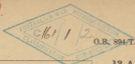


(P.B.)

S.S. 180.  
40/WO/4371

*5th Div L 399*



503

13 A.

*AUM 27  
300/L*

**FOR OFFICIAL USE ONLY.**

This Book is the Property of H.B.M. Government,  
and the information in it is not to be communicated,  
either directly or indirectly, to the Press or any person  
not holding an official position in His Majesty's  
Service.

**NOT TO BE TAKEN INTO ACTION OR FRONT LINE TRENCHES.**

Issued down to Brigades and Field Companies, R.E.

**NOTES ON SCREENS.**

*(Issued by the General Staff.)*

S.S. 173. Notes on Screens (Provisional) of July, 1917, is cancelled by the issue  
of this publication.

September, 1917.

P 17/067.

AWM	
Location	Public
Accession No.	II
Subject Catalogued	
Analysis	

FOR OFFICIAL USE ONLY.

This Book is the Property of H.M. Government, and the information in it is not to be communicated, either directly or indirectly, to the Press or any person not holding an official position in His Majesty's Service.

NOT TO BE TAKEN INTO ACTION OR FRONT LINE TRENCHES.

Issued down to Brigades and Field Companies, R.E.

NOTES ON SCREENS.

*(Issued by the General Staff.)*

---

S.S. 173. Notes on Screens (Provisional) of July, 1917, is cancelled by the issue of this publication.

---

September, 1917.

P 17,967.

A. W. M. LIBRARY	
Class. No.	503
Cost	
Was ordered	
How ordered	

## NOTES ON SCREENS.

### CONTENTS.

	PAGE.
I.—Employment of Screens	1
II.—Conditions of effectiveness	3
III.—Materials and types of Screens	4
IV.—Opacity	9
V.—Yieldability	12
VI.—Striking of Road Screens	23
VII.—Flash Screens	28
VIII.—Manufacture, erection, maintenance	30
Appendix I.—Manufacture of Screens.	
II.—Method of erecting "R" Type of Screen	

### PLATES.

I.—Grass Screen	Pl. 1
2.—"R" Type of Screen made with canvas strips	Pl. 2
3.—"R" Type of Screen made with canvas strips	Pl. 3
4.—Road screening with brushwood	Pl. 4
5.—Treatment of hedge to conceal movement	Pl. 5
6.—Camouflage Screen (road)	Pl. 6
7.—Flash screening, trussle type	Pl. 7
8.—Screening road from entrenchment	Pl. 8
9.—Screen in solution	Pl. 9
10.—Canvas stripping machine (general view)	Pl. 10
11.—Canvas stripping machine (detail)	Pl. 11
12.—Canvas stripping machine (detail)	Pl. 12
13.—Road roll for painting screens	Pl. 13

## NOTES ON SCREENS.

### I.—EMPLOYMENT OF SCREENS.

1. Screens are employed for the purpose of concealing from direct observation:—
  - (a) Roads, tracks, trenches, and areas.
  - (b) Ground which is waterlogged, where it is impossible to dig communication trenches and over which it is necessary to move troops.
  - (c) Battery positions and gun flashes.
  - (d) Work in progress and new work.
  - (e) Dumps.

They are also used for the purpose of:—

- (f) Thickening hedges which are not sufficiently opaque of themselves.
  - (g) Representing treacheries.\*
  - (A) Encouraging the enemy to waste ammunition by their evasion where there is nothing to hide or conceal.
2. Their main function, however, is concealment, so that if the enemy fires on them without aerial observation, he can only do so on the chance of there being something behind them.

### II.—CONDITIONS OF EFFECTIVENESS.

3. To be effective, screens should fulfil the following conditions:—

(a) *Materials and Construction.*—The materials should be as light as possible, for convenience of carriage; at the same time, the construction should be sufficiently strong to resist weather, and should not be liable to extensive damage by shell fire.

They must be easily repairable if damaged by weather or shell fire. They must be capable of being made and erected rapidly.

(b) *Opacity.*—The whole surface of the screen must not necessarily be opaque, but a sufficient proportion of the surface should be formed of opaque material to ensure that the screen as a whole conceals movement from the nearest hostile points of observation (see IV. (11)).

(c) *Immobility.*—Whether the screens should be arranged so that they are not likely to be recognised as such, or whether it is of vital importance to render them inconspicuous, is a matter for decision in each particular case.

### III.—MATERIALS AND TYPES OF SCREENS.

4. The forms of screening found most suitable are:—

(a) *Wire setting* furnished with grass (see Plate 1), brushwood or canvas strips (see Plates 2 and 3). It may be noted that screens made of string setting interbedded with grass or brushwood are troublesome to put up and do not stand weather.

(b) *Brushwood* and tree branches interwoven on horizontal wires stretched between rigid uprights (see Plate 4).

5. On both these nature of screens, (a) and (b), shell fire has practically no effect unless a direct hit is obtained; and even then, if they are properly constructed, the effect should be very local. They also stand the weather well. Grass screens, however, when dry are somewhat inflammable.

6. *Brushwood* is probably the best natural form of screen. It has no straight edges, barbedness with most surroundings, and is easily repairable. When it fades or dies it can be thickened up.

\* They were used for this purpose as early as A.D. 1513, at the siege of Thionville by Henry VIII.  
See "The Art of War" by Henry VIII, p. 245.

7. Other forms of screens employed are:—

(c) Complete canvas screens. These in certain cases are necessary, e.g., to hide flashes or movement at close range (up to 2,000 yards).

Such screens are highly susceptible to damage by weather and shell fire, must be extra firmly supported and, if possible, backed with wire netting. Wind has naturally a considerable effect on them.

Green Willowden canvas is not of a suitable colour; it is very conspicuous and is easily torn by the wind.

(d) Coir screening (a generic term for cocoanut or jute matting). This in single thickness is transparent; used double it forms an excellent and quickly constructed screen. It is useful as a temporary expedient, but does not stand the weather well. It should always be reinforced with longitudinal wires.

It has been employed with good results for horizontal screening, to conceal machine gun nests, entrenchments to deep dumps, &c., and has been stretched over a row of huts in an advanced Headquarters to hide the shadows which would have revealed the huts in an aeroplane photograph.

8. In general, canvas and coir screens are affected much more rapidly by weather than are those made of wire garbished with brushwood and grass, and are less easily kept in repair.

#### IV.—OPACITY.

9. Perfect opacity under all conditions of light and background can only be obtained by the use of perfectly opaque material, such as corrugated iron. Even thick canvas is not always opaque, e.g., when the sun is low and behind it. Usually it is found sufficient to provide a screen that is sufficiently opaque under normal conditions, that is to say, one which hides movement from any but very close and continuous scrutiny.

10. The screening effect is much influenced by background and angle of view. A comparatively transparent screen may be successful if the background is of a colour generally similar to the objects to be screened, is broken by trees and bushes, or is viewed from an angle other than at right angles to its surface. There appears to be little difference in visibility between objects 20 yards and 100 yards behind a screen, though an object 5 yards behind it is more easily seen than at 20 yards.

11. Unless assisted by natural accidents of scenery, it is necessary that about three-quarters of the surface of a screen should be made of opaque material, if it is to hide movement at medium ranges (2,000 to 4,000 yards).

#### V.—VISIBILITY.

12. There are two distinct categories of screens:—

(a) Those which must be obvious to the enemy as screens.

(b) Camouflaged screens, designed to conceal and yet to escape detection themselves.

13. These latter are either made of:—

(i) Solid painted canvas, or wire netting garbished with strips of canvas, brushwood, grass, &c., coloured in patches to present a general landscape effect, or to represent ledges (see Plate 3).

(ii) Solid canvas carefully painted to reproduce a definite locality, brickwall, ruins, and such like (see Plate 6).

14. Camouflaged screens can rarely serve their purpose for any length of time, and only in exceptional cases (where they are not required for more than a few weeks) are worth the time and trouble that must be expended on their manufacture.

15. Their defects are:—

(a) That the effect obtained by painting only lasts a short time when exposed to weather, and does not vary with the seasonal changes in the natural surroundings.

(b) That they require greater care in construction, and more maintenance, than ordinary screens, and are highly susceptible to damage by weather and shell fire.

(c) That it is very doubtful whether they do deceive the enemy. Should they not do so, they only perform the function of an ordinary screen, i.e., that of concealment, but have taken longer to construct.

16. It must be noticed that camouflaged screens are usually erected where they are liable to steady direct observation as opposed to the comparatively fleeting examination from aeroplanes to which camouflage gun covers are exposed.

17. The following are examples of the successful use of camouflaged screens:—

(a) Work on exposed battery positions about 1,800 yards from the enemy's front line was made possible by the erection of screens composed of raffia and wire netting. The screens were mounted on wooden trestles, to a maximum height of 10 feet (see Plate 7). These enabled the raffia netting to be put up at a slope and so to simulate a bank or false crest. The extremities of the screen were sloped gradually to the ground by using progressively lower trestles. Both front and back slopes were furnished with raffia netting, in order to get sufficient thickness to conceal flashes. The outline of the top of the screen was made to conform to the features of the landscape in its vicinity, and the slopes were gentle.

(b) In another instance, imitation brick walls painted on canvas backed with wire netting were erected for a similar purpose (see Plate 6).

(c) Imitation ledges of a combination of raffia, canvas strips and brushwood on wire netting were made to conceal a battery position, which otherwise would have been under direct observation. In this case an existing ledge, which was in the rear of the position, from behind which the guns were unable to fire, was removed and the imitation ledge substituted for it in front of the guns.

18. It is a general experience that hastily-erected screens are shelled by the enemy for a short period, but that he soon gives up firing if damage is repaired promptly.

19. A good example of this is afforded by the screening of an exposed area on the British front. Over 7,000 yards of screening, consisting of hay bands interwoven in wire netting, were erected, but no attempt was made to render the screen inconspicuous. It was shelled to some extent, but no damage caused was immediately repaired. The screen five months later was still fulfilling its purpose, i.e., that of concealing what went on behind it.

20. The following are examples of the special use of clearly distinguishable screens:—

(a) By erecting screens in front of a line on a portion of the British front, it was possible to employ large working parties by day, with the result that there was a considerable increase in the amount of work done.

(b) At another spot, an old shattered trench was made practicable for the conveyance of wounded, although in full view of the enemy, by the erection of a screen made of raffia on wire netting fastened to pickets set at an angle of 60°. This also served to conceal the newly excavated chalk thrown up in improving the trench.

(c) A road was screened by stiling the trees which had been felled by the enemy in retreat. Strong straight limbs to serve as posts were erected about every 18 feet, with 10 feet projecting out of the ground, and large branches were cut off and stuck upright between them. Three strands of plain wire were run from post to post and passed through the branches to help to support them. There was a lot of dead wood about on both sides of the road. The screen was effective and was not shelled.

(d) While battery positions were being dug a screen was put up some 400 yards away to the left. It afforded the enemy much amusement and usually drew 80 to 100 rounds of 5-inch a day from him. The battery positions were left in comparative quiet.

(e) A screen about 600 yards long and 16 feet high, made of hop poles, with lewens canvas strips, painted here and there with big patches of black and green, and of seven-inch wire netting which were hung from five horizontal wires, was erected to screen seven guns. It was put up a month before it was wanted. The enemy shelled it for a week or two, but after breaking two poles, which were repaired at night, desisted.

21. There is no doubt if screening is carried out on a comprehensive scale, and with a continuous policy, that localities which would normally be under observation, and subject to deliberate shelling, become practically immune from it. This immunity does not depend upon the invisibility of the screens erected, but on their distribution. From ranges of 4,500 yards and under there is little difficulty in picking up the various types of screening ordinarily used. In every case, however, before a scheme of screening is settled, the ground should be carefully reconnoitred to assure that every advantage is taken of its natural features, and to ensure, as far as possible, that there is assimilation of colour to local surroundings and background. Straight lines are usually more easily distinguishable than broken ones, so that irregularity of the top of the screens may be of value. Some screens along a road draw fire probably because they ended abruptly instead of sloping gradually away to the ground.

22. It is advisable to consider well beforehand in the summer months what screens will be required in the winter after the leaves are off the trees, and to have them erected before the autumn cover disappears.

#### VI.—SETTING OF ROAD SCREENS.

23. Roads running perpendicular to the front line are best screened by hanging vertical screens between trees or houses, or poles, across the road (see Plate 8).

24. In the case of roads running parallel, or more or less parallel, with the front line, it is advisable, when possible, to site the screens at least 50 yards from the edge, in order that shell fire directed at the screens shall not cause damage on the road and vice versa.

25. Such road screens may require to be made specially high; but at the same time, the lower edge can usually be some distance above the ground.

26. Short lengths, of about 30 yards, placed in echelon and overlapping each other are preferable to long continuous lengths. This method permits of plenty of passage ways, and limits damage by shell fire; and further, the line of route screened, not being defined, becomes difficult to range on (see Plate 9).

27. Roads at an angle to the front can be concealed by screens facing the front, arranged in echelon (see Plate 10).

#### VII.—FLASH SCREENS.

28. Screens have been successfully used to hide gun flashes at night from the front and from a flank (see Plate 7).

29. In one case where the flashes were visible from a flank, a long solid canvas screen (painted a dark colour) was placed 50 to 100 yards on the right front of the battery. This was found difficult to maintain, and six small screens were substituted, one about 4 yards to the right of the muzzle of each gun, and running out about 8 yards to the front. They were about 8 feet high, of which only the top 6 feet were canvas. They were dismantled during the day and re-erected each night, in socketed holes.

#### VIII.—MANUFACTURE, ERECTION AND MAINTENANCE.

##### Manufacture.

30. It is convenient when manufacturing screens in bulk areas to make them up in bays of 20 feet, with intermediate supports 10 feet apart, so 20 feet is a fifth part of an ordinary roll of wire netting, and a convenient length to handle.

31. In order to localise the effect of shell fire, it has been found advisable to hang each longitudinal width of wire netting independently on a longitudinal wire between the uprights.

32. It is important that the manufacture and assembly of screens should be well organised, so that the actual erection can be carried out rapidly.

33. The adoption of a standard type of screen which will serve anywhere will result in economy of time and labour.

34. Strips of canvas interlaced in wire netting will make such a screen. The strips should be  $\frac{3}{4}$  inches wide, and threaded through every third or fourth mesh vertically, leaving no horizontal interval. Opacity, but not invisibility, can be considerably increased by the use of alternate vertical bands of plain and dark coloured canvas, each band being about a foot wide. It is important that there should be a strong contrast between the plain and the coloured canvas. Such a screen is effective at ranges of a mile and upwards (see Plate 2).

35. Still better results can be obtained if the colour is arranged on the vertical bands so as to produce a chequer effect. This can be easily done in manufacture, for the screens are made up of widths of wire netting 3 feet wide which are subsequently joined to form screens 6 feet or 9 feet high. It is simple, therefore, to arrange either in the manufacture or in the assembling, that the coloured bands on one 3-foot width is fixed next to a plain band above and below (see Plate 3).

36. Irregularity of outline, if necessary, can be given by not commencing the threading of every strip at the top of the wire netting, or by inserting a hemlock crown.

##### Erection.

37. Whenever possible, screens should be attached to existing objects such as trees, hedges, houses, &c. If poles have to be used instead they should be sunk well into the ground and well guyed.

38. The screen should be both suspended from longitudinal wires and fastened with staples to the poles.

39. The following methods of fencing have been found satisfactory:—

(a) The uprights joined by longitudinal wires 2 feet apart, and guyed to stout pickets set midway between each pair of uprights. Each upright is therefore secured to four pickets, which are shared by the uprights on either side (see Plate 1).

(b) Cross diagonal bracing between each pair of uprights, which should be guyed in the normal way (see Plate 2).

40. Uprights should be of at least 3-inch timber. Guys should consist of at least four strands of No. 14 gauge wire, or the equivalent.

41. Wooden bollard pickets should be driven inclined at about right angles to the direction of the guy rope attached to them; iron screw pickets, on the contrary, parallel to the direction.

42. Failure of screens which have occurred have been principally due to:—

(a) Wire not sufficiently stout having been used between poles to carry the wire netting. If the netting is only made fast to the poles it soon sags and breaks away.

(b) Bad or insufficient staking of the poles.

(c) The feet of the poles not having been placed far enough in the ground.

(d) The use of canvas or other heavy material that offers resistance to the weather.

(e) Neglect of ordinary maintenance. This means not only failing to keep the screens up, but omitting to insert additional material when it is required, and re-painting material as it fades or changes colour.

##### Maintenance.

43. It is recommended that resistance parties should be detailed for effecting immediate and pressing repairs, and that a reserve dump of material should be formed near any extensive range of screens that is liable to damage.

## APPENDIX I.

## MANUFACTURE OF SCREENING.

- R" Type.

## Common Finishing and Stripping.

1. The screen (finishing) is cut into strips 2½ inches wide and 2 feet long on a machine (construction shown on Plates 11 and 12). The width of the cutting table can be made to suit the width of screen to be cut. The screen cuts better if it is wet.

2. For advanced strips - a roll of screen is fed through a point mill built on the principle of the wringer. Plate 13 illustrates a convenient type.

In order to extract as much as possible of the excess of paint, scraping bars are fitted (see Plate 12) by the adjustment of which the angle of travel of the screen can be altered so as to increase the tension under which the screen passes through the mill.

3. The following is a recommended process of manufacture:—

(a) Holes are punched on material from Oklahoma in 7½ inches wide folded to 26 inches wide. The ends of the material in each hole should be wound on to a roller, and whilst this is being done the screen may be cut along the fold to form two 26 inch widths.

(b) The double roll of screen is then placed on a mangle or brackets at the intake end of the pressing mill, and is passed through the mill double by winding on a spindle at the other end of the mill.

(c) When each spindle has had enough painted screen wound on to it, the screen is cut, the loaded spindles removed and an empty one inserted, and so on (see Paragraph 4 below).

(d) To make this process continuous, the ends of one double roll should be attached to the incoming ends of the next following, so as to save the necessity of loading the beginning of each roll by hand under the driving roller over scraping bars and through the pressing rollers, &c.

4. The full spindle mentioned in Paragraph 3(c) with its roll of painted screen is taken to a stand between two cutting machines placed back to back. The roll being double above of one thickness being taken to each of the two cutting machines.

5. The width of strips cut obviously depends on the interval between the knives in the cutting machine. This interval for ordinary screen strips cutting is usually about 1½ inches. By taking alternative knives out of a set or spaced, the interval becomes 2½ inches, which is that required for the "R" type of screen described. Illustrated in Plates 2 and 3.

## APPENDIX II.

## METHOD OF ERECTING "R" TYPE SCREEN.

(See Plates 2 and 3).

The screen should be made up in rolls each consisting of one bay complete.

Each bay is 20 feet long, and includes besides the roll which forms the screen itself:—

- 4 spigots,
- 5 gys,
- 5 pickets.

End gys and pickets as required.

Each gys rope is attached at one end to the top of an upright and at the other end to its picket. Gys ropes, spigots and pickets should all be packed up neatly inside the roll.

Each bay of such a screen can be carried by two men.

To increase the speed of erection at site, all gys on one side of the screen should be attached during the process of unrolling to a fraction under their ultimate length so that they will become taut by the tightening of their lower gys.

As unrolled at site the roll is unrolled and fully extended along the line that it is to occupy, the feet of the spigots being laid in that line. The heels will then mark the positions of one line of pickets. The other line of pickets is located by moving in the opposite direction a distance equal to the height of the spigots.

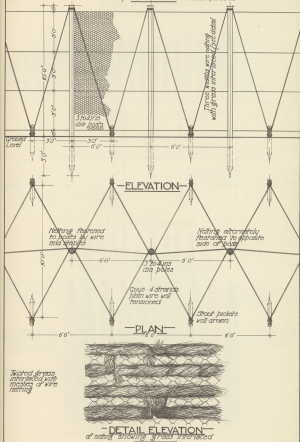
The pickets should then be driven as covered in, as the case may be, and the gys being already attached will hold out clear, the screen is ready for bolting.

Bolting can be done by three men per bay. As each bay is carried by two men, it is only necessary to arrange the men so as to distribute the lift equally. Three bays at a time or 20 feet of screening can be conveniently raised and each secured simultaneously by the six men who carried the material to the site.

## GRASS SCREEN

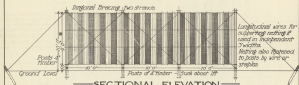
## PLATE I.

No attempt made to render it impregnable

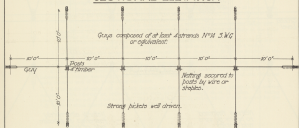
DETAIL ELEVATION  
of netting showing strands and holes

## "R" TYPE OF SCREEN — PLATE 2.

which will conceal movement under normal conditions at range of 1 mile upwards. No attempt needs to be made to render screen impenetrable. Concealment only aimed at. Sketch showing construction of one bay 30 FT long 3 FT high.

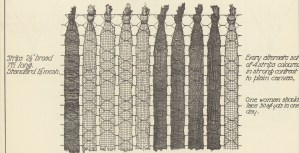


**SECTIONAL ELEVATION**



### PLAN

showing arrangement of gaps.



**ENLARGED ELEVATION**

showing manufacture.

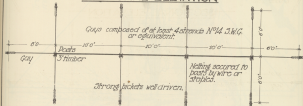
Screen can be made up as follows—(a) one left and one right roll, (b) three left rolls, (c) left roll comes taken right through from top to bottom, (d) 3 rolls as on plate 3.

## "R" TYPE OF SCREEN — PLATE 3.

which will conceal movement under normal conditions at range of one mile upwards. No attempt made to render screen impenetrable. Concealment only aimed at. Sketch showing construction of one bay 30 FT long 7 1/2 FT high.

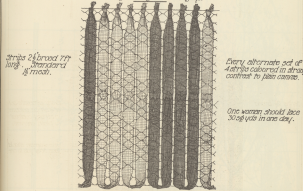


**SECTIONAL ELEVATION**



### PLAN

showing arrangement of gaps.



**ENLARGED ELEVATION**

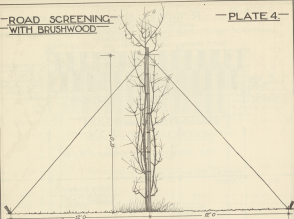
showing manufacture.

Every alternate set of 4 strips colored in strong contrast to plain canvas.

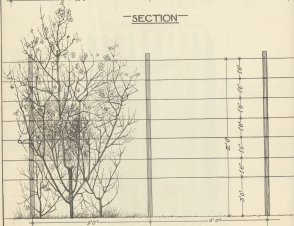
One woman should face 30 ft wide in one day.

ROAD SCREENING  
WITH BRUSHWOOD

— PLATE 4. —



— SECTION —



— ELEVATION —

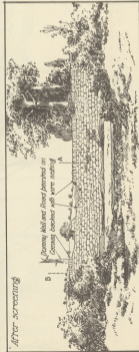
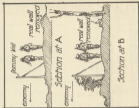
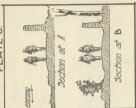
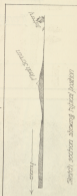
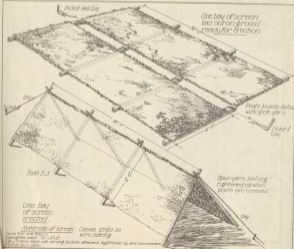
Note — Only cross-section of work shown.  
Brushwood must be at least as deep as  
a hedge is wide.

— PLATE 5. —

Treatment of hedge to conceal  
travellers or goods by  
(a) Trimming  
(b) Heightening  
(c) Extending



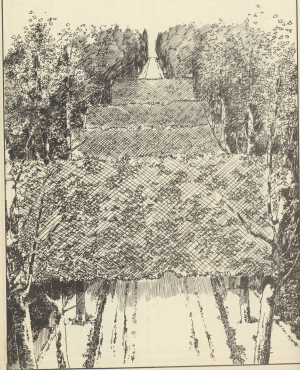


*Enemy view of road before screening**After screening**Enemy view of position unscrubbed**Enemy view with screen erected**Sketch section showing typical position**Line bay of screen erected*

Materials of screen: Canvas strips on  
 1/2" x 1/2" x 1/2" wire mesh  
 1/2" x 1/2" x 1/2" wire mesh  
 1/2" x 1/2" x 1/2" wire mesh

—SCREENING FROM ENFILADE— PLATE 8  
—VIEW.

*Transport to pass under screens.*



SCREENS IN ECHELON, for road parallel to Front-Line

*Enemy view of road unscreened*



*After screening*

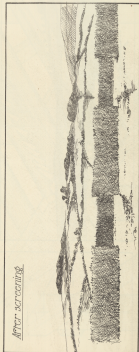
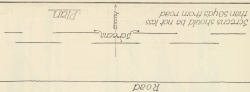


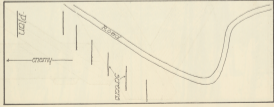
PLATE 9.



Road

Plan

Screens should be not less than 50 yds from road



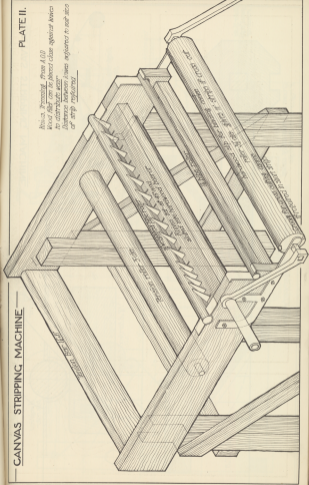
—After screening—



—Early view of road constructed—

PLATE 10.

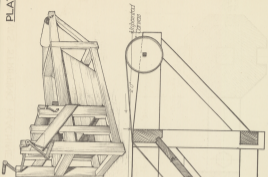
SCREENS IN ECHELON for road abuttes to first line



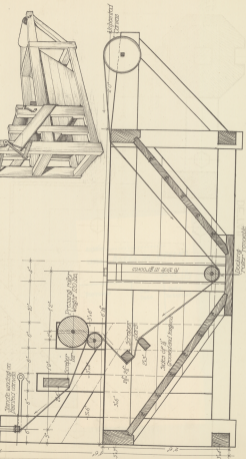
CANVAS STRIPPING MACHINE

PLATE 11.

Fig. 11. Pressing. Press A 100  
Wood filler can be placed close against rollers  
to distribute water  
between rollers. Lines referred to are axes  
of shafts indicated



HAND MILL FOR PAINTING CANVAS

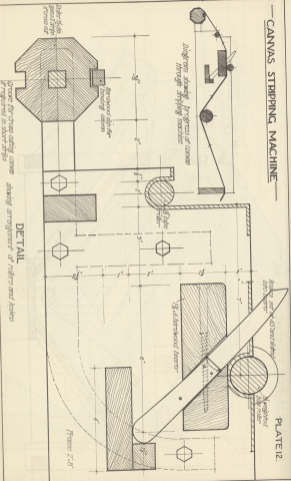


CANVAS STRIPPING MACHINE



Illustration showing the process of canvas through stripping machine

PLATE 12



DETAIL

groove for cross cutting canvas always arrangement of rollers and rollers required in short strips

Author.....

TITLE...NOTES ON GREEN'S

II

JULY 1971

Borrower

Due  
Date

Into  
Returned