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GROUND COVER FOR ROCKET LAUNCHING EQUIPMENT

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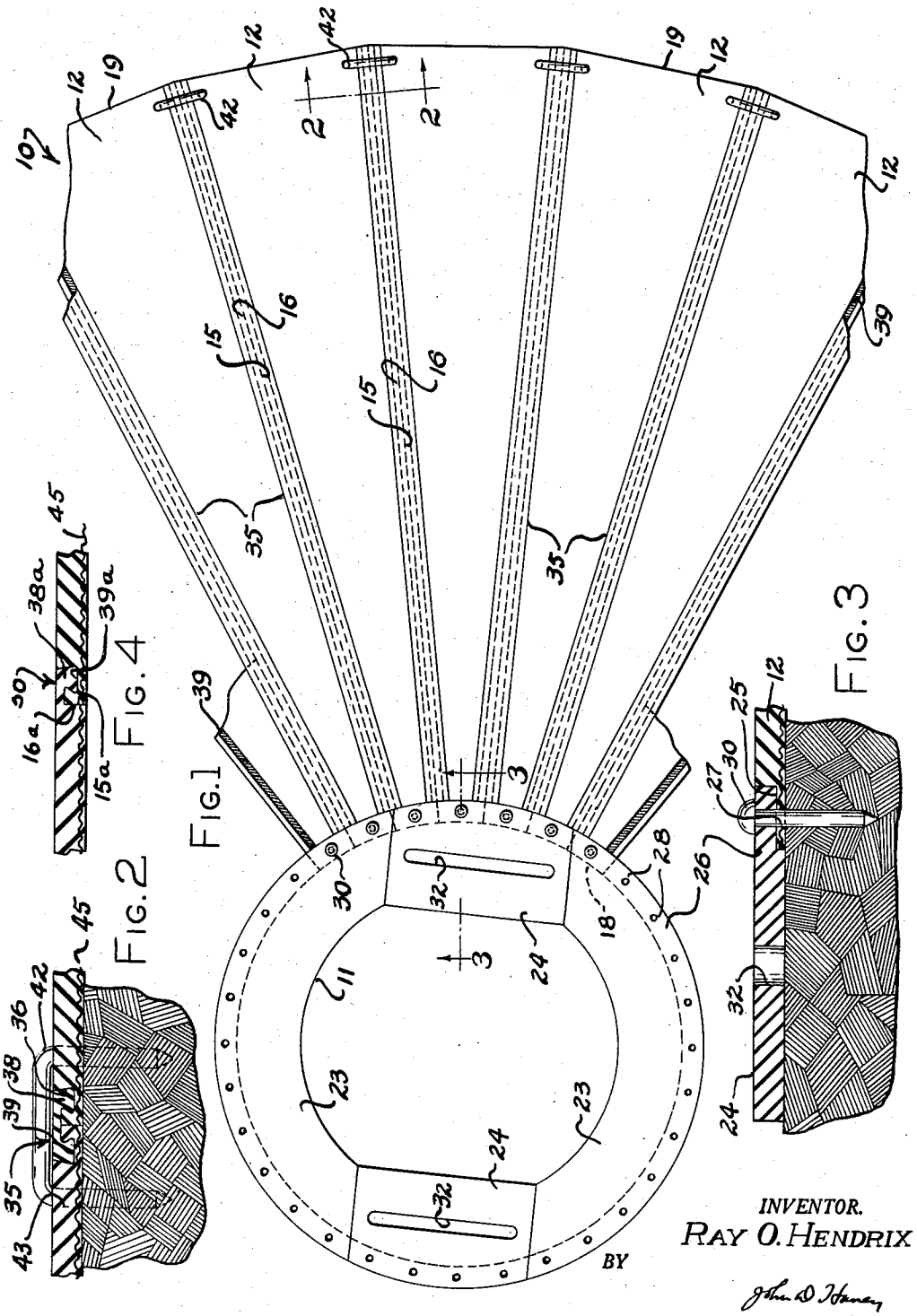


FIG. 1

FIG. 2

FIG. 3

FIG. 4

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GROUND COVER FOR ROCKET LAUNCHING EQUIPMENT

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1 Claim. (Cl. 89—1)

This invention relates to ground covers, especially suitable for use with equipment for launching rockets and similar apparatus to minimize soil erosion and the formation of clouds of dust and other damage at a launching site.

The launching blast of propellent gases from rocket-type projectiles tends to devastate exposed ground area near the launching equipment. This is particularly objectionable in connection with portable launching equipment for ordnance rocket missiles since the resulting clouds of dust and dirt seriously handicap the equipment operators, are injurious to the launching equipment and disclose the location of the launching equipment. Also, such severe soil erosion renders portable launching equipment unstable and makes it very difficult to drive a vehicle close to the launcher to deliver ammunition. At permanent launching sites this problem has been minimized by the use of concrete platforms but this is obviously unsuitable for portable equipment. Metal ground covers have been proposed heretofore, but these have been objectionably heavy, subject to warpage and become heated rapidly, thus interfering with the traffic of loading vehicles and the equipment operators.

Ground covers made in accordance with this invention are highly resistant to weather and to heat, flame and abrasion and erosion resulting from the gaseous discharge accompanying the launching of such projectiles. These covers will withstand indefinite consecutive firings and are highly portable. In structure the covers are an assemblage of mutually engageable flat cover sections which may be quickly and easily assembled at a launching site adjacent to the launching apparatus. The several cover sections are formed of rubber-like materials and preferably the sections are reinforced with fabric or the like to minimize stretching and displacement of the cover resulting from the force of the launching blast. The rubber sections have sufficient flexibility to conform generally to the contour of the ground surface and individual sections are easily replaceable if the cover structure is locally damaged. The several sections are formed and assembled so that regardless of the direction in which a missile is fired, the junction between adjoining sections exposed directly to the launching blast extends in the direction of the effective force of the blast. Means is provided for releasably interconnecting adjoining sections so that the junctions of adjoining sections are impervious to the blast of propellent gases accompanying a launching.

A cover structure of preferred form embodying this invention is illustrated in the accompanying drawing in which,

Fig. 1 is a fragmentary plan view of the cover structure in its assembled condition;

Fig. 2 is a cross-sectional view through a junction of contiguous sections taken along the line 2—2 of Fig. 1;

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 1; and

Fig. 4 is a fragmentary cross-sectional view somewhat similar to Fig. 2 but showing another preferred mode of interconnecting adjoining sections.

The cover **10** in its fully assembled condition (see Fig. 1) is annular in shape and is thereby adapted to cover an extensive area completely surrounding the base of a rocket launching apparatus. The drawings do not illustrate any particular launching apparatus but it should be understood that such apparatus may be positioned within or over the area bounded by the central opening **11** of the cover. In structure, the cover is an assemblage of flat sector-shaped sections **12**, each of substantially uniform thickness. Each of the sections **12** in its plan aspect is shaped like an isosceles triangle with a truncated apex. More particularly each section includes a pair of side edges **15** and **16** which diverge radially from each other from an inner narrow end **18** to an outer wide end **19** of the section. The sections are assembled into annular form by successively connecting the radial side edges **15** and **16** of each section to the corresponding edges of adjoining sections so that the narrow ends **18** of all of the sections are disposed adjacent each other and the outer wide ends **19** of the sections collectively form the outer periphery of the cover.

The inner narrow ends **18** of the several sections **12** are each engaged with a flat central annular member **22** in which the central opening **11** of the cover is formed. The central annular member **22** is formed of two long arcuate segments **23** and two shorter segments **24** which fit intermediate and in abutting relation to the ends of the segments **23**. As shown in Figure 3, the inner end **18** of each sector section is rabbeted at numeral **25** to receive the outer margin **26** of the central annular member. The inner end **18** of each section also includes a hole **27** which registers with one of a series of holes **28** through the outer margin of the central member **22** and both the central member and the inner end of each sector section are anchored to the ground by a stake **30** which is driven through the holes **27** and **28** into the ground. The central annular member **22** extends radially inwardly a short distance from the inner ends **18** of the sector sections and as previously noted a launching mechanism may rest directly on the central annular member or the ground area exposed at the opening **11** of the central annular member. The short segments **24** of the central annular member are each provided with a slot **32** through which electrical wiring, etc. (not shown) necessary to operate the launching apparatus may be directed. Such wiring will normally extend under the ground cover to the launching apparatus from a source remote from the cover and is protected by the cover from being destroyed by the launching blasts.

The radial edges **15** and **16** of adjoining sector-shaped sections **12** are fastened together in abutting relation by connector strips **35** (see Fig. 2) which overlap and interlock with the margins of the adjoining edges **15** and **16**. As shown in Figure 2, there is a rabbet **36**, formed along the margin of each radial edge **15** and **16** of each sector section so that when the sections are assembled, the rabbets of the adjoining edges form channels to receive the connector strips **35**. The connector strips fit into these rabbets so that the plane upper surface of the connector strips is flush with the upper surface of the sector sections. The connector strips **35** are interlocked in the rabbets of the sector sections by projecting ribs **38** of dovetail cross-sectional which extend along the lower margins of each strip and which are received snugly in mating grooves **39** of dovetail cross-sectional shape formed in the rabbeted portions of the sector sections. In assembling the cover the radial edges **15** and **16** of adjoining sections are fitted together

in abutting relation and then a connector strip **35** is laid over these edges and its dovetail ribs **38** are then snapped into their respective grooves **39** in the sector sections. This assembly may be made very quickly and easily and the connector strips **35** may be removed to disassemble the cover sections with comparative ease.

It will be noted that the connector strips **35** extend radially outwardly from the central annular member **22** and a launching apparatus which may be positioned thereon. Normally this apparatus may be trained through 360° and missiles may be fired from any position in this path. It is therefore evident that regardless of the firing position of the apparatus, the connector strips **35** subjected to the launching blast will extend in the same direction as the effective force of a launching blast. Also the overlapping and interlocking mode of engagement of the connector strips with the radial margins of the sector sections provides a junction between the sector sections which is impervious to a blast of propellent gases and therefore such gases cannot penetrate beneath the cover and tear it apart.

Preferably, the cover at its outer periphery is secured to the ground by U-shaped stakes **42**, the legs of which extend through holes **43** formed near the corners of each section adjacent the outer periphery of the cover. Fig. 2 shows that the stakes **42** bridge over the connector strips **35** from one section to another to provide further resistance to displacement of the sections by the force of a launching blast.

The ground engaging side of each of the sector sections in this embodiment of the invention is reinforced with several plies **45** of stretch-resistant fabric material which are preferably coated and impregnated with rubber material and are vulcanized to the bottom surface of the sector-shaped sections. These plies advantageously strengthen the sector sections against stretching and tend to minimize flex cracking of the sections. One type fabric suitable for this purpose is square-woven duck fabric such as is commonly used as plies for rubber conveyor belts.

Preferably the upper surface of the connector strips **35** are similarly reinforced with one or more plies of similar fabric to minimize stretching and distortion of the connector strips when subjected to the heat of the propellent gases.

The rubber-like material preferred for forming the sector-shaped sections, the connector strips, and also the segments of the central annular member **22** is preferably a rubber compound resistant to heat, flame and abrasion. Compounds for example, which are satisfactory in these respects include the type of compounds of either natural or man-made rubbery materials which are in use at the present time for automobile tire treads. One highly abrasive-resistant elastomeric material which is particularly suitable for this service is material known as Armorite now manufactured by The B. F. Goodrich Company, Akron, Ohio. Grade 1165 Armorite which includes a 2-ply fabric-fiber base construction is particularly suitable for the various parts of the cover. Preferably the various parts of the cover are molded to the shapes desired but they may be also shaped by cutting the parts from fully vulcanized slab stock. Preferably the sector-shaped mat sections and the central annular member are in the order of about 1" thick.

In the embodiment shown in Figure 4 a projecting lip **50** is formed along radial edge **15***a* of each sector section integral with the body of the section whereas the other radial edge **16***a* of each section is rabbeted and grooved in the same manner as described in connection with the assembly shown in Fig. 2. The sections of Fig. 4 are assembled so that the projecting lip **50** overlaps the margins of the rabbeted edges **16***a* of the adjoining sections. The lip **50** includes a dovetail-shaped rib **38***a* which interlocks with a corresponding dovetail-shaped groove **39***a* in the adjoining section. This construction may be used where the effective force of the blast gases is not as great as that in larger missiles and the like.

Variations in the structure disclosed may be made within the scope of the appended claim.

I claim:

A flexible protective ground cover comprising an assemblage of flat individual imperforate fabric-reinforced rubber sector-shaped sections each including a pair of radially diverging side edges extending from an inner narrow end to an outer wide end of each section and having a ground-engaging side and an upper side, the sections fitting together in laterally contiguous relation with their respective radial edges directed toward corresponding edges of adjoining sections and with their respective inner narrow ends disposed adjacent the corresponding inner narrow ends of adjoining sections, the complete assemblage being annular and adapted to surround an extensive area adjacent the base of launching apparatus for rocket-propelled objects, an annular central member, means fastening said central member to the inner end of each said section to secure said sections against displacement from the force of the launching blast of said objects, a rabbet formed in each of said side edges of each section along the margins of the upper side thereof and extending the complete length of said edges from said inner end to said outer end, the rabbeted portions of adjoining sections fitting together to define a channel, flexible resilient rubber connecting strips overlapping the abutting edges of said members and disposed in said channels, means on said connector strips and in said rabbeted portions mutually interlocked to provide a releasable connection between said adjoining sections impervious to the blast of propellent gases from said objects accompanying launching, and means interconnecting the adjoining sections near said outer edges of said sections and anchoring said sections to the ground.

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