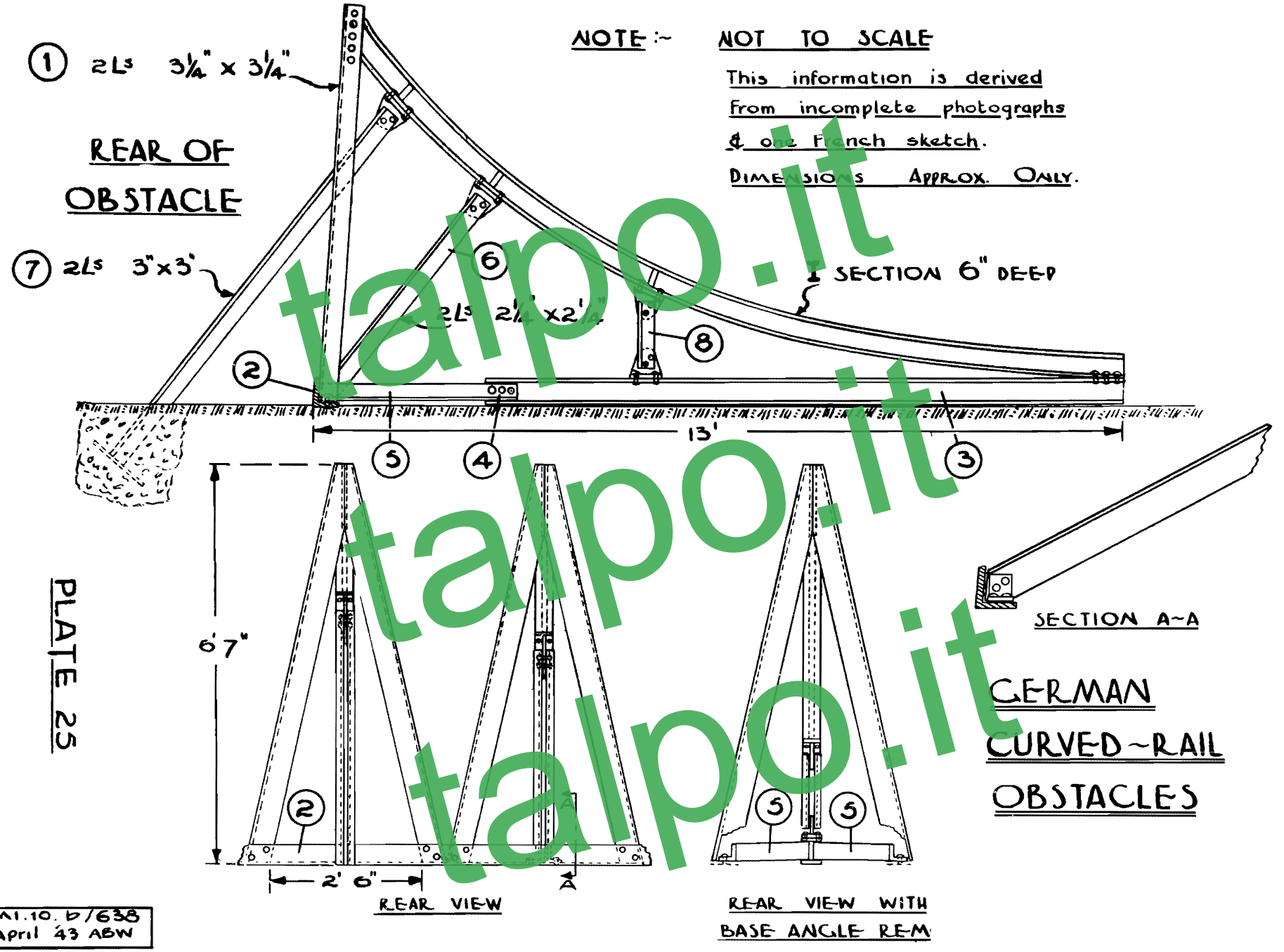
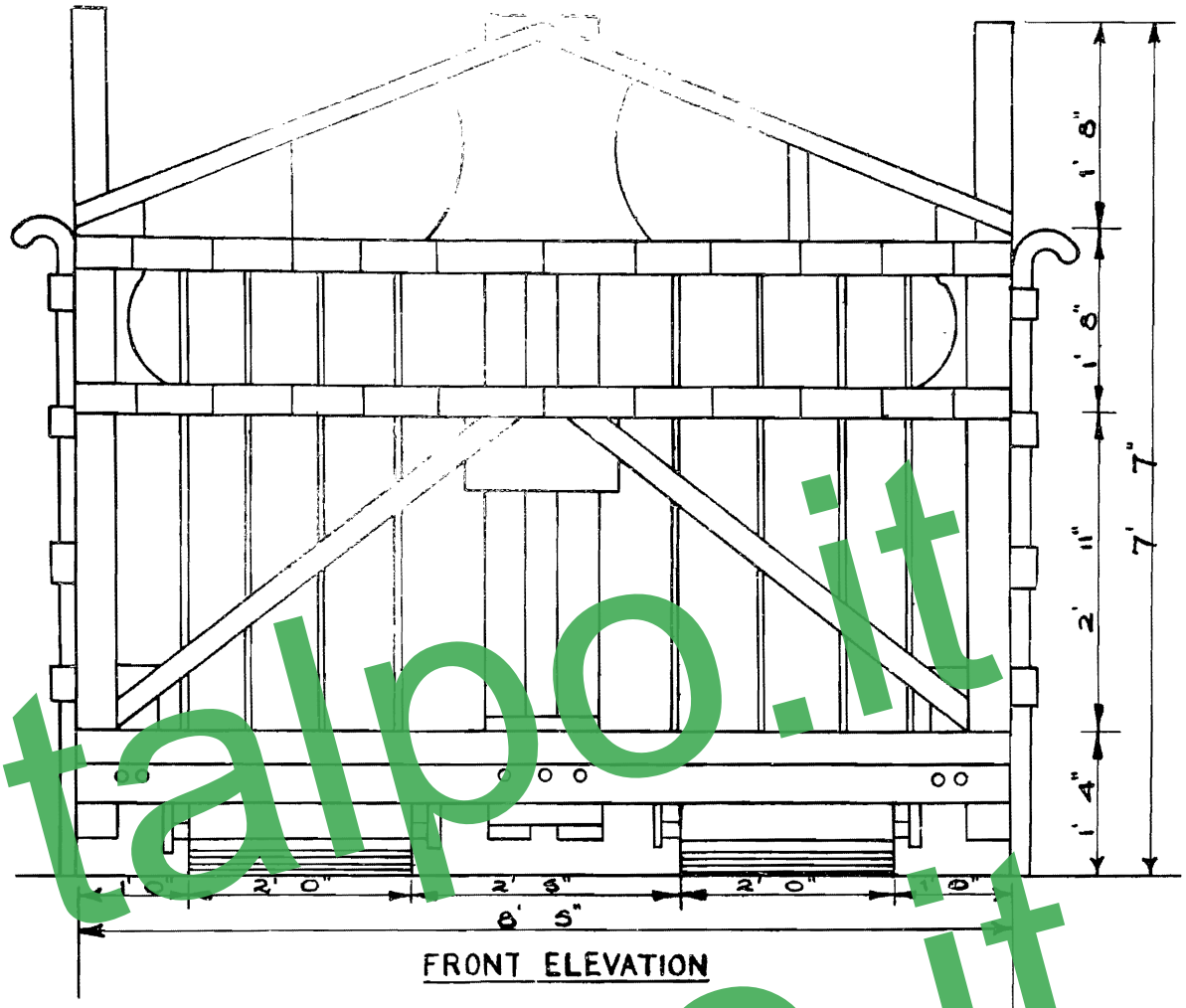
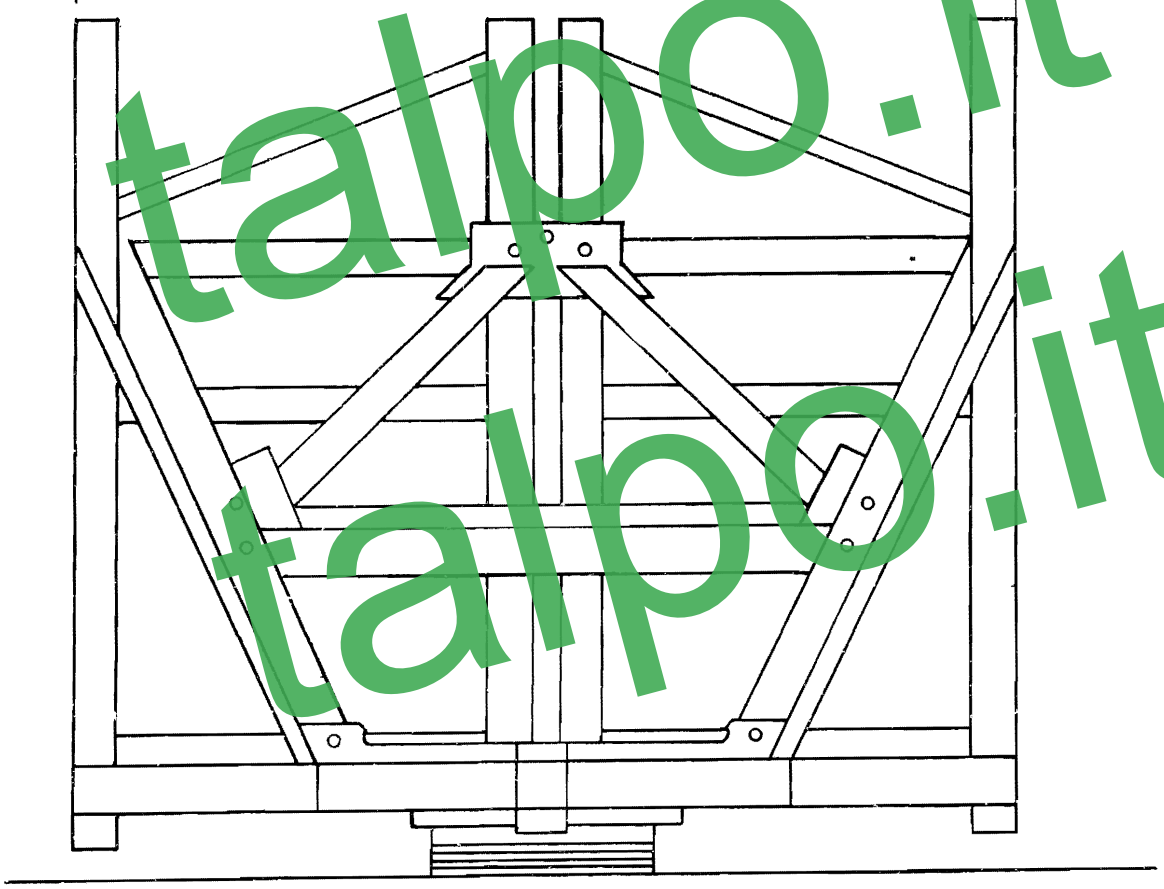


PLATE 26

PLATE 27



FRONT ELEVATION



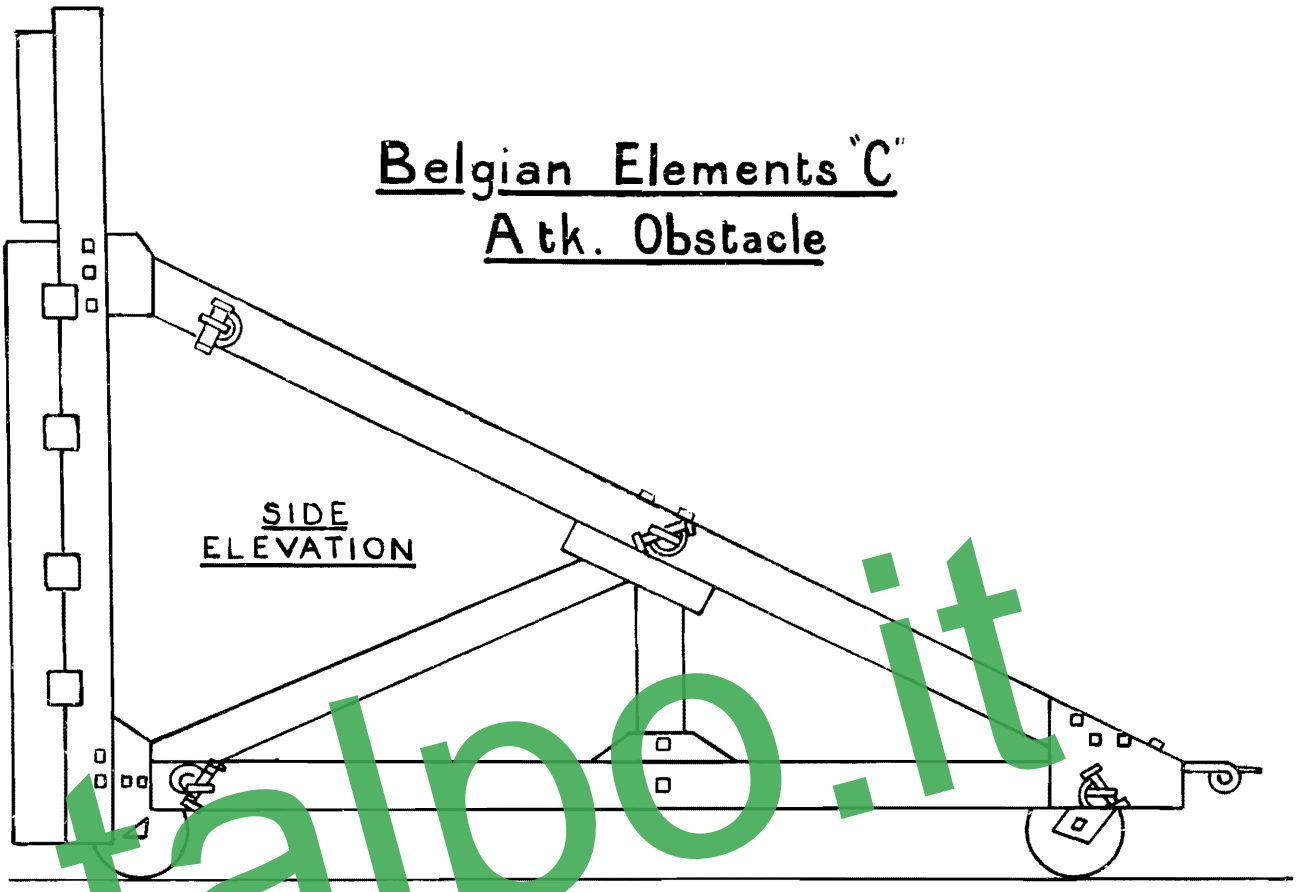
REAR ELEVATION

Belgian "Elements C" A tk. Obstacle

MI.10B/753

PLATE 28

Belgian Elements "C"
A tk. Obstacle



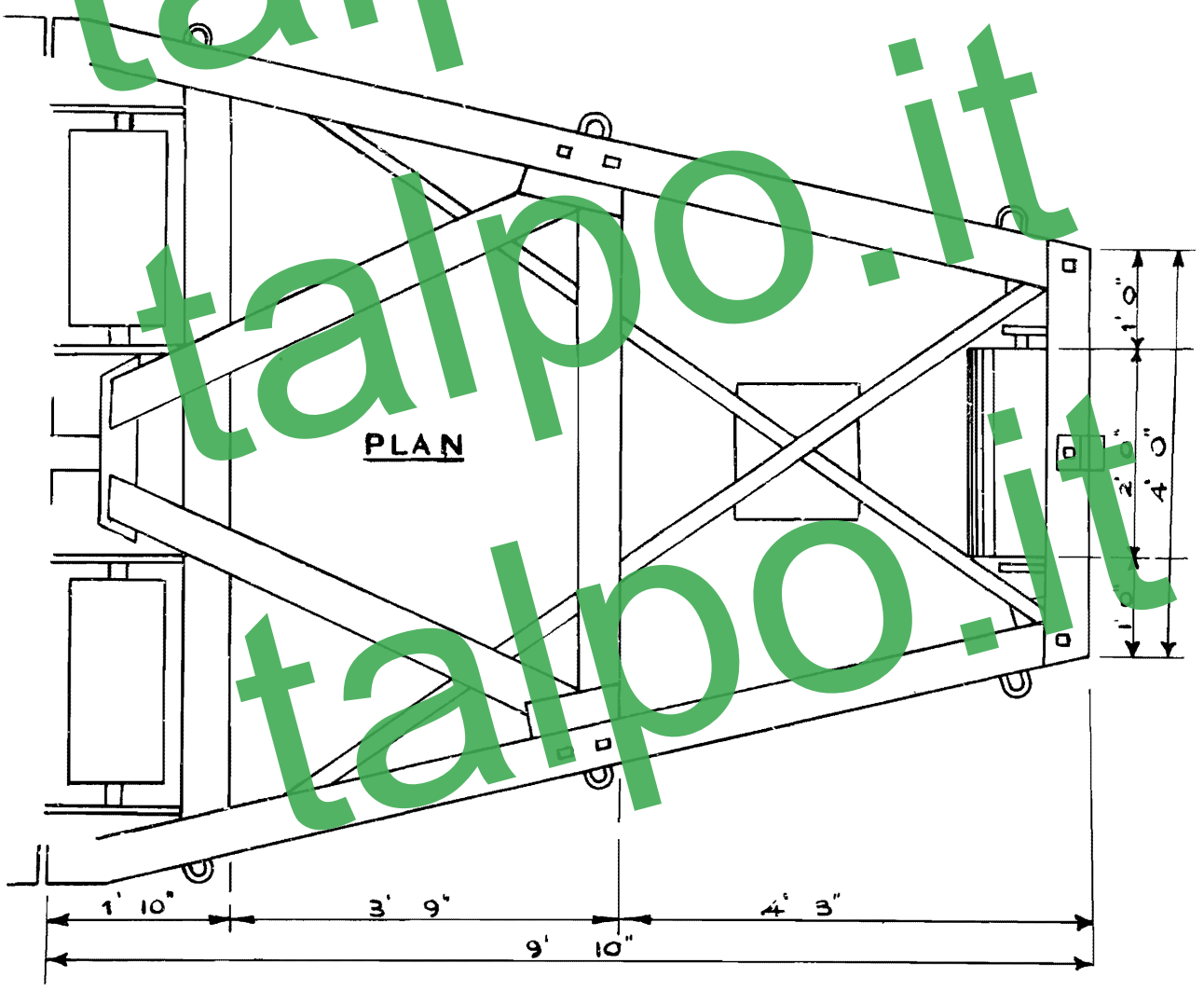
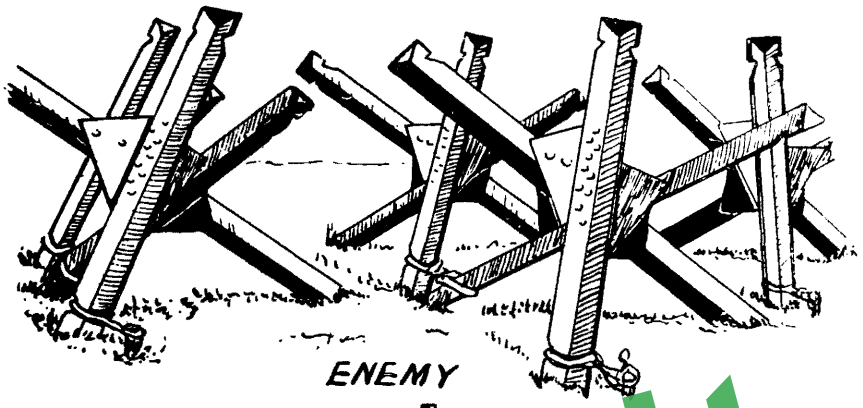
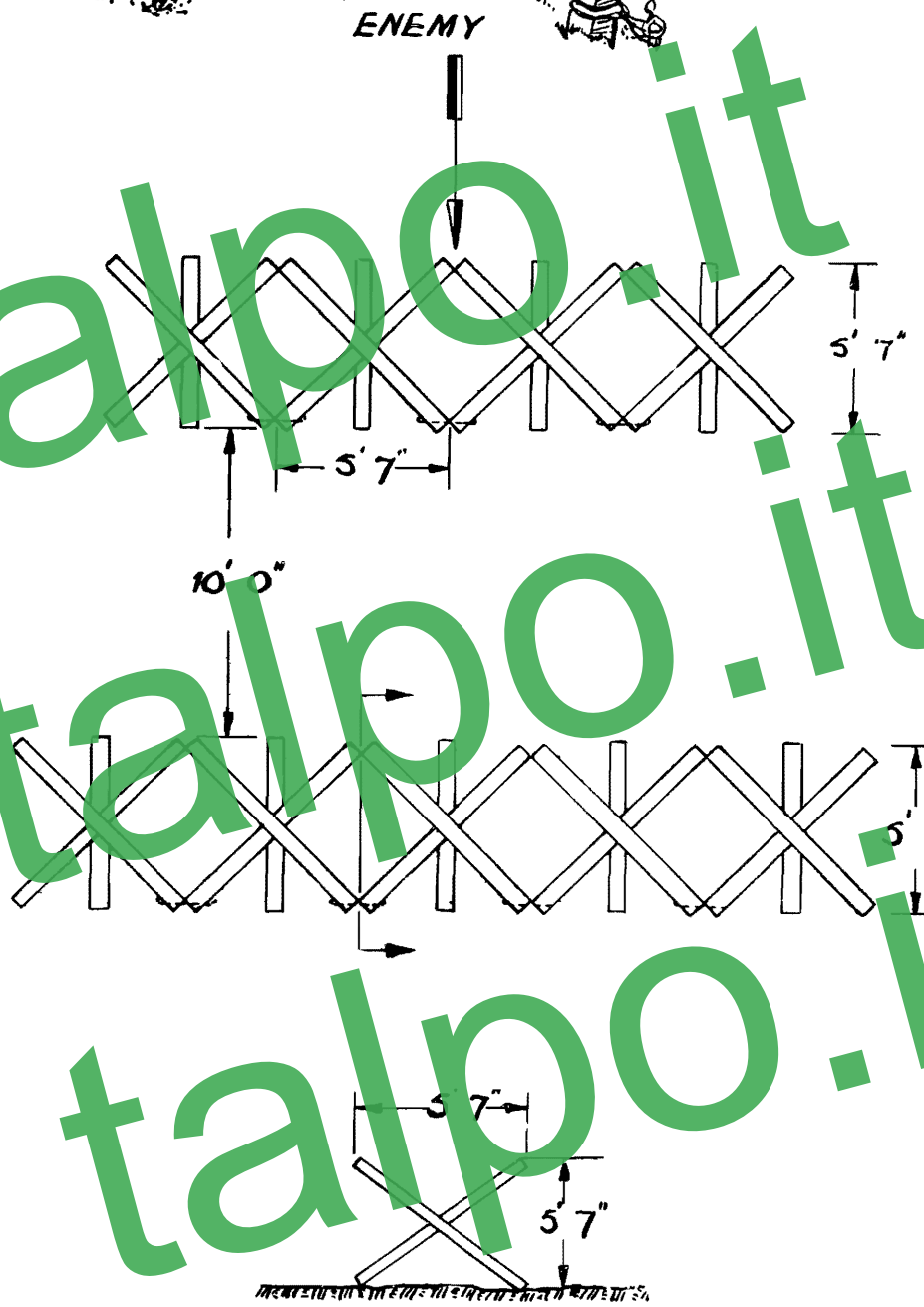


PLATE 29

M1.10 B/754





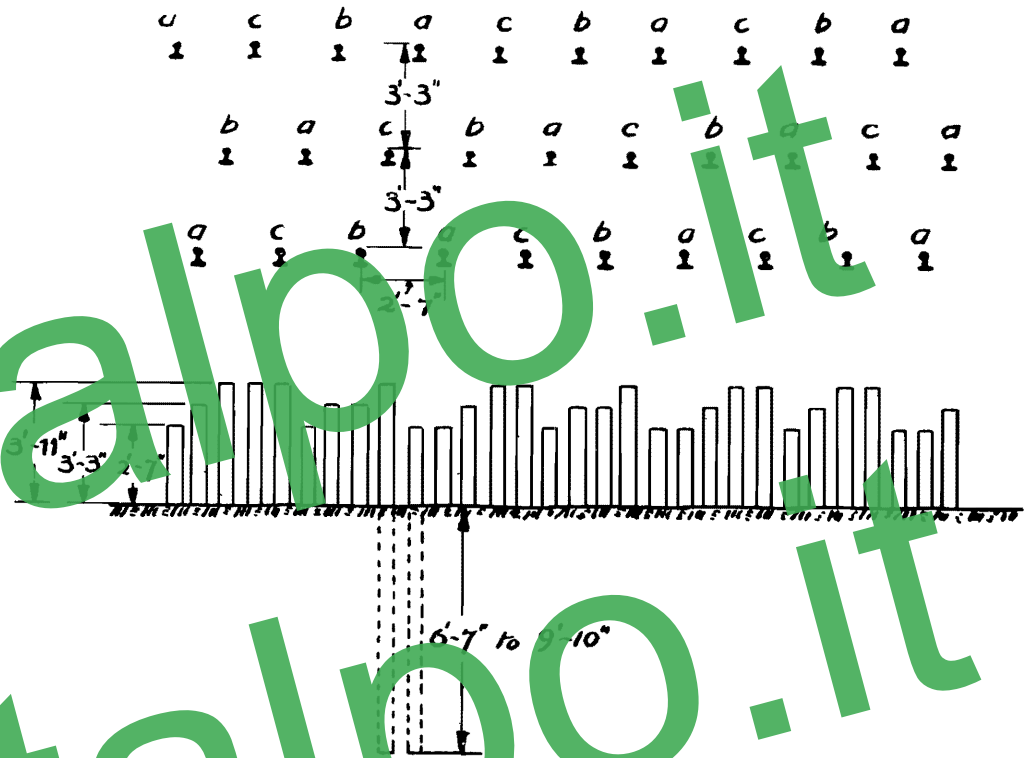
GERMAN STEEL OBSTACLE ~ HEDGEHOG

PLATE 30

MI. 10b/792
July '43 ABW

PLATE 31

PLATE 32



HEIGHT OF RAILS MARKED "a" = 2'-7"
" " " " "b" = 3'-3"
" " " " "c" = 3'-11"

GERMAN R.S. RAIL OBSTACLE

PLATE 33

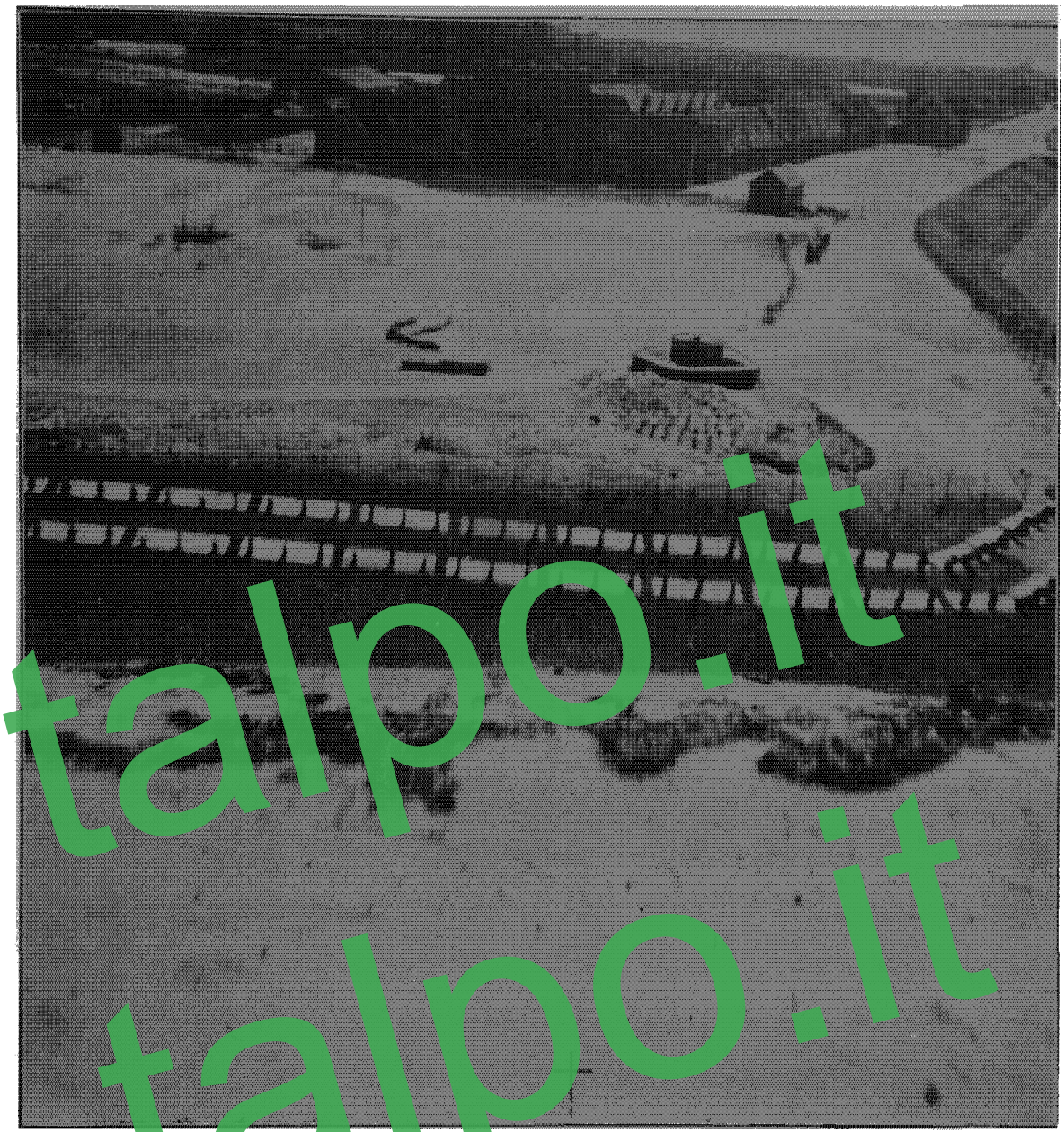


PLATE 34

PLATE 35

[redacted]

PART IV - DITCHES

1. OFFICIAL TYPES.

The Germans lay down that anti-tank ditches should be of triangular cross-section, the rear side vertical, 4 ft. 6 in. deep to 6 ft. deep and 7 ft. 6 in. to 21 ft. wide, with a 2 ft. 6 in. earth parapet on each side. The vertical face should be retained, where possible, by a concrete wall. Another type is the water ditch, up to 18 ft. deep and 36 ft. wide at the top. Great stress has been laid on the importance of camouflage e.g. by coils of barbed wire laid in the ditch covered with camouflage material. Contrary to their teaching the Germans have not taken any steps to camouflage the finished work except where tank traps have been constructed in coastal districts.

2. EXISTING TYPES.

Ditches are found practically to encircle key-points particularly in HOLLAND and BELGIUM where the land is flat and water is ready to hand for flooding the ditches. Where ditches meet major roads the latter are not excavated but roadblocks are constructed which only allow single line traffic. In coastal districts there may be two ditches within a few yards of each other, cut in the road so as to leave a gap for single line traffic. The ditch is generally revetted with concrete on the vertical face and in some cases may be entirely lined with concrete.

The ditch at HOOK is a notable example of revetment with osiers and it is probable that the very wide ditches are not revetted in concrete.

The principal dimensions of ditches are:-

(a) HOLLAND (inland)

Width (top)	60 ft.
" (bottom)	50 ft.
Depth	15 ft.

(b) ELSEWHERE (coastal areas)

Width (large works)	30 ft.
" (minor ")	9 - 20 ft.
Depth	7 - 15 ft.

A low oblique of the Eastern end of the ST. MALO anti-tank ditch is given at Plate 36. The ditch is approximately 30 ft. wide at the bottom and has gently sloping sides. There are two pile-drivers on the Southern bank and it is likely that these are engaged on the construction of a sluice which will control the flow of sea water into the ditch, the bottom of which is below sea level. If not flooded the ditch would not be a tank obstacle.

To improve the effectiveness of a sea wall obstacle the Germans, since the DIEPPE raid, have excavated trenches down to the toe of the walls. Only approximate dimensions can be given since most of them will be affected by tidal influences, these are

(c) Width (top)	15 - 30 ft.
" (bottom)	5 - 10 ft.
Depth	7 - 12 ft.

3. TANK TRAPS.

These have been seen on the beaches and have been reported in conjunction with road blocks. The type constructed on beaches consists of straight forward trench with sides revetted in brick work on a concrete

/ foundation

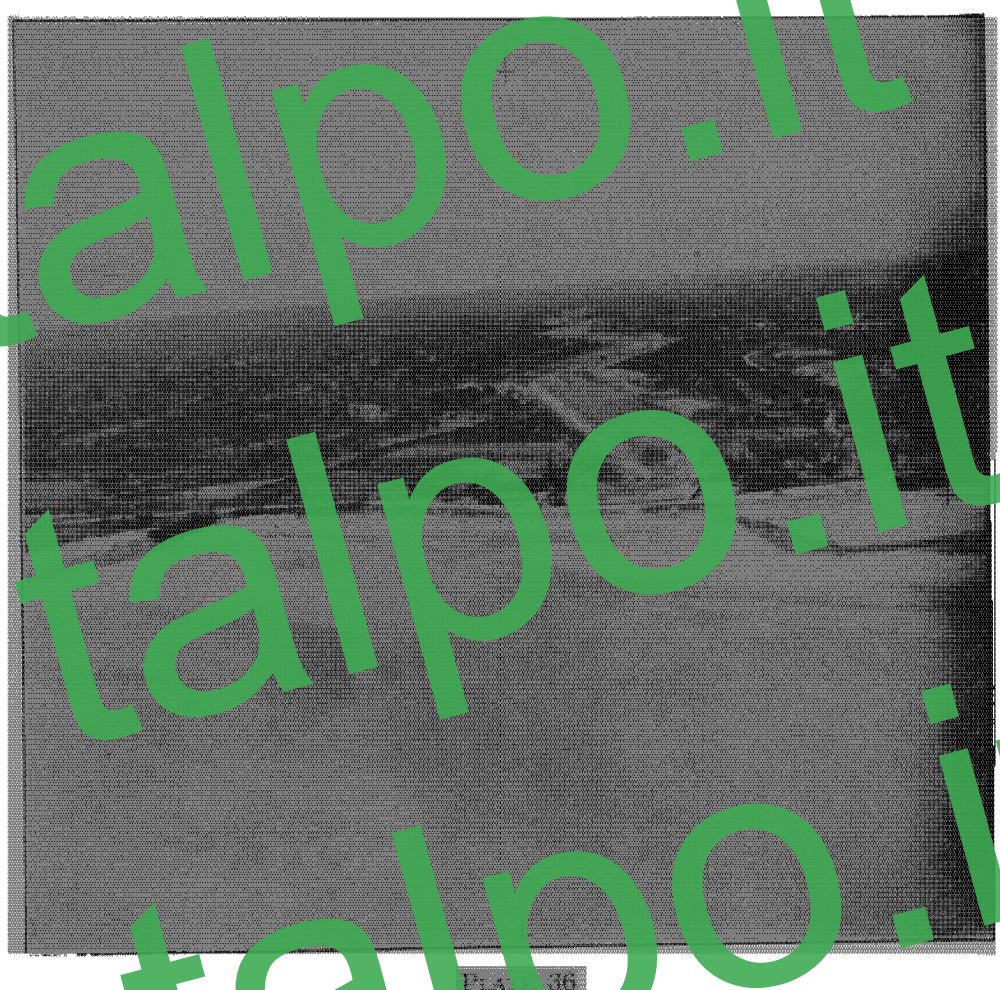
[redacted]

foundation; the trench is roofed over with a low rise/span ratio arch one brick on edge thick (about 4½ in.). The roof is then covered over with spoil and it is reported that it will take a load of 700 lb., presumably this per metre length of trap.

The tank traps reported in conjunction with road blocks, apparently consist of small trenches covered over with timber or thin concrete slab with the road surfacing relaid. The thin covering is presumed to be strong enough for very light traffic only.

4. INUNDATIONS.

The Germans have a recognised drill for constructing dams. In areas where there are small rivers the narrow estuaries and a fairly wide flat valley behind, the practice of damming up the estuary, usually at a bridge, and controlling the flow of water by a sluice is fairly common. In this way areas up to three miles inland and up to one mile broad can be flooded in emergency to form a barrier to troops and vehicles.



[redacted]

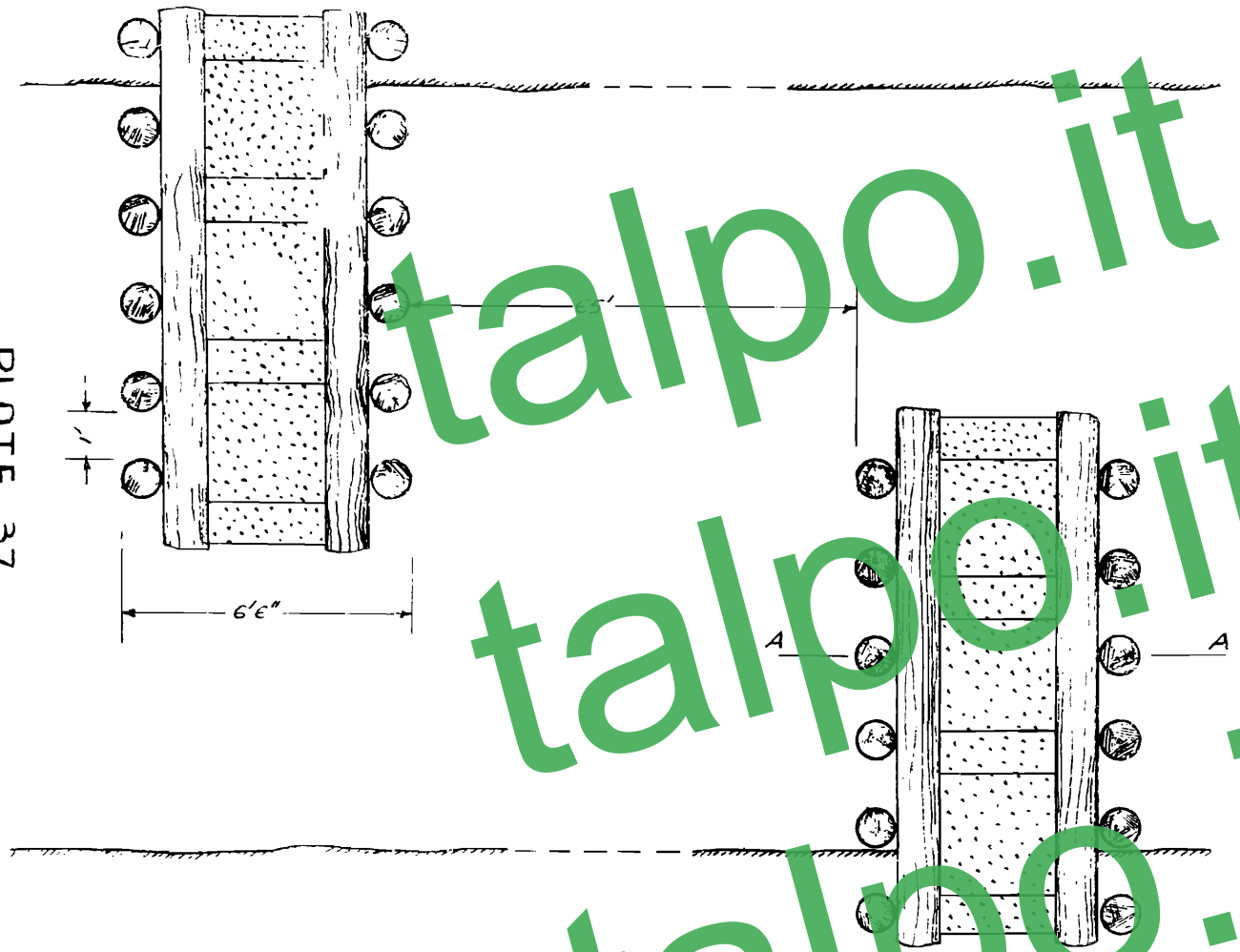
PART V - TIMBER.

The Germans have laid down in their manuals on fieldworks the types of timber obstacle construction. Timber has not been used on a large scale but Plat 37 shows one type reported from FRANCE. The dimensions are only approximate and the horizontal and vertical members were stated to be 10 - 12 in. diameter with the verticals fixed deeply into the ground. The interior filling is of sand and the walls are strengthened by diagonal bracing.

Plate 38 shows the standard design (Pfahlsperre) to stop light tanks. It consists of four rows of 10 - 12 in. diameter timber pickets set 7 ft. 3 in. in the ground. This design may be the one used at the road block described in Part II, para. 2 (b) Plate 15, fig. 2.

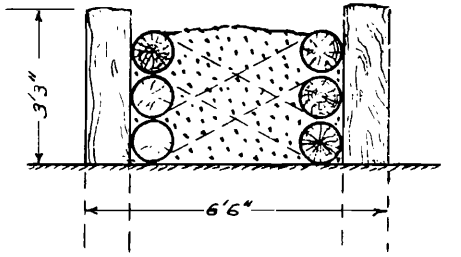
[redacted]

PLATE 37



SCALE : 1/50

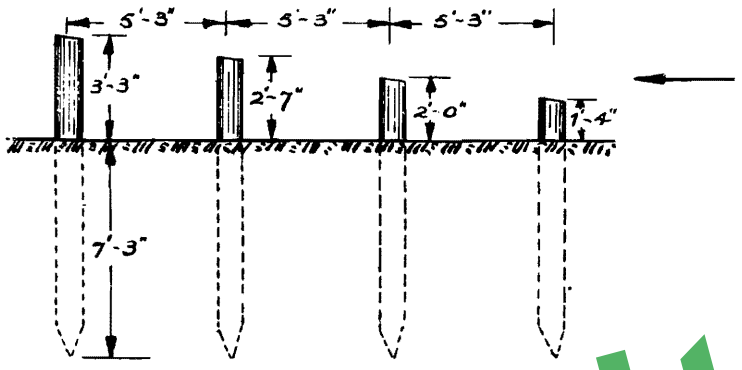
DIMENSIONS APPROXIMATE

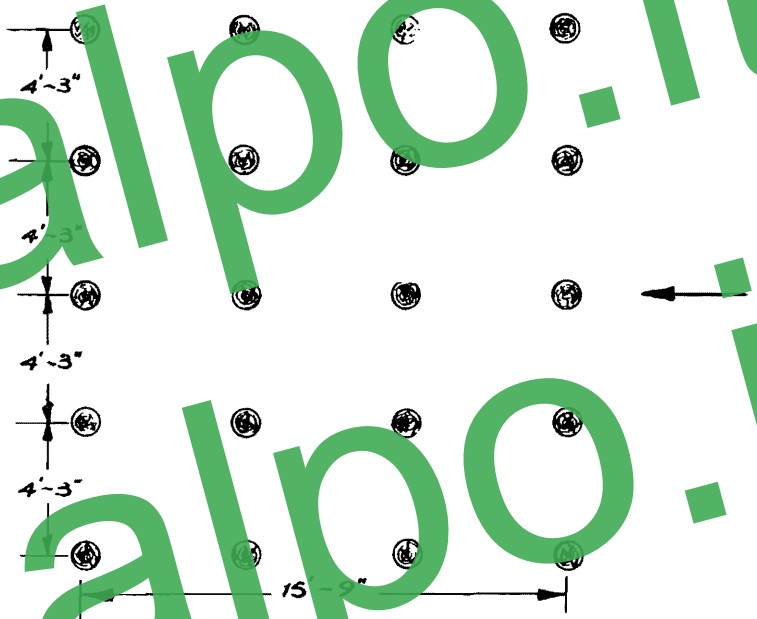


SECTION AA

GERMAN STAGGERED ROAD BLOCK ("CHICANE" TYPE)

M.I.10B/629
P.E.F. Ap '43





GERMAN STANDARD TIMBER PICKET OBSTACLE

PLATE 38

MI. 10 b/797
AUG. '43 AP[illegible].

[redacted]

PART VI. MISCELLANEOUS.

1. CROWSFEET.

Two types are known and these are intended to be scattered on the ground to damage the tyres of vehicles passing over the area.

(a) Plate 39 shows one type:-

Description. The device is made of two sheet steel stampings 1 mm. (0.04 in.) thick, shaped and spot welded together to form a symmetrical object with four spikes forming the apices of a regular tetrahedrom. The edges of the stampings are chamfered and serrated in order to increase the cutting and penetration power.

Two sizes have been recovered. The apex of the larger, which is stamped L on one of the webs, stands 2.5 in. off the ground, while the smaller, stamped R, is 2.1 in. high.

Both sizes appear camouflaged painted in two ways, either all grass green, or green and buff; the former suggesting that this equipment is also intended for use in European theatres.

Method of use. German crowsfeet are dropped by plane in a container similar in all respects to the ABB 500 incendiary bomb container (Summary 88, para. 7). In one sample recovered the stencilled markings ABB in black were present but any subsequent marking would have been on the loading hatch which was missing.

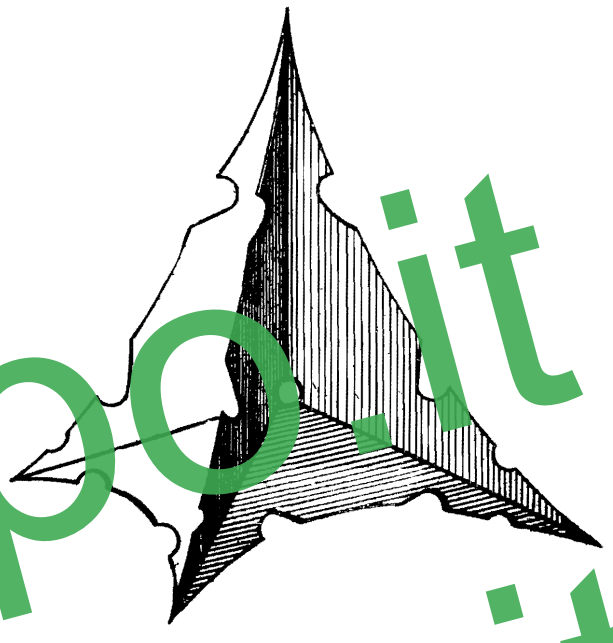
It is estimated that this container will hold 1400-2000 crowsfeet.

Recognition. In most cases early recognition in the field, of crowsfeet will depend on observation of the container. On roads the devices will be easy to see but on tracks and fields they may pass unnoticed.

Efficacy. When dropped on to hard ground or ground consisting of a hard under surface with 2-3 in. of loose dust or soil above it, they will do serious damage to any tyre passing over them.

Their effect in very soft soil is difficult to assess as this depends entirely on the amount of support available either immediately underneath or which they may receive when dragged along by the tyre.

(b) Plate 40 shows the older wrought iron type of crowsfeet.



GERMAN CROWSFOOT

PLATE 39

PLATE 40

[redacted]

1st Bell Engr Inf

[redacted]

The information given in this publication is not to be communicated, either directly or indirectly, to the Press or to any person not holding an official position in his Majesty's Service.

UNCLASSIFIED

NOTES ON GERMAN OBSTACLES

No. 2

M.I.10.
The War Office
October 1943

0160/2436(M.I.10)

DISTRIBUTION LIST "E"

UNCLASSIFIED

[redacted]

INTRODUCTION

Notes on German Obstacles No. 1 described all the known types constructed up to August 1943 together with certain known standard materials used.

This publication, which should be read in conjunction with the above, covers the standard types of obstacle laid down by the Germans up to September 1942 (Bildheft Neuzeitlicher Stellungsbau September 1942).

Information on wire obstacles from refugee sources has not been sufficiently conclusive to justify circulation but comparing the poor sketches as are available with Plates 1 to 8 we see that the Germans have, to some extent and where conditions permit, constructed their wire obstacles on the lines of the official instructions. It must be borne in mind, however, that many wire obstacles are likely to be found which differ very much from the official illustrations.

There has been no mention in official documents of the construction of concrete walls, cubes and dragons teeth, although the latter were constructed in the Siegfried line before the war. The construction of steel tetrahedra, de Cointet and curved rail obstacles are also omitted from captured pamphlets; the latter has also been a standard type for some considerable time.

In order to have a complete publication of official types as distinct from those known to exist, particularly in France, a certain amount of the information in Notes No. 1 has been repeated here.

[redacted]

GERMAN OBSTACLES

INDEX

[redacted]

INDEX TO PLATES

[redacted]

PART I - WIRE

1. DOUBLE APRON FENCE (Plate 1)

German designation "Flanderzaun" meaning Flanders fence. The following are the German instructions:-

(a) Order of work. Mark out obstacle, drive in pickets, fix plain apron wires taut. Fix barbed wire to long pickets, fix vertical diagonals taut and fix apron barbed wires.

(b) Labour. 4 N.C.Os and 40 men - [illegible] per day.

(c) Materials. Long pickets 5' 8" x 4" - 5" diam,

Short " 3' 3" x 3" - 4" "

Plain wire 3 - 5 mm.

2. D.A. FENCE FOR SNOW (Plate 2)

The fence is intended where deep snow conditions are expected in winter. The method of erection is the same as the above fence. One day's work for the same number of men is 220 - 270 yds.

3. D.A. FENCE WITH SINGLE COIL (Plate 3)

German designation "verstärkte Flanderzaun" meaning reinforced Flanders fence.

As will be seen, this fence is strengthened by the addition of a concertina of plain or barbed wire ("E" or "S" rolle). The concertina is fixed to the pickets before the longitudinal barbed wires; 167 rolls are needed per 1100 yds (1000 metres).

4. D.A. FENCE WITH DOUBLE COIL (Plate 4)

German designation "Doppelt verstärkte Flanderzaun". The ordinary D.A. fence is strengthened by means of a double row of concertinas under the aprons. These may be plain or barbed concertinas. In this type the vertical section of the fence is completed before the concertinas are fixed. One day's work for 4 N.C.Os and 40 men is given as 440 - 500 yds.

5. APRON TYPE FENCE - 21 FEET (Plate 5)

German designation "Flachendrahthindernis." This particular design was referred to in Notes on German Obstacles No. 1 part [illegible] para 2, but it was not known at the time that they had a similar layout for a fence 21 ft. deep.

(a) Order of work. Mark out obstacle, drive in pickets, fix barbed tripwires, longitudinal barbed wires on pickets and plain wire bracing between pickets. Place two barbed wire concertinas in the apron facing the enemy, complete plain wiring to aprons and fix longitudinal barbed wires.

(b) Labour. 4 N.C.Os and 40 men - 130 yds per day.

(c) Materials.

Long pickets (centre)	6' 6" long
Medium "	5' 8" "
Short "	3' 3" "
Plain wire	3 - 5 mm.

/6.

[redacted]

6. APRON TYPE FENCE - 33 FEET (Plate 6)

The German designation is the same as the 21 ft. obstacle and the fence is constructed on similar lines to that described in para. 5.

7. CATTLE FENCES (Plate 7)

The German designation is "Koppelzaune",

Attention is drawn to Notes on German Obstacles No.1 Part I para 8 (g): It is probable that this design may be associated with the layout of minefields in some areas.

(a) Order of work. Mark out the obstacle, drive in pickets and fix diagonal plain wire bracing. Fix the three rows of barbed wire. Construct the second fence in the same way and lay plain or barbed concertinas ("K" or "S" rolle).

(b) Labour. 2 N.C.Os and 26 men - 875 - 1100 yds. per day.

(c) Materials. Long pickets 5' 6".

Plain wire 3 mm.

One interesting note in the German document says that in view of the general shortage of material it is forbidden to substitute barbed wire for plain wire.

8. TRIP WIRE OBSTACLE (Plate 8)

The German designation is "Stolperdrahthindernis"

The illustration agrees with the description given in Notes on German Obstacles No. 1 Part II para 1. It will be noted that the Germans illustrate the use of loose barbed wire within the framework of the obstacle.

(a) Labour. 1 N.C.O. and 6 men 1200 sup. yds. per day.

9. KNIFE RESTS (Plate 9 and 9A)

The German designation is "Spanischer Reiter". Why it should be so called is obscure.

Two standard types are known but the timber knife rests to be found in France are generally larger than illustrated here. The timber framing is braced in all directions with plain wire 2 mm. thick and an allowance of 21 yds. per knife rest is made.

(a) Labour. 1 N.C.O. and 10 men - 20 knife rests per day.

A standard type of folding angle-iron knife rest is illustrated at Plate 9A.

10. WIRE TO PILLBOXES IN WOODS (Plate 10)

Instructions have been given on the method to be used in constructing wire obstacles around pillboxes in woods; it is not known whether this has been carried out to the letter.

Use is made of wire netting to screen the pillbox (a material noted on a photograph of a Dutch pillbox), and the following particulars provide a general idea of the extent to which wire might be expected in woods.

(a) Materials.

Per 100 yds. of wire netting:-

Pickets 20 - 10' x 6" - 8" diam.

Netting	4 – rolls each 82 ft. long.
Plain wire	164 ft. 2 mm. diam.
for surrounding wire obstacle:-	
Pickets	1000 – 6' 6" x 4" – 6" diam.
	plus use of trees.
"	1000 – 5' 3" x 4" – 6" diam.
"	400 – 3' 3" x 3" – 4" diam.
Barbed wire	1,350 rolls = 33 tons.
Plain "	200 " 2 mm. diam.
"S" rolls (barbed concertina)	2 tons.
"K" rolls (plain concertina)	4½ tons.

(b) Labour. 1 pl. 6 days @ 8 hrs/day.

(c) Layout. The obstacle should be up to 55 yds. deep around the pillbox. Plain and barbed concertina should be irregularly interwoven in the fences. The wire netting should be 7 ft. 6 in. high having low firing apertures to suit the level of the pillbox loopholes.

11. SIMPLEX WIRE (Plate 11)

This is heavy gauge wire consisting of a single square-section strand of 3 x 3 mm. cross section (1/8 x 1/8 in.), twisted once in approximately 2 inches. The barbs are twisted on only. Vickers hardness is 197. This wire is of standard manufacture and it is possible that there are slight variations in the amount of twist in the wire, cross section etc. depending upon the manufacturers.

12. BARBED WIRE (Plate 12)

This wire was cut from a wire fence somewhere in FRANCE and is under examination. It is of lighter cross section than "simplex" and the barbs are spaced at about 1.75 in. instead of 0.75 – 1 in. A description of this wire has not been seen in any German documents but it is presumed to be one of the standard types of barbed wire in general use.

13. STANDARD TYPES OF STEEL PICKETS (Plate 13)

The two sheets of illustrations, figs. 1 to 4 show the four types of standard German pickets. These types are:-

(a) Screw pickets (Fig.1)

German designation: "Hindernisschraubpfahl". Used in soft ground.

(b) Tubular steel pickets (Fig.2)

German designation: "Hindernisschlagpfahl aus Stahlrohr". Used in medium ground.

(c) T-section pickets (Fig.3)

German designation: "Hindernisschlagpfahl aus T-Eisen". Used in hard ground.

/(d)

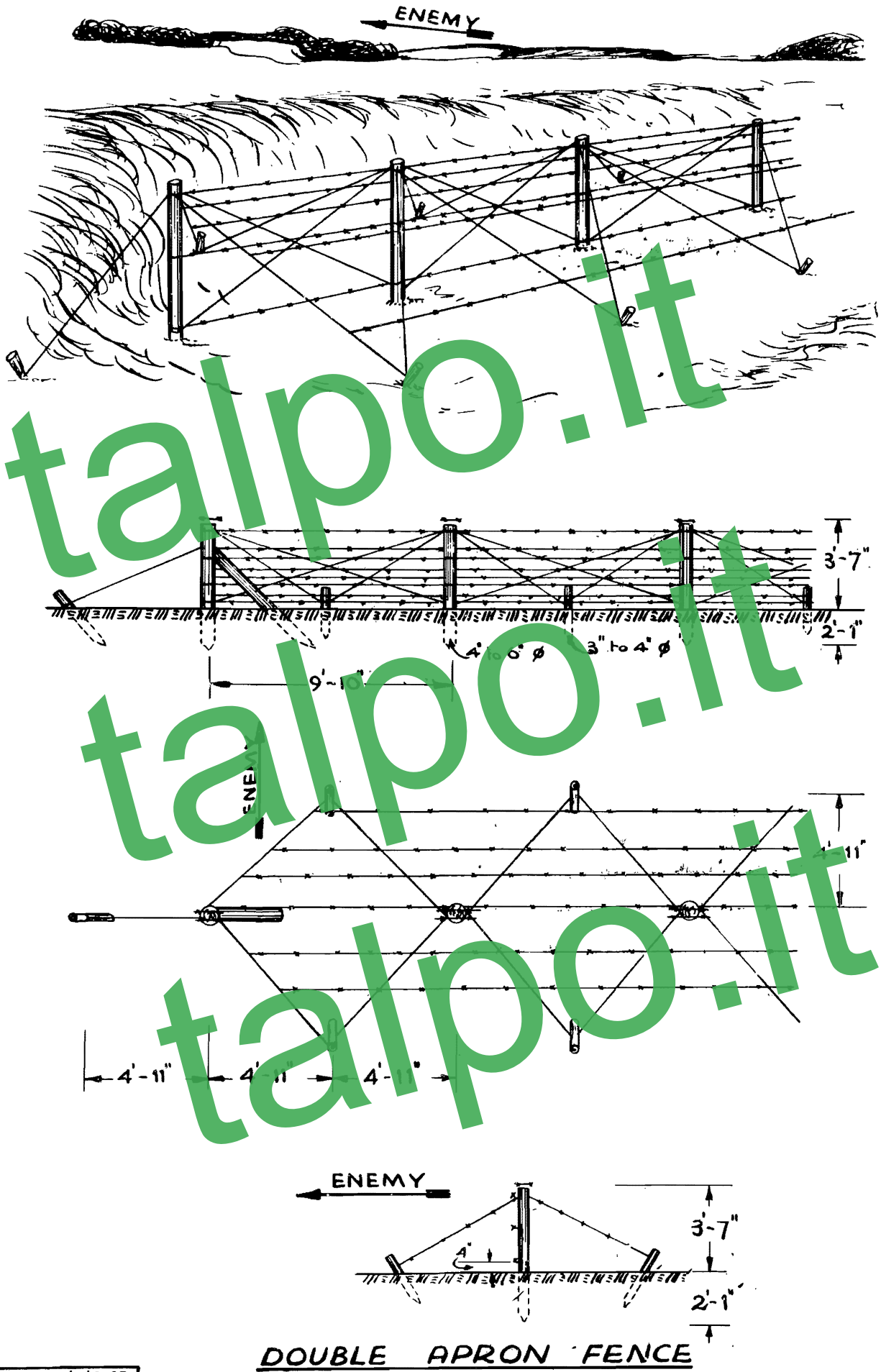
(d) Stand pickets (Fig.4)

German designation: "Hindernisplattenpfahl." Used in sandy ground.

All four types are made in three sizes, with lengths of 1.00, 1.75 and 2.00 metres (3 ft. 3 in., 5 ft. 9 in., and 6 ft. 7 in.). Weights of these pickets are as follows.

Type	Length	Weight	
		Metric	British
Screw	1.00 m. 1.75 m. 2.00 m.	1.90 kg. 4.70 " 6.70 "	4.2 lbs. 10.8 " 14.8 "
Tubular	1.00 m. 1.75 m. 2.00 m.	1.95 kg 4.50 " 5.00 "	4.3 lbs. 9.9 " 11.0 "
T-section	1.00 m. 1.75 m. 2.00 m.	4.40 kg. 7.70 " 8.80 "	9.7 lbs. 17.0 " 19.4 "
Stand	1.00 m. 1.75 m. 2.00 m.	8.0 kg 10.3 " 11.0 "	17.6 lbs. 22.7 " 24.3 "

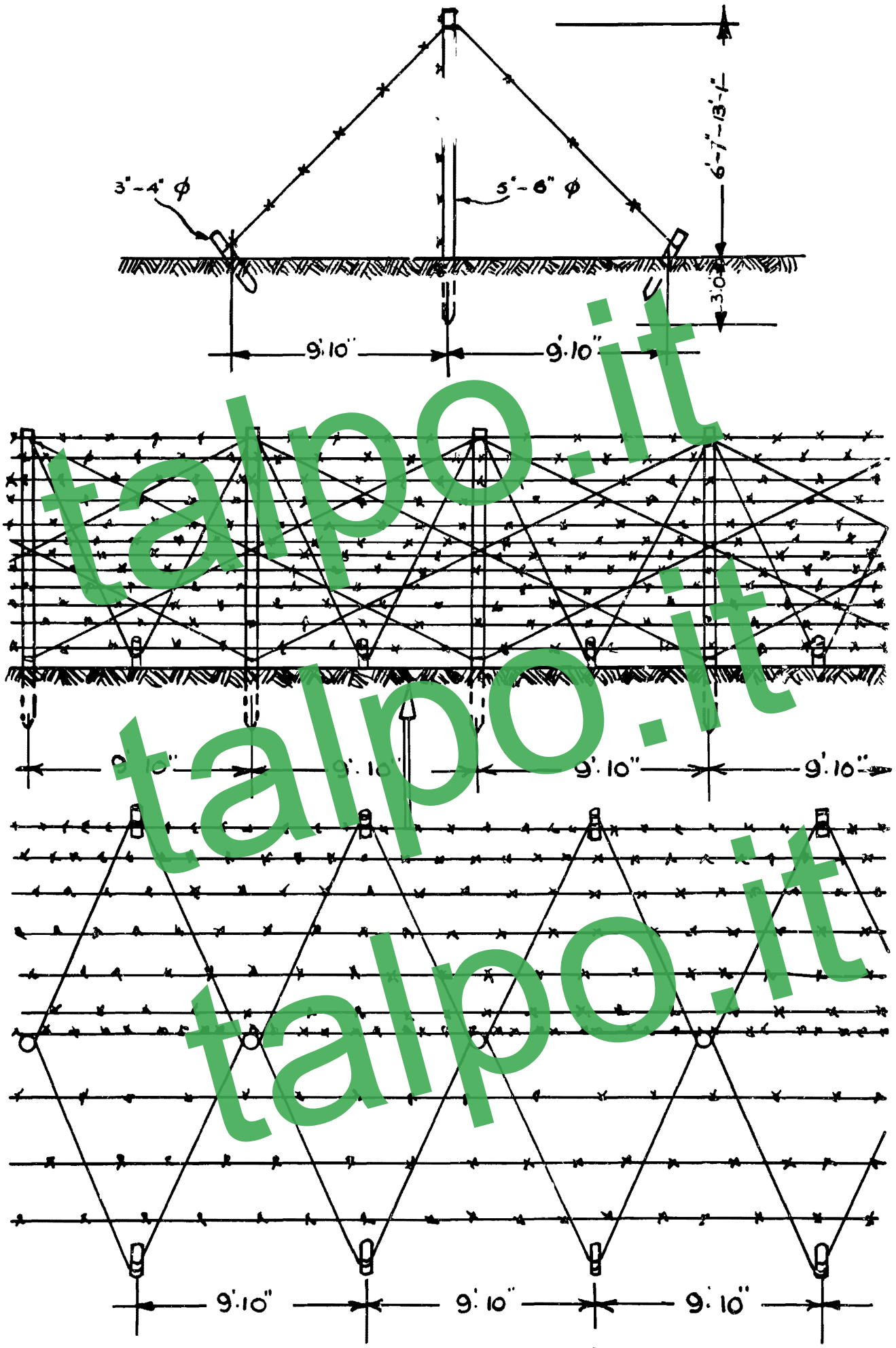
Plate 1



DOUBLE APRON FENCE

M.I. 10 b/842
SEPT. '43 ABW.

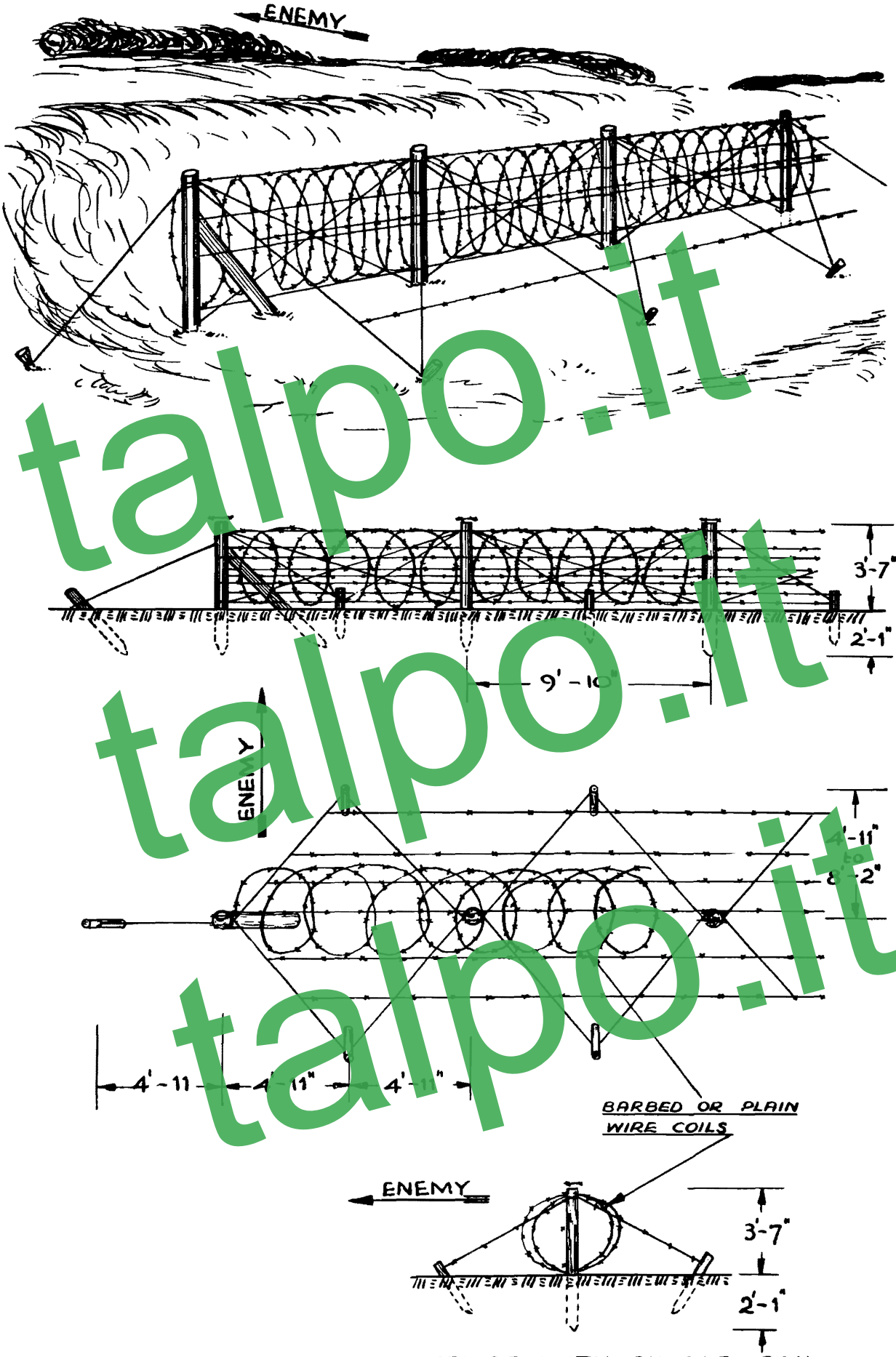
Plate 2



DOUBLE APRON FENCE
(FOR SNOW CONDITIONS)

M.I 10.b/843
SEPT '43

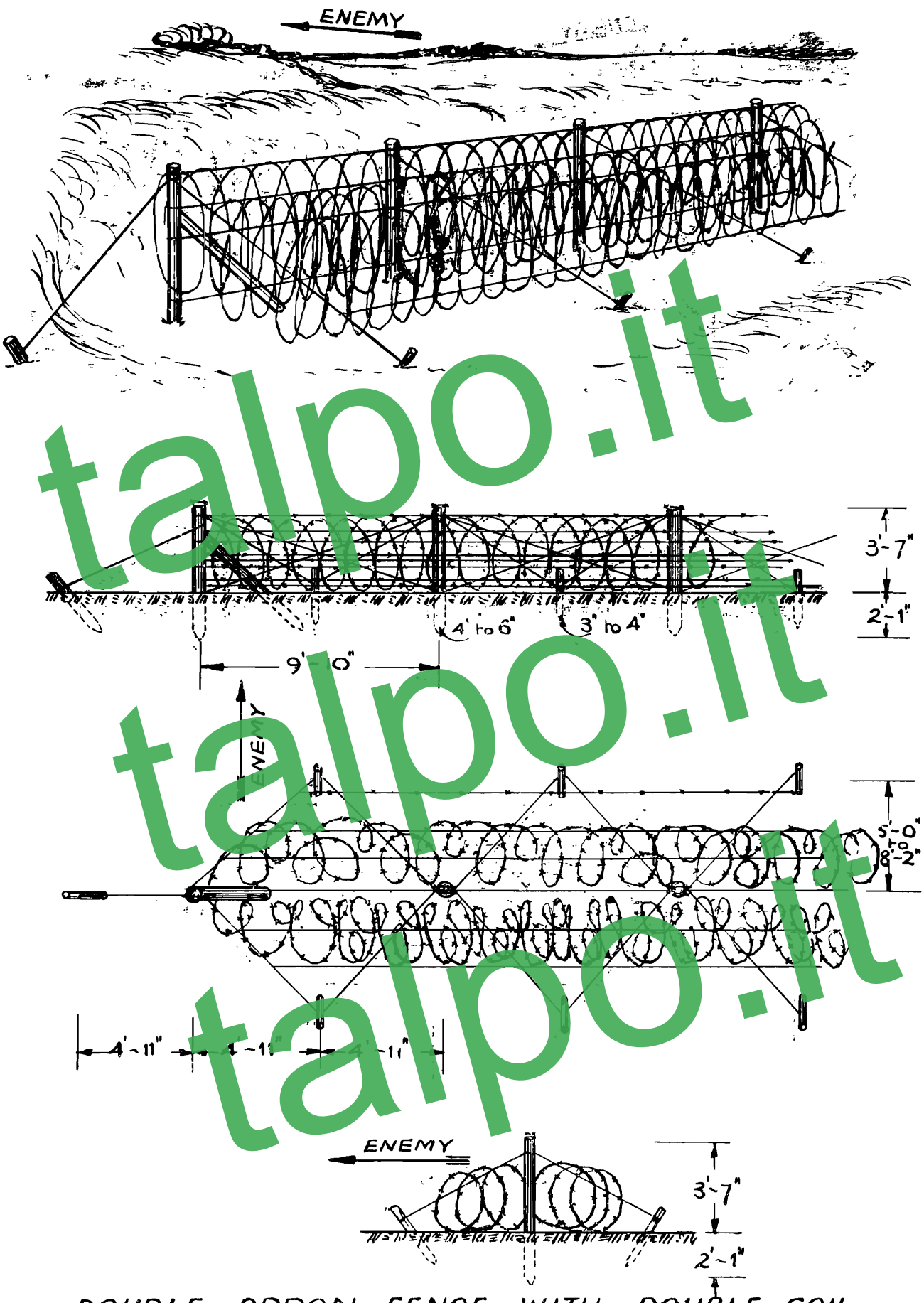
Plate 3



DOUBLE APRON FENCE WITH SINGLE COIL

I. 10b/844
EPT 43 ABW

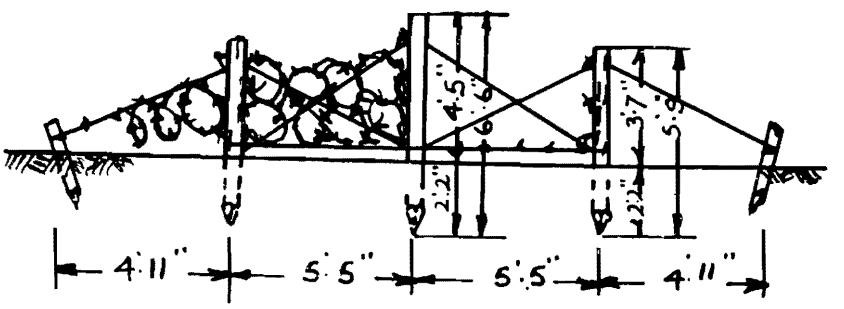
Plate 4

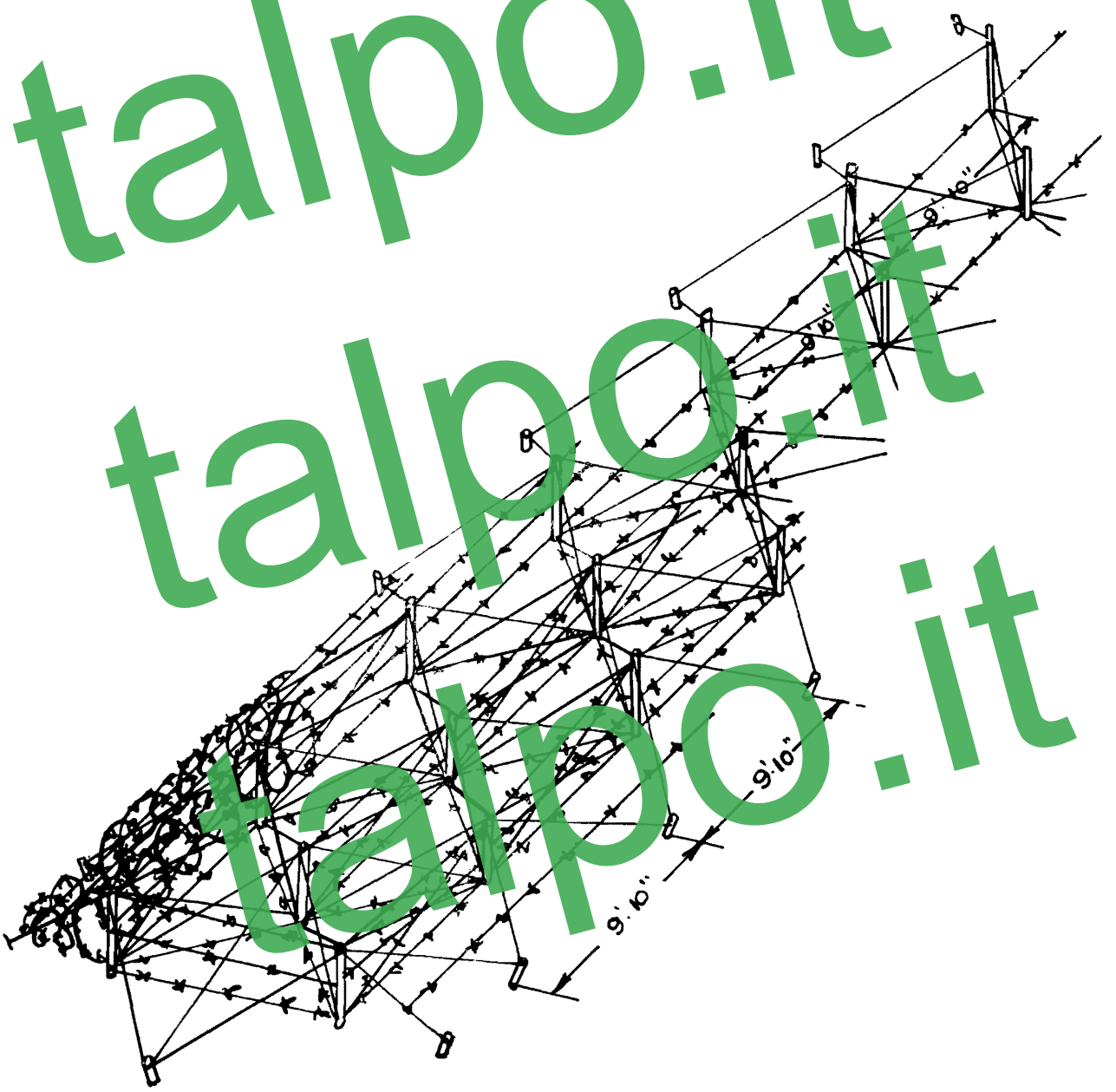


DOUBLE APRON FENCE WITH DOUBLE COIL

MI. 10 b/845
SEPT. '43 ABW.

Plate 5





APRON TYPE FENCE – 21'-0"

Mi. 10 b/846
Sept. '43 ABW

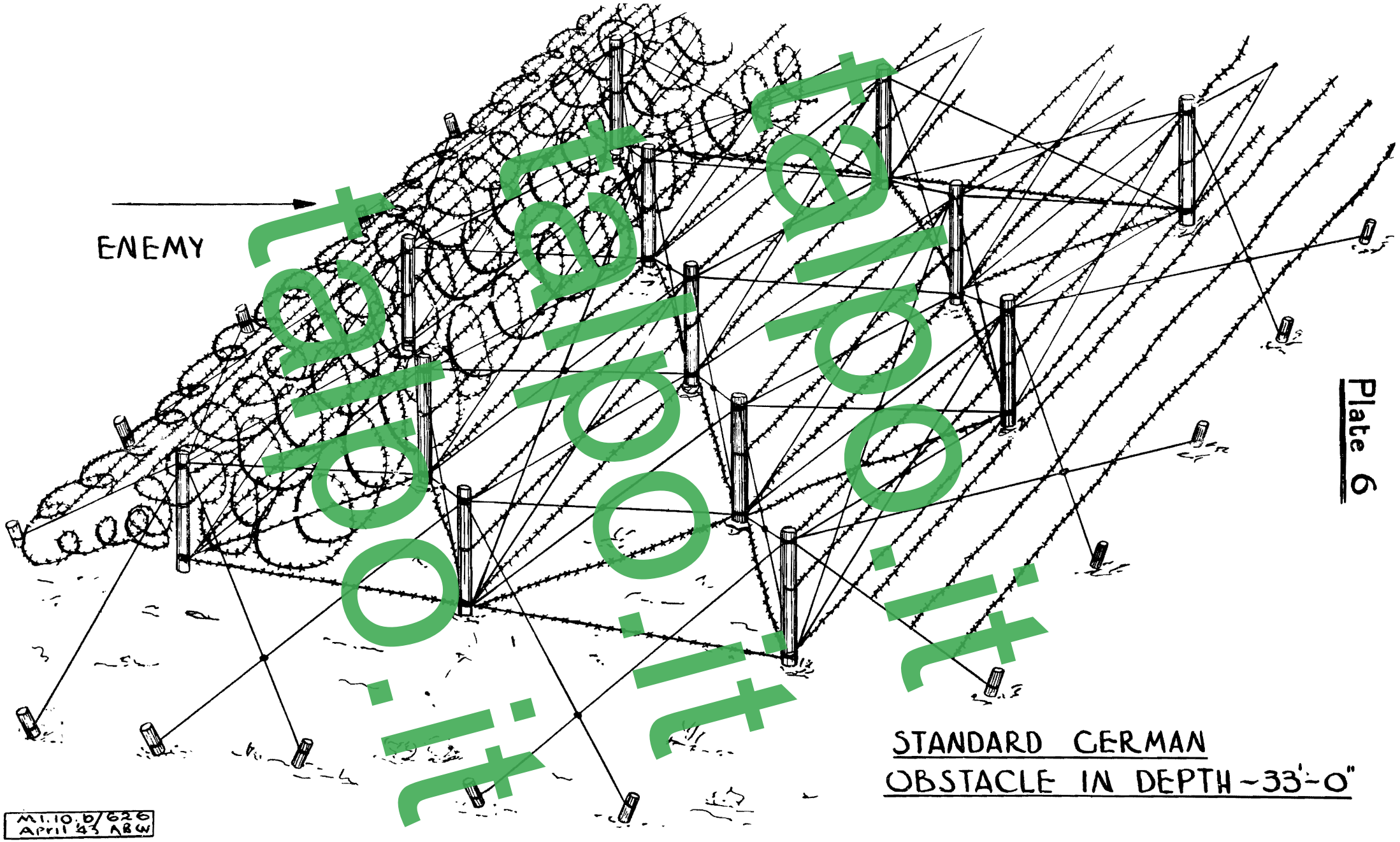
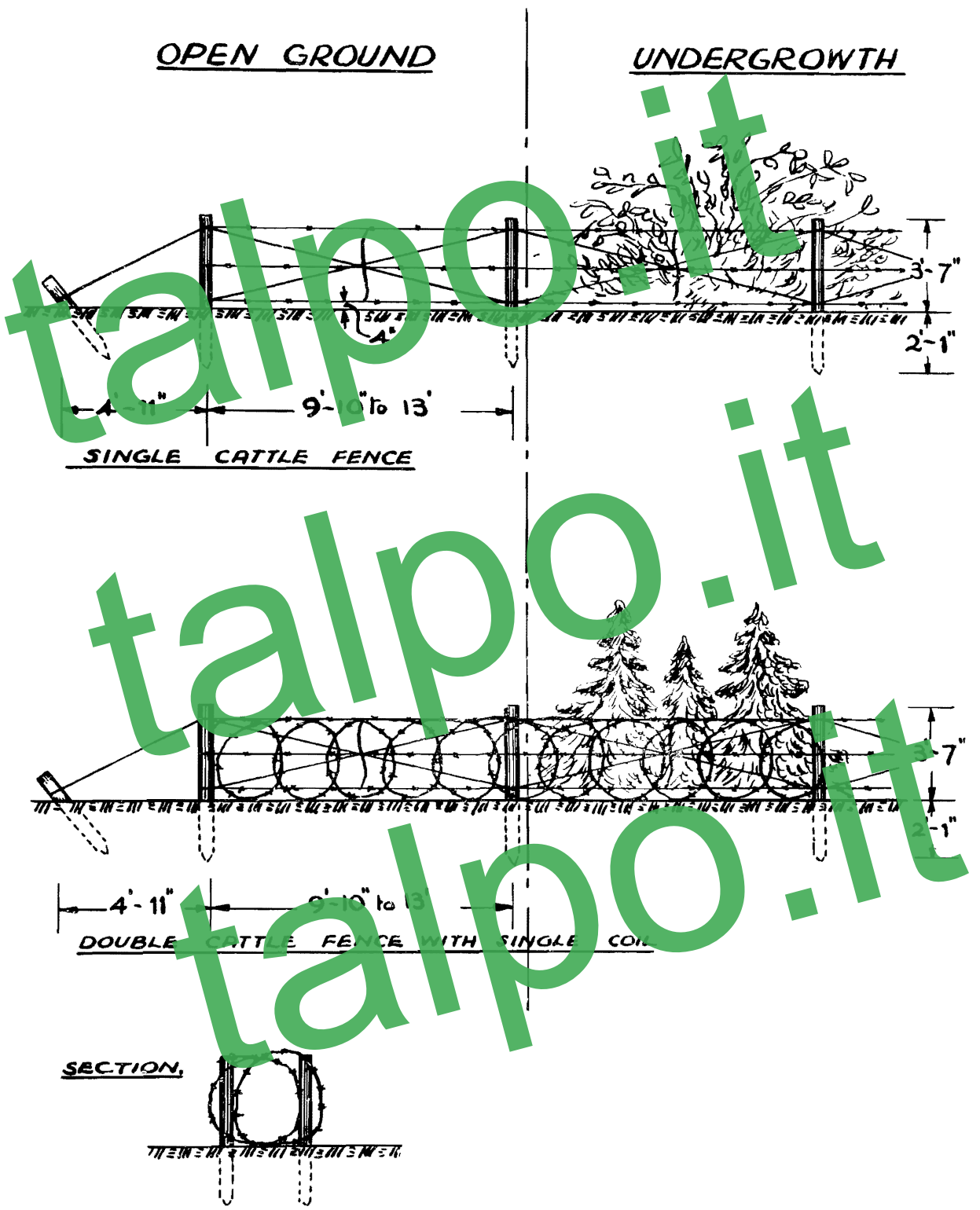


Plate 6

STANDARD GERMAN
OBSTACLE IN DEPTH ~ 33'-0"

M1.10.b/626
April '43 ABW

Plate 7



CATTLE FENCES

M.I. 10 6/847
SEPT. 43 ABN.

Plate 8

OPEN GROUND

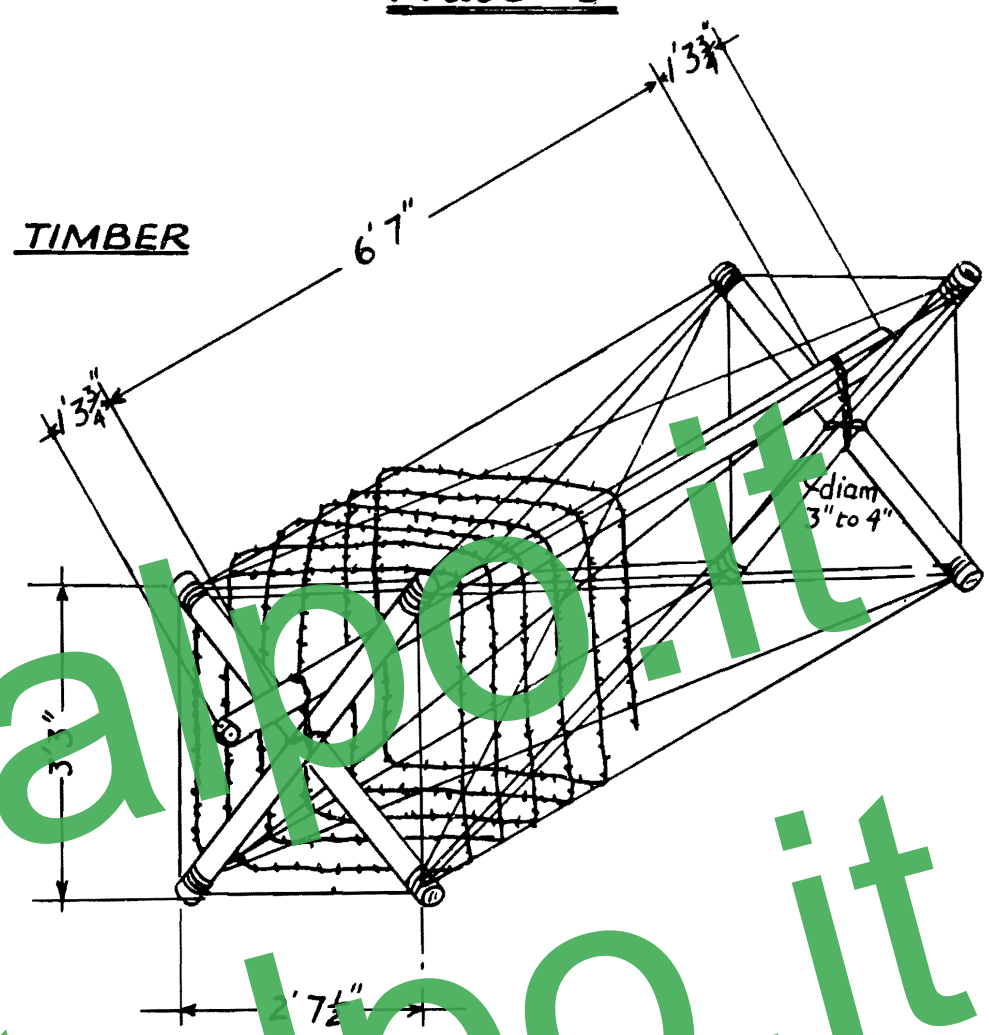
UNDERGROWTH

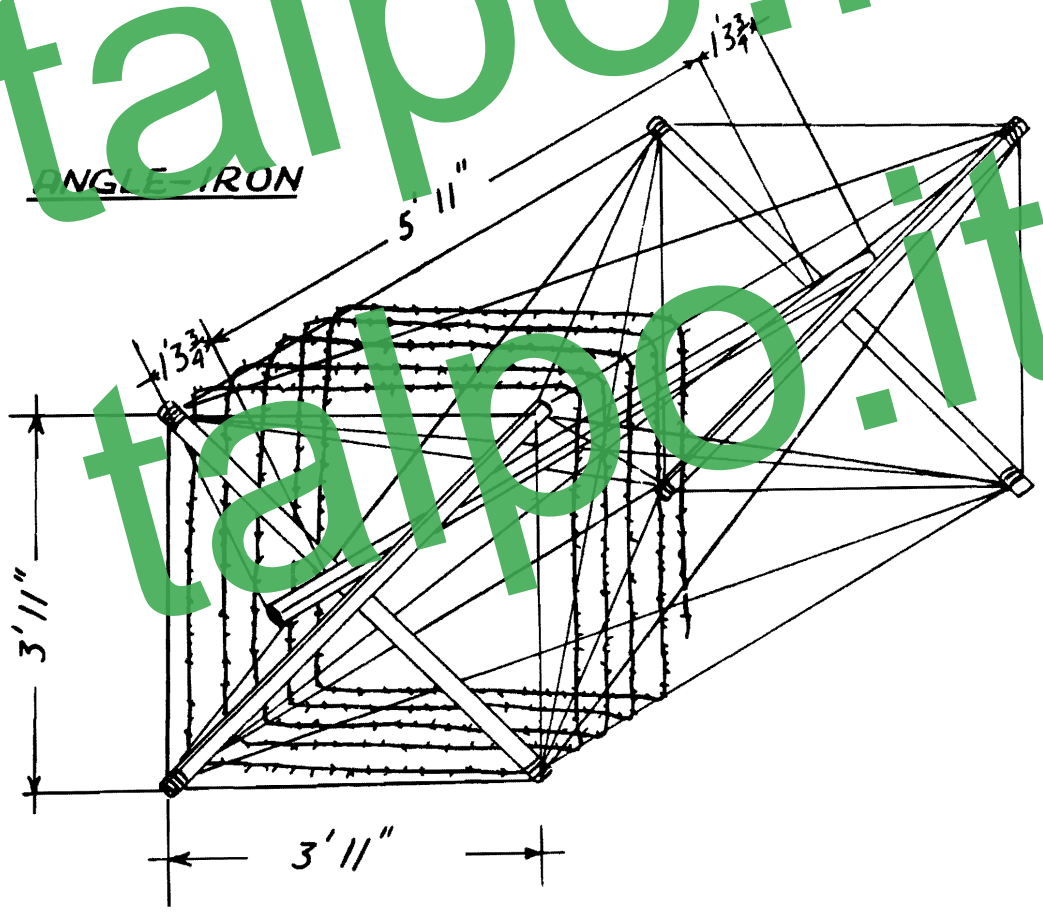
SCALE 3/100

TRIP WIRE OBSTACLE

M.I. 10 b/848
SEPT. '43 ABW

Plate 9

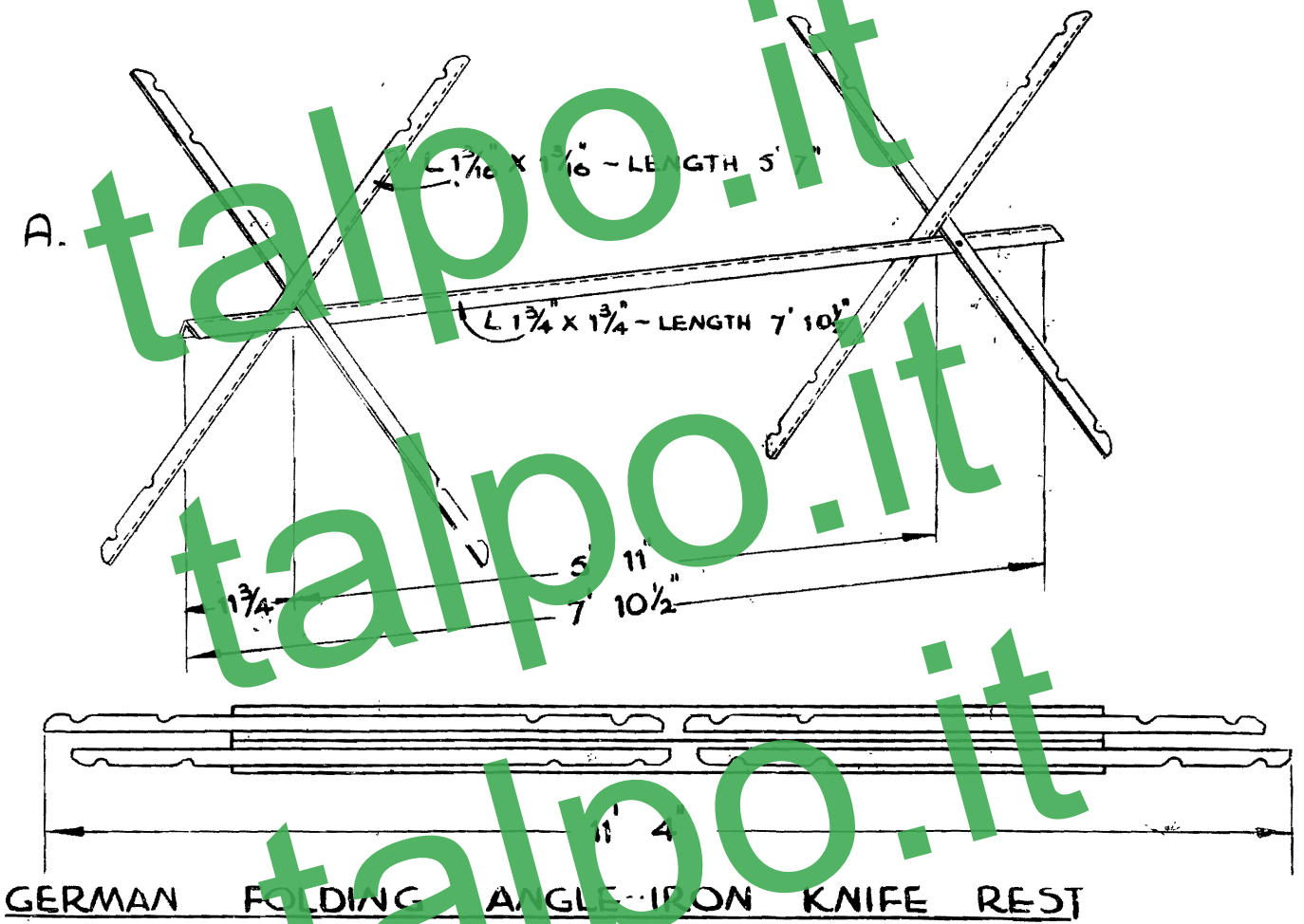




KNIFE-RESTS

MI. 10/849
SEPT 43

SCALE 1/20 FULL SIZE



GERMAN FOLDING ANGLE-IRON KNIFE REST

MI 10 b/824
July 43 ABW

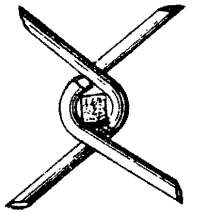
Plate 9a

Plate 10

LAYOUT OF WIRE SURROUNDING PILLBOX IN WOODS

M.I. 10 D/850
SEPT. '43 ABW

SCALE ½ FULL SIZE



END VIEW

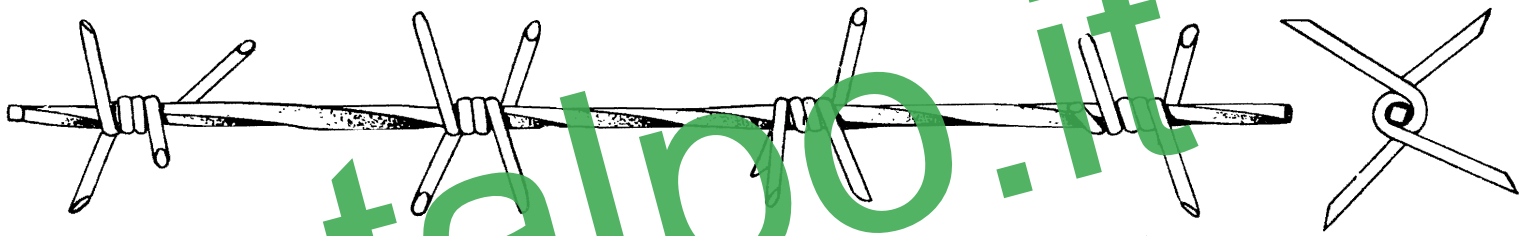
Plate II

SECTION OF CENTRE STRAND
4·X FULL SIZE

SECTION OF BARB
4·X FULL SIZE

GERMAN BARBED WIRE (SIMPLEX)

M1.10b/759
June '43 ABW



CENTRE STRAND TWISTED ONCE IN APPROX. 3½ INCHES

SCALE: FULL SIZE

SECTION OF CENTRE STRAND SECTION OF BARB

SCALE: TWICE FULL SIZE

GERMAN BARBED WIRE

MI.10b/872
Oct. 43.

Plate 12

Plate 13

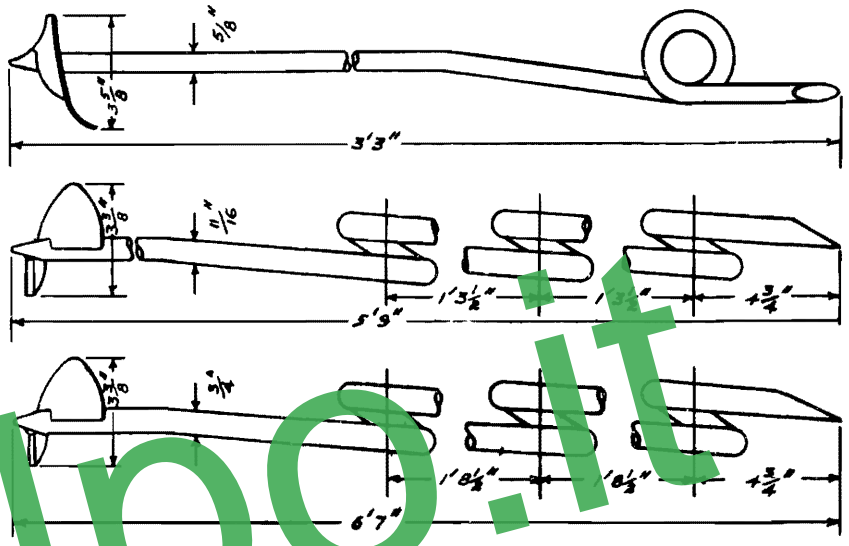


FIG. 1.

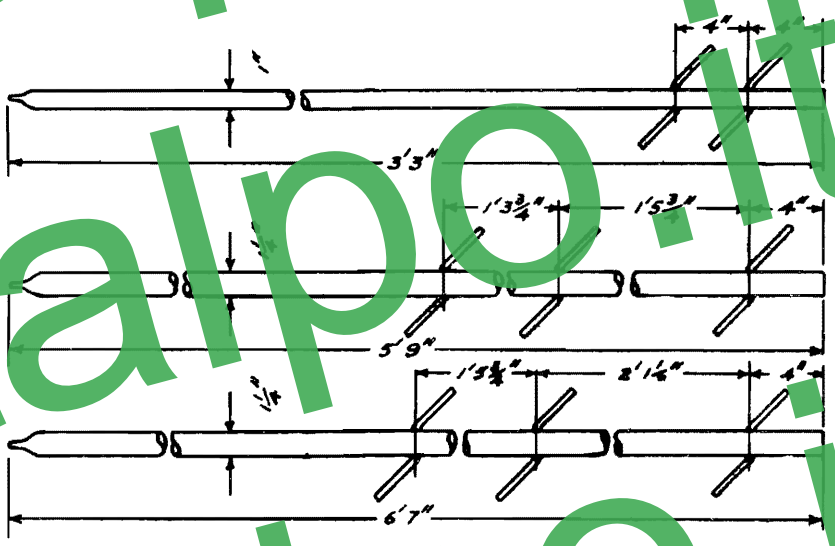


FIG. 2.

GERMAN PICKETS FOR WIRE OBSTACLES

MI. 10D/743
June '43 ABW

Plate 13A

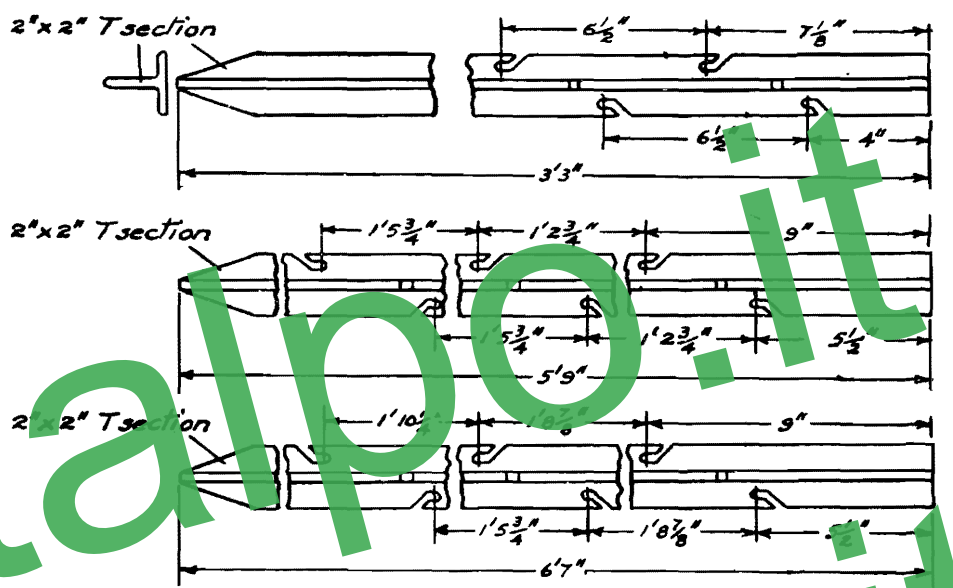


FIG. 3.

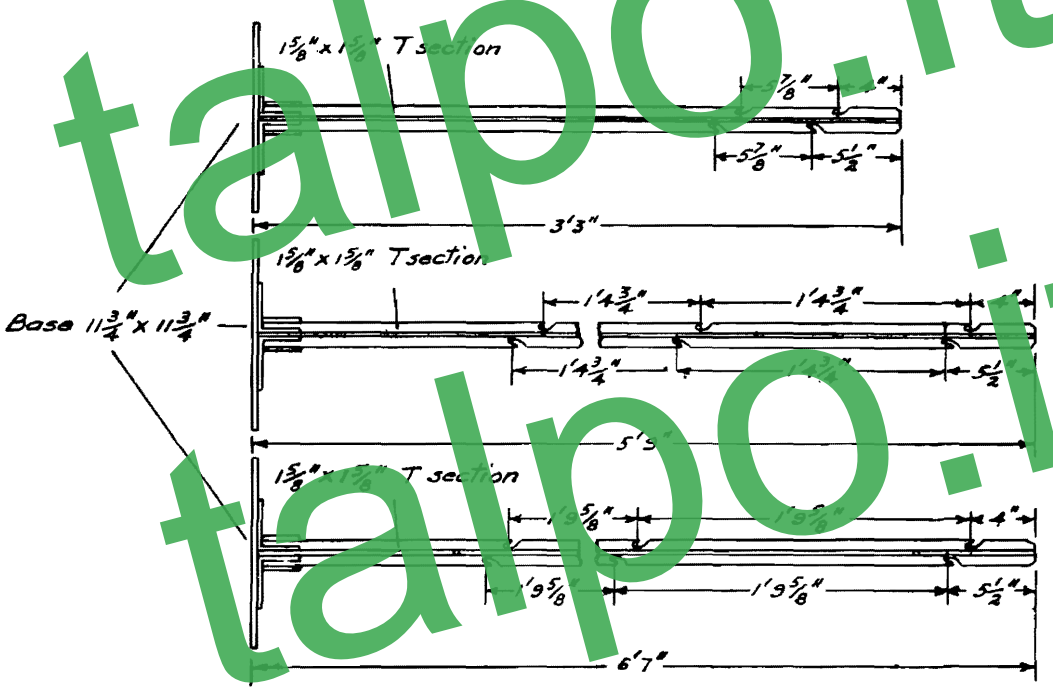


FIG. 4.

GERMAN PICKETS FOR WIRE OBSTACLES

MI. 10 b/744
June '43 ABW

[redacted]

PART II - STEEL

1. **HEDGEHOGS** (Plate 14)

The German designation is "Stahl-Igel". This design was referred to in Notes on German Obstacles No. 1 Part III para 3.

2. **ROLLED STEEL RAILS** (Plate 15)

The German designation is "Schienensperre." This design was referred to in Notes on German Obstacles No. 1 Part III para 5.

PART III - TIMBER

UNCLASSIFIED

1. **PICKET OBSTACLE** (Plate 16)

The German designation is "Pfahlsperre." This design was referred to in Notes on German Obstacles No. 1 Part V.

[redacted]