Jan. 11, 1944. K. J. SOMMERFELD 2,338,785

CONSTRUCTION OF ROADS OR RUNWAYS

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Fig. 1.

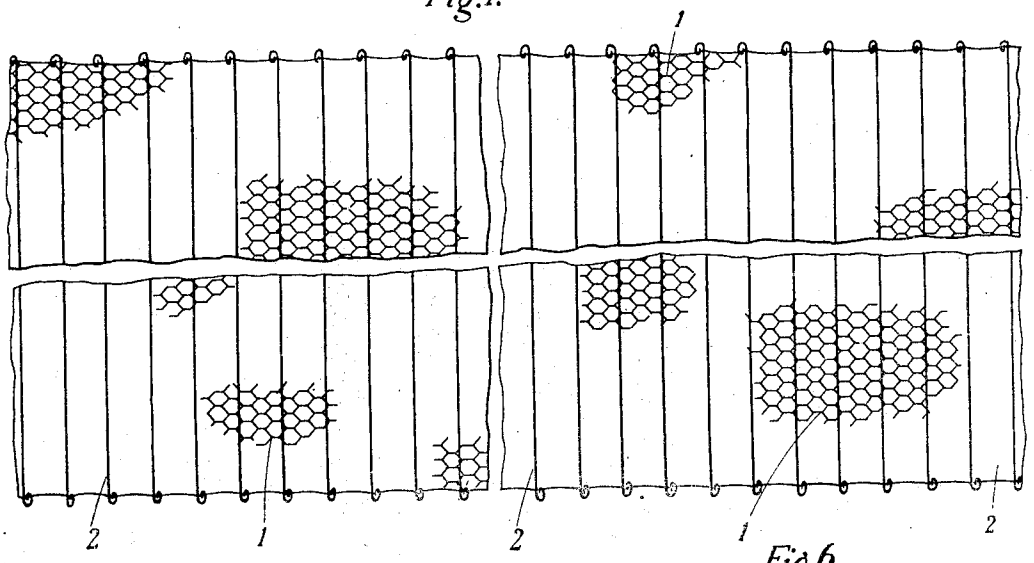


Fig. 5.

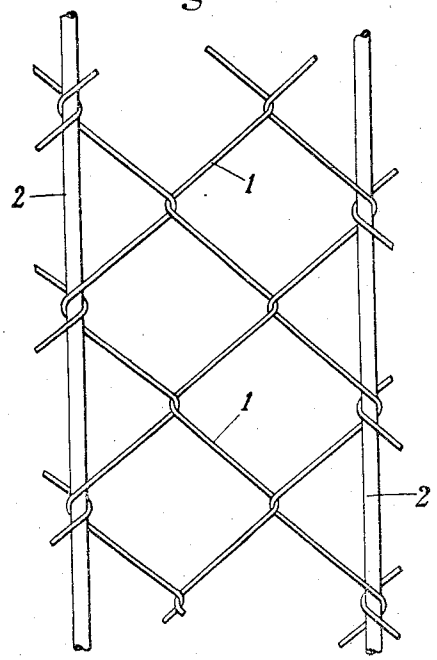


Fig. 6

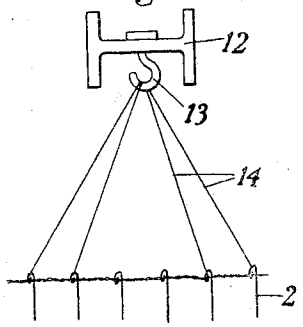
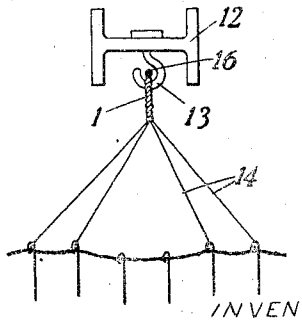


Fig. 7.



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Fig.2.

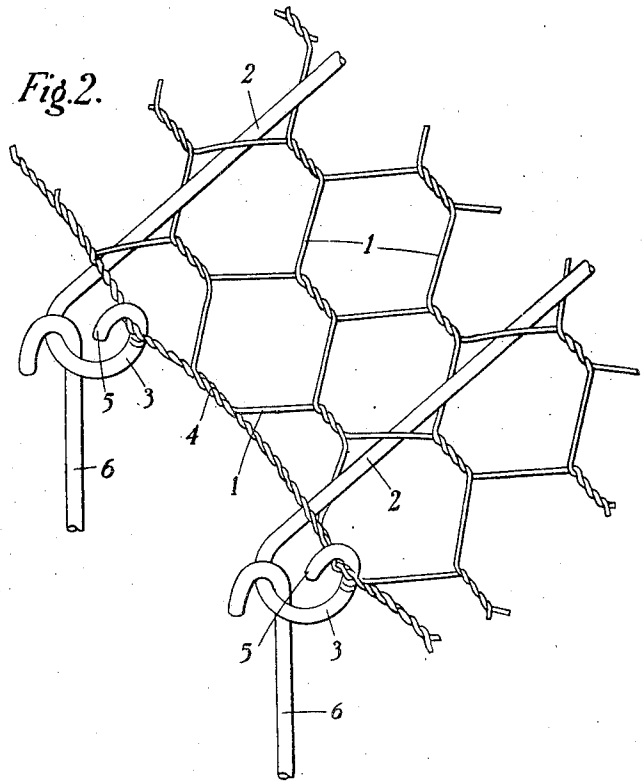


Fig.8.

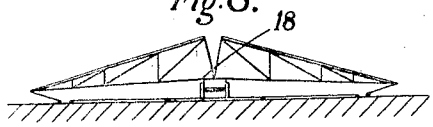


Fig.9.

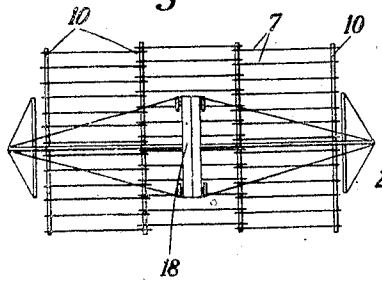
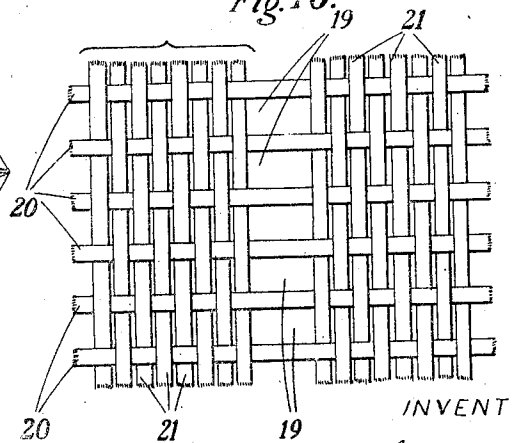


Fig.10.



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Fig. 3.

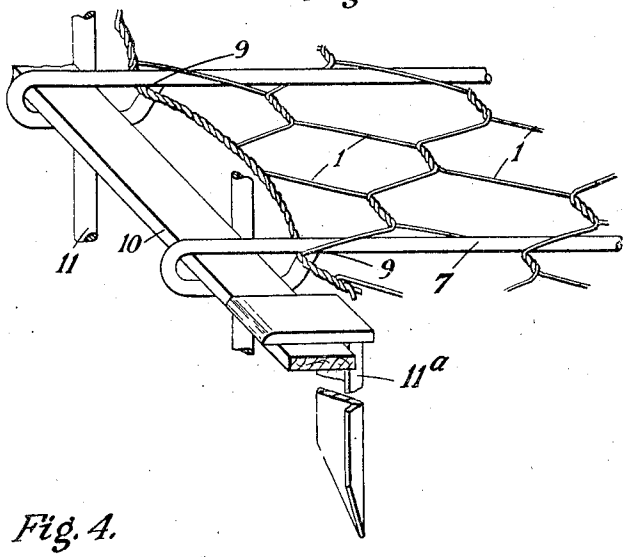
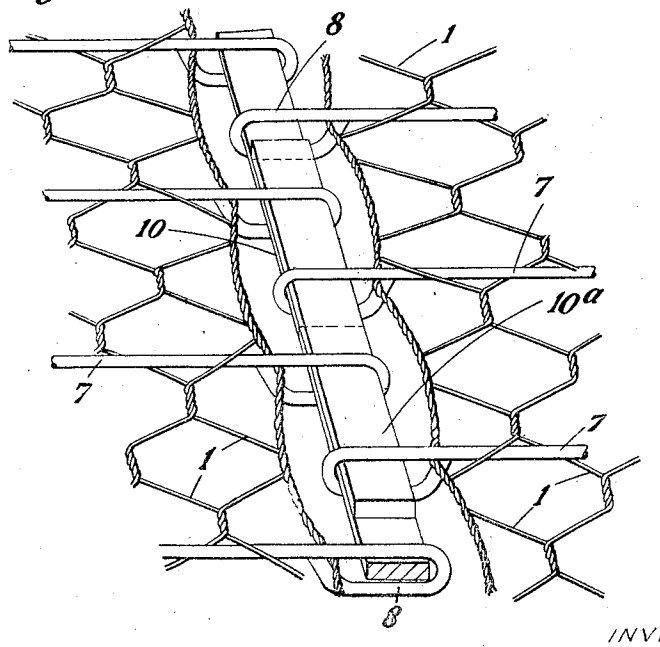


Fig. 4.



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UNITED STATES PATENT OFFICE

2,338,785

CONSTRUCTION OF ROADS OR RUNWAYS

Kurt Joachim Sommerfeld, Uxbridge, England

Application October 23, 1941, Serial No. 416,263
In Great Britain July 11, 1940

6 Claims. (Cl. 94—4)

This invention relates to the construction of roads, particularly roads used for military purposes and aeroplane runways, the chief object being to evolve a construction of road or runway which can be easily and quickly laid and taken up, which is light in weight, and sufficiently flexible to permit of it being rolled up for the purpose of transport, and which at the same time will be sufficiently strong to support relatively heavy lorries and mechanised vehicles or aircraft even though the road or runway be laid on boggy or marshy land or on sand.

Material for use as a road or runway in accordance with the invention which is flexible in a longitudinal direction but stiff or rigid laterally consists of a fabricated surface comprising a series of spaced transversely arranged rigid metal rods or tubes connected together by wire mesh, netting or other flexible material or by a series of links or like members to give the fabricated surface the requisite degree of flexibility in a longitudinal direction.

It has already been proposed to use wire mesh for such roads or runways but without the transversely arranged stiffening members and consequently although the material was flexible in a longitudinal direction, the fact that it was also flexible in a lateral direction prevented it supporting heavy loads without being deformed, and consequently such material had to be flattened out after being in use for only a short period which was a very serious disadvantage. During the short periods of usefulness it could only carry light traffic.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be described more fully with reference to the accompanying drawings, wherein:

Figure 1 represents in plan view a portion of a road or runway constructed in accordance with the invention;

Figure 2 is a perspective view illustrating one method of attaching the steel wire netting to the transverse metal rods;

Figure 3 is a perspective view illustrating an alternative method and also an improved anchorage;

Figure 4 is a perspective view illustrating a method of joining two sections together;

Figure 5 is a plan view illustrating an alternative form of fabricated surface consisting of chain link fencing;

Figures 6 and 7 illustrate one method of maintaining the material of the road or runway in a taut condition;

Figure 8 illustrates in side elevation and Fig. 9 in plan view an alternative method of stretching the fabricated surface transversely before securing it by picket pins or the like; and

Figure 10 is a plan view illustrating a suitable weave of matting for use as a sub-layer beneath the fabricated surface in certain circumstances.

In the constructions illustrated by Figures 1 and 2 of the accompanying drawings, the fabricated surface consists of hexagonal or other type of wire mesh netting 1, or chain link fencing, as shown in Figure 5, into which are interlaced a series of transversely arranged spaced mild steel rods 2, which serve to stretch the netting laterally and give the fabricated surface the necessary lateral stiffness to withstand heavy loads, but at the same time not interfering with its flexibility in a longitudinal direction, thus permitting the fabricated surface to be rolled to enable it to be quickly laid and to take up the minimum amount of room during transport.

The end of each rod 2 is bent into the form of a hook 3, each rod being interlaced into the netting as shown in Figure 2, the hook portion 3 engaging the longitudinal selvage 4 of the netting, the netting being thereby stretched in a lateral direction. The extremity 5 of the hook 3 is bent as shown to prevent any possibility of it catching in adjacent layers of netting when rolled. The fabricated surface may be stretched and held down while being stretched by picket pins 6 or in any suitable manner.

Figures 3 and 4 illustrate an alternative improved construction in which each transverse rod 7 is formed at each end into an elongated closed loop 8, the rods being threaded through the netting and the longitudinal edge caused to enter the loop whilst in an open condition, the loop being then closed. It is preferable to stretch the fabricated surface as taut as possible. The lateral rods 2 may be stretched up to their yield point; this would cause the loops 8 to open, i. e. to uncurl. Wherever such maximum tautness is required the loop may be maintained closed by welding its extremity to the adjacent part of the rod at the point 9, or in any other suitable way.

The longitudinal selvages of the fabricated surface may be bordered by metal bars 10 passed through the loops 8. The bars 10 may be joined by a connecting metal strip or strips 10*a* as shown in Figure 4, which prevent the ends of the bars 10 from bending upwards. Pickets 11 may be employed to hold the fabricated surface in a taut condition. The heads of pickets 11 or alternatively 11*a* (see Figure 3) are formed in such a

way as not to present obstacles to the wheels of landing or taxi-ing aircraft or road vehicles.

The metal bars 10 may be used to secure parallel lengths of runway together, the metal bars being threaded through the adjacent lengths of the runway in the manner illustrated in Figure 4. The various sections of fabricated surface may be connected together end to end by wire clips which are bent around adjacent transverse metal rods.

Figures 6 and 7 illustrate one method of maintaining the fabricated surface in a taut condition either in a transverse or longitudinal direction or in both directions. A suitable picketing member 12 is driven into the ground, the member 12 carrying a rotatable hook or eyed member 13 through which is passed looped cables 14 attached to the longitudinal edge bar or end of the fabricated surface. On the hook 13 being rotated, the looped cables 14 will be twisted as shown at 15 in Figure 7 thereby reducing their effective length and subjecting the fabricated surface to considerable tension. The hook 13 may be maintained in its operative position by a picket pin 16 passed through the hook and driven into the ground or by any other suitable means.

The fabricated surface may be stretched taut by means of a strainer coupled with a turnbuckle to a tractor or other vehicle or temporary holdfast. While the fabricated surface is well stretched, pickets 11 or 11*a* are driven into the ground and this prevents the fabricated surface from becoming slack after the strainer is uncoupled. The pickets 11*a* (Figure 3) are pointed in such a manner that they stretch the fabricated surface while they are being driven into the ground.

Another method of stretching the fabricated surface taut is shown in Figure 8.

In the method described in the preceding paragraph the stretching of the fabricated surface is effected by pulling the outside edge flats from the temporary fixed points. In the method shown in Figure 8 the fabricated surface is stretched towards the outside edges by means of a stiff horizontal column which is extensible in length. The extensible column is indicated by the reference numeral 18, the column which constitutes a strainer being temporarily attached at its ends to the edge bars 10. The fabricated surface is then drawn outwards and thereby stretched by extending the column, the column being removed when the edges of the fabricated surface have been picketed down.

In lieu of the netting hereinbefore described a chain link material (see Figure 5) or welded fabric may be employed or as a further alternative an Indian or other matting which is interlaced with wires, rods or tubes. As a further alternative, the transverse members may be connected together by a series of links, bars or rods having a pivotal connection with the transverse members which permit of the fabricated surface being rolled up or folded for transport.

When intended to be laid on boggy or marshy land it is preferred that the fabricated surface shall be used in conjunction with wooden boards, corrugated metal, or other material such as coir matting, the wooden boards or the like being either superimposed on the fabricated surface or arranged beneath it to form spaced tracks, spaced apart sufficiently to receive the wheels of the vehicles using the road, the fabricated surface being, if necessary, stapled or otherwise attached to the wooden boards or the like, the rods or tubes, for example, being stapled or otherwise attached to the boards or other members.

Although such additional tracks are not generally necessary, they may be required when the road or runway is to be laid on boggy, marshy, or other ground which would not normally support the wheel loads if the fabricated surface alone were used. It has been found during the course of experiments that the fabricated surface, if used in conjunction with the tracks, will support a much heavier wheel load than if the fabricated surface or tracks were used alone, the fabricated surface plus the tracks producing virtually a "snow-shoe" effect, the sum of the load carrying powers of the fabricated surface and track if used individually being less than the load carrying power of the fabricated surface and track if secured together and used in conjunction.

The tracks may if required be bordered by channel or other shaped kerb pieces secured to and which serve to support the wooden or other tracks, thus not only serving as additional supports for the tracks but assisting in the prevention of the wheels of vehicles driven along the road accidentally leaving the tracks.

A good means of preventing mud squeezing through the meshes of the fabricated surface and further increasing the area over which the wheel load of aeroplanes and/or road vehicles is spread is a sub-layer of strong natural turf. This reinforced turf formed of grass and strengthened by a taut fabricated surface made, e. g. by stiffened netting, acts as a shock-absorber and enables smooth landing to be effected. Where such natural turf is not available and on muddy grounds a sub-layer of open woven fabric, e. g. coir matting, straw mats, cane mats, etc., as shown in Figure 10 may be used. In this form of matting, openings 19 of a substantial size are left between the warp and weft threads 20 and 21 through which moisture can drain away and through which grass can readily grow. After some years when the matting rots the grass will form a firm turf reinforced by the fabricated surface.

The road or runway material, by virtue of its lightness in weight and the fact that it can readily be rolled, takes up very little space and can be readily transported from place to place, and has the advantage that it cannot readily be observed from the air. Furthermore, it can be easily and quickly laid by unskilled workmen without the employment of special tools, and can readily be taken up after use and relaid if required.

What I claim and desire to secure by Letters Patent of the United States is:

1. A road or runway comprising a flexible open mesh material held under tension and reinforced in one direction by a series of spaced rods interlaced with the open mesh, and means engaging the ends of the rods and secured relative to the earth to hold said runway in position.

2. A road or runway comprising a flexible open mesh material held under tension and reinforced in one direction by a series of spaced rods interlaced with the open mesh, the said rods having their ends hooked around the edges of the mesh material, and means engaging the ends of the rods and secured relative to the earth to hold said runway in position.

3. A road or runway comprising a flexible open mesh material held under tension and reinforced

in one direction by a series of spaced rods interlaced with the open mesh, the ends of said rods being bent around the edges of the mesh material into the form of closed loops, and means engaging the ends of the rods and secured relative to the earth to hold said runway in position.

4. A road or runway comprising a flexible open mesh material held under tension and reinforced in one direction by a series of spaced rods interlaced with the open mesh, the ends of said rods being bent around the edges of the mesh material into the form of welded closed loops, and means engaging the ends of the rods and secured relative to the earth to hold said runway in position.

5. A road or runway comprising a flexible mesh material held under tension and reinforced in one direction by a series of spaced transverse rods threaded through the meshes of said flexible material and means engaging the ends of the rods and secured relative to the earth to hold said runway in position.

6. A road or runway comprising a number of sections of flexible open mesh material together constituting a runway or road, each section comprising a length of a flexible open mesh material reinforced in one direction by a series of spaced rods interlaced with the flexible material and attached at their ends to the edges thereof, the ends of the rods being bent around the edges of the flexible material into the form of closed loops, the various sections being arranged side by side with the rods all lying transversely of the runway or road, the various sections being connected together and bordered by metal bars threaded through the loops and in the case of adjacent sections threaded through the loops of adjacent sections, and means engaging the ends of at least some of said rods and secured relative to the earth to hold said runway in position.

KURT JOACHIM SOMMERFELD.