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METHOD AND APPARATUS FOR DRYING FIELDS

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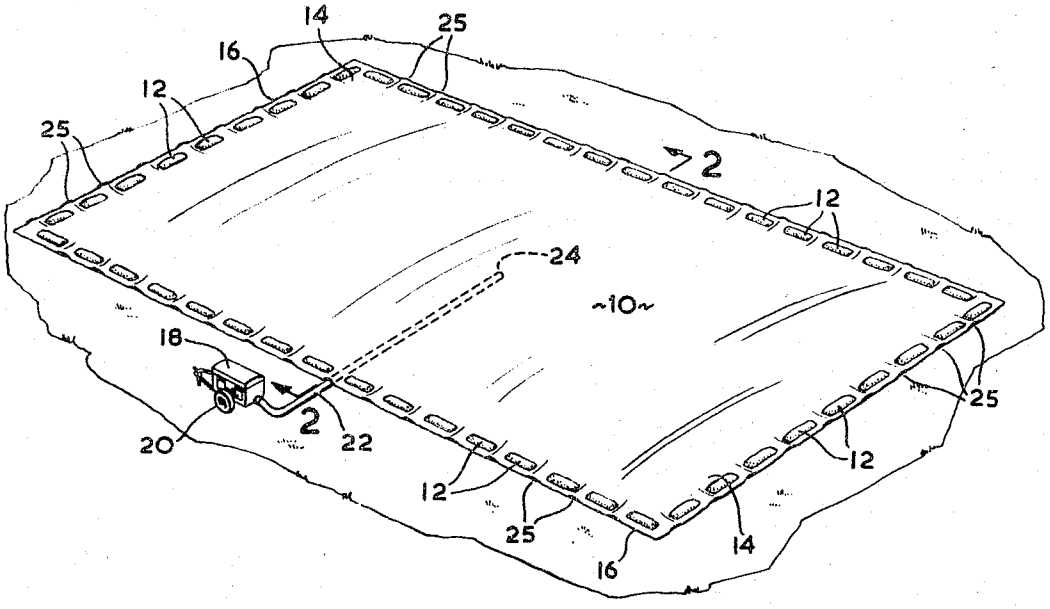
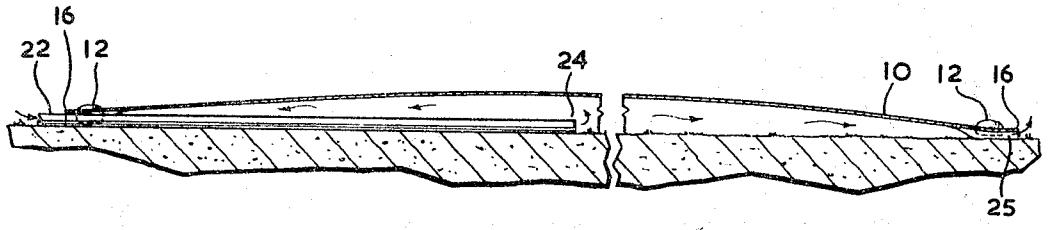


FIG. 1

FIG. 2



INVENTOR
ALBERT A. SMITH
BY~ Maybee & Legris
ATTORNEYS

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METHOD AND APPARATUS FOR DRYING FIELDS

Albert A. Smith, 2 Clearview Heights, Toronto, Ontario, Canada

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This invention relates to the problem of maintaining large fields, such as playing fields, free from moisture during precipitation.

Since it is desirable that playing fields, such as football fields, be substantially dry during their use, the risk of precipitation prior to a scheduled game or event has been a source of concern. Up to now, the problem of precipitation collecting upon a playing fields has been overcome by placing thereover a large covering or tarpaulin, constructed of plastic or woven material.

This solution to one problem, however, gives rise to a second problem which has not thus far been overcome satisfactorily. Although no moisture is permitted by the covering to pass downwardly through it, neither may any moisture entrapped beneath the covering pass upwardly. On large fields whose upper layers are not entirely dry, the phenomenon of "ground sweating" often occurs, so called because moisture seeps or "sweats" upwardly to the surface of the ground. Unless prevented from doing so, this moisture will evaporate. However, a covering or tarpaulin will effectively prevent any such evaporation, with the result that moisture will gradually collect beneath the covering, causing the ground surface to become muddy and slippery despite the presence of the covering.

In the past it has thus been necessary, at intervals, to remove the covering for periods of up to half an hour, to permit the collected "sweated" moisture to evaporate. Of course, the covering is removed only during let-ups in the precipitation. Aside from the inconvenience of having to remove and relace a covering of a size often exceeding 60,000 square feet, this expedient involves the drawback that the covering cannot be removed during precipitation. Thus, for example, such a covering could not be used to advantage in the case of prolonged rain or drizzle.

Most coverings now in use are opaque, and another of their disadvantages is that when they cover a field it cannot be inspected to determine the degree of moisture at different locations unless the covering is removed. Using a translucent or even transparent plastic covering permits such inspection but requires that the covering be walked upon, with the consequent risk of damage to the covering.

The main object of this invention is to provide a method and apparatus for maintaining large fields free from moisture due either to percipitation or to "ground sweating."

Another object of this invention is to provide an apparatus for maintaining large fields free of moisture, employing a covering tarpaulin, during the use of which apparatus there is permitted thorough inspection of both the covering and the field, without the risk of damage to the covering.

The foregoing and still further objects and advantages of the invention will become apparent from a study of the following specification, taken in conjunction with the accompanying drawings, in which like reference characters indicate corresponding parts throughout the several views, and in which:

FIGURE 1 is a perspective view, from above, of a playing field overlain with a covering or tarpaulin embodying the invention; and

FIGURE 2 is a fragmentary elevational view taken on the line 2—2 of FIG. 1, the scale being considerably enlarged.

As shown in FIG. 1, a flexible, substantially air-impervious covering or tarpaulin **10** is placed over the area of ground that it is desired be protected from precipitation, either liquid (rain) or solid (snow, hail). The covering **10** should be translucent or transparent. I perfer to use plastic polyethylene film of 6 mils thickness, at which thickness the polyethylene film has a slightly milky semi-transparency which permits a high percentage of light to pass through the film. The weight of 6 mil film is approximately 28.8 pounds per 1000 square feet. The covering is substantially the same size as the area to be covered and is simply spread evenly over the area without stretching.

A plurality of elongated sand bags **12** are arranged in spaced end-to-end relationship around the periphery **14** of the covering **10**, slightly inwardly of the edge **16** so as to anchor the covering against the ground at intermittent locations around its periphery. The word "periphery" is used herein to designate the peripheral band of covering material extending a short distance inwardly of the edge **16** of the covering **10**.

Situated outside of the area covered by the covering **10** is an air-blower **18** mounted on a trailer **20** for ease of transportation. A gas conduit **22** extends from the air-blower **18** and runs under the edge of the covering **10** to a substantially central location **24** beneath the covering. Air is drawn through an air intake (not shown) of the air-blower **18**; and is blown by the air-blower **18** through the conduit **22** into the space between the covering **10** and the ground, the air being delivered centrally beneath the covering.

The air-blower **18** is a "compressor" in the broad sence of the word. Other compressors can be used in place of the air-blower **18**, and any device capable of moving a gas against a backpressure is contemplated as within the ambit of this invention: engine exhausts, positive-displacement gas-pumps, various types of fans, etc.

The air being delivered may escape from beneath the edge **16** of the covering **10** only at the points around the periphery **14** which are intermediate of the locations at which the sand bags **12** anchor the covering against the ground. The resistance to the escape of air from beneath the covering **10** at these points creates a slightly super-atmospheric pressure beneath the covering. This resistance is increased by restricting, and decreased by enlarging, the size of the openings beneath the edge **16** of the covering **10** at the points intermediate the sand bags **12**.

FIGURE 2 shows the sand bags **12** anchoring the periphery **14** of the covering **10** to the ground. Air enters the space beneath the covering via the conduit **22** and escapes via the openings **25**.

An alternate or an auxiliary way of removing the air from beneath the covering **10** is by way of perforations in the covering itself. In the case of initially imperforate plastic film, small holes could be cut and fitted with flaps to prevent the entry of water but permit the escape of air.

It is contemplated to set up beneath the covering **10**, by adjusting the resistance to the escape of air, a pressure sufficiently super-atmospheric that the covering, except for its periphery **14**, will be raised and spaced above the ground. The air beneath the covering will thus be slightly compressed.

Provided its relative humidity is less than 100%, air is a gas into which moisture can evaporate. The air that is blown through the conduit **22** into the space between the covering **10** and the ground will be of a relative humidity no higher that that of the atmosphere at the intake of the air-blower **18**, and even were the relative humidity of the

atmosphere to be 100%, the work done on the air as it is blown through the conduit **22** would raise the air temperature sufficiently to lower its relative humidity to a point below 100%.

The effect of the air passing between the covering **10** and the ground, moving radially outwardly from the point **24** towards the peripheral openings **25**, is that the air picks up the "sweated" moisture from the ground and conveys it to the outside atmosphere.

Gases other than air can of course be employed, the only requirement being that they be gases into which moistrue can evaporate, and thus capable of picking up moisture from the ground. One alternative is an admixture of air and engine exhaust gases.

Because of the super-atmospheric pressure underneath the covering **10**, it balloons upwardly with its highest point near the centre. From this highest point, the covering slopes downwardly towards the edges **16** so that liquid precipitation will run off the covering at its edges **16**. Most fields of the kind considered here have drainage facilities around their peripheries for disposing of this run-off. In the case of solid precipitation (snow, hail, etc.), it is contemplated to add to the air-blower **18** a heating element, for example a heating coil, for heating the air being delivered through the conduit **22** to a temperature sufficiently above that of the atmosphere that heat will be delivered to the space between the covering **10** and the ground at a rate sufficient to melt the solid precipitation collecting on the covering. The melted precipitation will then run off the covering in the same way as does rain.

Access can be gained to the space between the covering and the ground by temporarily removing a few adjacent sand-bags from the periphery **14** of the covering **10** and crawling in beneath the edge **16**. It is therefore possible, while my apparatus is operating, to inspect both the ground and the covering without walking on the covering, the light necessary for inspection being transmitted through the covering due to its semi-transparent characteristic. If a covering is employed which does not pass sufficient light to permit a proper inspection to be made, flashlights or other artificial light sources may be taken beneath the covering.

The specifications of a prototype apparatus constructed according to the invention are given below:

Field size	100 yards x 100 yards.
Area of covering	10,000 sq. yds.
Weight of covering	2,590 lbs.
Inside-outside pressure differential required to raise the covering	Less than $\frac{1}{1000}$ p.s.i.
Sandbags	Approximately 225, each 6 ft. long x ½ ft. diameter.
1.2 cu. ft. of sand per bag	135 lbs.
Total weight of sand	15 tons.
Air delivery rate	7800 c.f.m. for 100,000 sq. ft.

With an ambient temperature of 30° F., under an average snow fall, pump 7800 c.f.m. per 100,000 sq. ft. at 45° F. to melt the snow.

What I claim as my invention is:

1. Apparatus for removing moisture from a playing field and for preventing precipitation from collecting thereon, comprising a flexible, impervious covering to place on the field, a compressor for supplying compressed air to the space between the covering and the field into which air the moisture can evaporate whereby the air picks up moisture from the ground, and securing means to anchor the flexible covering against the ground at intermittent locations around the periphery of said covering and whereby the moisture-charged air may escape from beneath the covering at points intermediate of said locations.

2. Apparatus as claimed in claim **1** in which a conduit extends from the compressor to a substantially central location beneath the covering thus to convey compressed air to the central location.

3. Apparatus as claimed in claim **1** in which the flexible covering consists of a transparent plastic material.

4. A method of removing moisture from a playing field and of preventing precipitation from collecting thereon, comprising the steps of placing a flexible, impervious covering on the field, securing the covering against displacement at intermittent locations around its periphery to leave unsecured spaces between the intermittent securing locations, continuously delivering to the space between the covering and the ground compressed air into which moisture can evaporate whereby the air picks up moisture from the ground, the air being delivered at such a rate and pressure as to raise the covering and space it from the ground inside the periphery of the covering, and continuously allowing the moisture-charged air to escape from the space between the covering and the ground through the unsecured spaces between the securing locations.

5. A method as claimed in claim **4**, wherein the compressed air delivers heat to the space between the covering and the ground at a rate sufficient to melt solid precipitation collecting on the covering.

6. A method as claimed in claim **4** wherein the covering used is a transparent plastic material.

References Cited

UNITED STATES PATENTS

1,131,378	3/1915	Hill	126—271.1
2,910,994	11/1959	Joy	52—2
3,035,590	5/1962	Helmers	52—2
3,159,165	12/1964	Cohen et al.	52—2 X

CHARLES J. MYHRE, *Primary Examiner.*