Sept. 27, 1938. J. E. HUBBART 2,131,398

APPARATUS FOR CLEANING GROUND

Filed Jan. 2, 1937 2 Sheets-Sheet 1

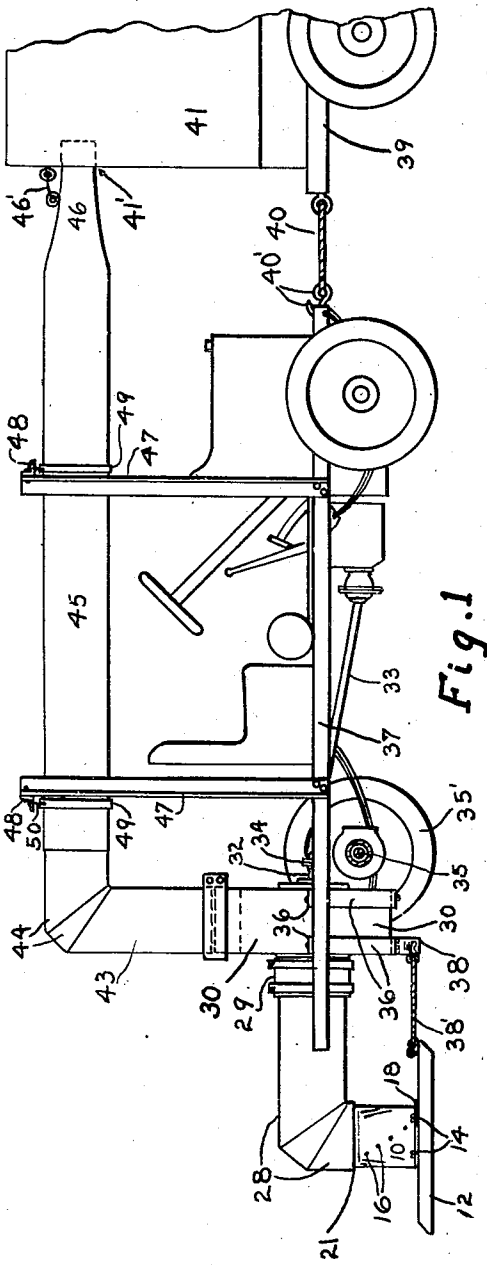


Fig. 1

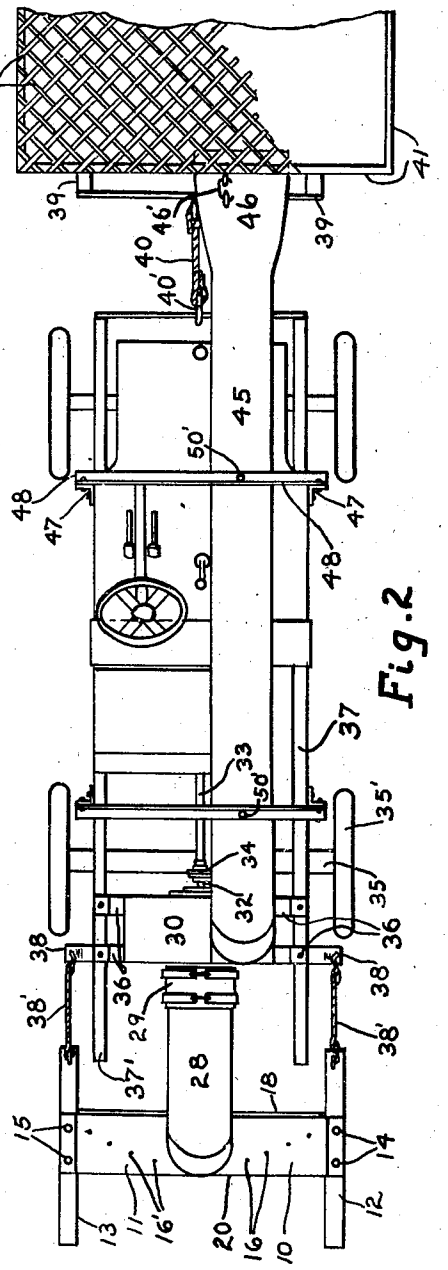


Fig. 2

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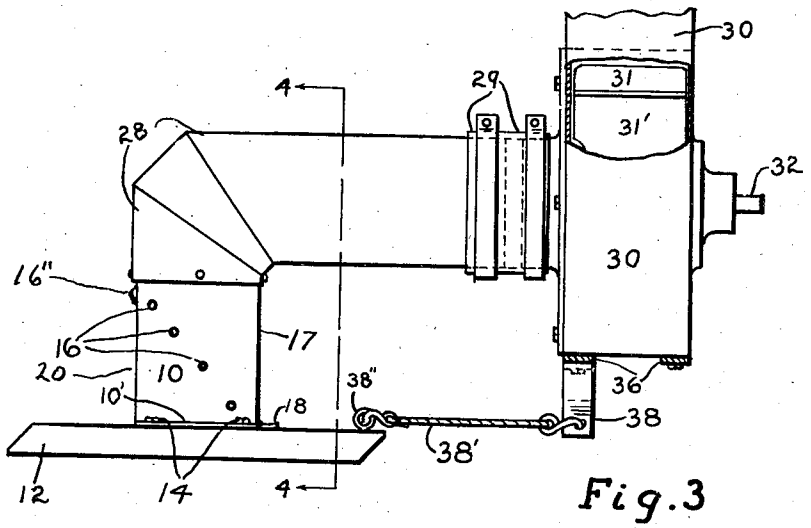


Fig.3

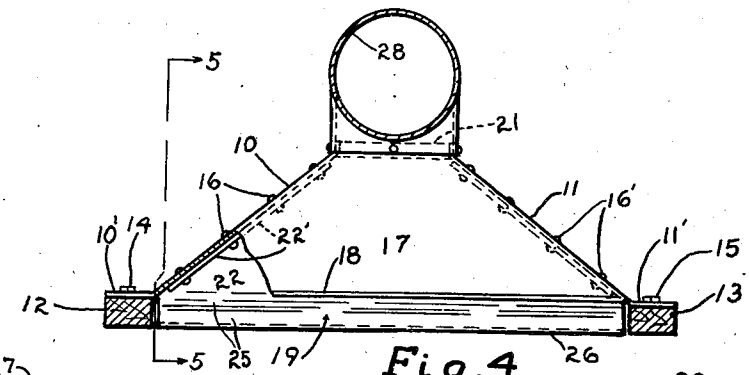


Fig.4



Fig.7

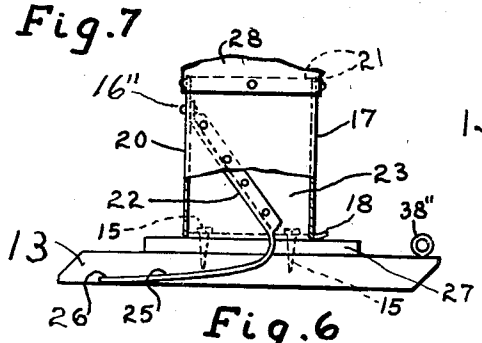


Fig.6

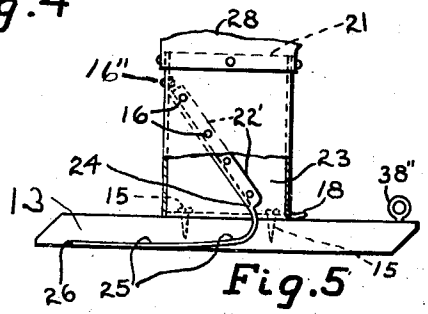


Fig.5

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UNITED STATES PATENT OFFICE

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APPARATUS FOR CLEANING GROUNDS

James E. Hubbart, Seattle, Wash.

Application January 2, 1937, Serial No. 118,828

1 Claim. (Cl. 15—19)

This invention relates to apparatus for cleaning golf-courses, estates, park grounds, lawns and the like.

Where recreation grounds are frequented by numerous persons, such places often become littered with scraps of paper and other debris, and are rendered unsightly thereby; and in the fall season leaves frequently produce the same results. On golf courses such litter and leaves may become obstacles to driven balls, and tend to divert the lines of travel thereof.

Devices have been proposed for clearing streets and other smooth surfaced areas, to be operated by suction and propelled on wheels. Such devices if useful in any places, are impractical for cleaning surfaces where depressions and uneven surfaces prevail. Supporting wheels are raised and lowered when passing over such uneven surfaces, and this changes the elevation of the lower portions of the devices above the surfaces to be cleaned. Ordinarily such devices are provided with openings at the lower portions thereof, for sucking up such debris, and the varying elevations tend to vary the sizes of such openings. When widened, such openings decrease the strength of air currents passing therein for suction purposes.

It is therefore an object of this invention to provide a movable suction device for picking up such debris and cleaning such unevenly surfaced grounds, with means for maintaining the base of the device substantially level, while the surface of the ground may vary; and also to provide means for controlling the size of the suction mouth, and for preventing flow of air into such device except at said mouth.

A further object is to provide a suction head to be mounted on skids, beneath the opposite sides thereof, for moving the same, and provided with a mouth along the lower front margin between such skids; and also a resilient sloping apron extended backward and downward from the rear wall of the device for sliding contact with uneven surfaces of the ground behind such mouth. Said apron to be adapted to close all rear entrances for air between such skids, and said skids adapted to close all side entrances for air beneath the sides of said head. Means also to be further provided, for regulation of the size of said suction mouth, and further means to be provided for creating a suction current of air into said mouth.

A still further object is to provide such a device adapted to be towed behind any ordinary automobile chassis, in combination with a suction fan mounted on such chassis and operable by the ordinary drive shaft of such automobile. A suction passage to be also extended from said suction mouth to said fan, and a discharge tube extended from said fan. Said discharge tube to be adapted to convey and deposit debris gathered by said mouth and suction, and also adapted to be used for blowing litter from ground surfaces, particularly golf "greens", where vehicles can not be used.

With these and other objects, that will hereinafter appear, I have illustratively exemplified my invention by the accompanying drawings, of which:

Figure 1 is a side elevation of the complete apparatus, together with an automobile chassis, and the rear end of a towing truck.

Figure 2 is a top plan view of the same parts, as Figure 1.

Figure 3 is an enlarged side elevation of the suction head, suction tube, fan housing, and fan blades.

Figure 4 is an enlarged front elevation of the suction head with parts broken away and parts in section taken on line 4—4 of Figure 3.

Figure 5 is side elevation of the suction head, with parts broken away and taken on line 5—5 of Figure 4.

Figure 6 is a similar view to that in Figure 5, with the addition of an adjustment shim, for widening the mouth of the head, and

Figure 7 is a top plan of the shim.

Like numerals on the different figures represent like parts. The suction head is preferably formed of a number of parts and of rectangular form through its lower cross section. The two opposite narrow sides thereof as 10 and 11, are mounted on runners or skids, 12 and 13, and adjustably attached thereto by bolts, or lag screws, 14 and 15. Such skids are of suitable length to span across small depressions on the surface of the ground when drawn along the same, and to thereby maintain the suction head base substantially level. Said skids also serve as closures for the spaces between the ground and the lower margins of said end walls of said head.

The base margin of the front wall 17, of the head, terminates with an outward curved lip 18, to facilitate the entrance of air and debris beneath the same when drawn inward through the mouth 19 beneath the lip. The rear wall 20, and said front are approximately perpendicular and each of said side walls taper inward and upward to a suitable height, and the tops of all

four thereof terminate around a tubular discharge neck 21.

A baffle plate 22, is extended lengthwise between said side walls in an oblique direction, with the lower margin of such plate commencing opposite from and back of the top of said mouth, and spaced therefrom. From thence it slopes upward and backward to near the top of said rear wall, and is rigidly affixed thereto. The ends of said plate are attached also by rivets 16 and 16' to the respective side walls. Such plate is spaced behind said front wall to provide a guide and passageway 23, to aid the flow of air and litter, from said mouth upward to said neck, and also to provide rigidity for the rear wall, and head member.

From the lower margin 24, of said baffle plate, a suitable resilient metal apron 25, is extended backward and downward to a point even with the bases of said skids, approximately in line below said rear wall, and slidably between said skids; for closing the space between said rear wall and the ground. The rear margin of said apron is preferably extended a suitable distance backward for a tail 26, to provide slidable contact with the surface of the ground, and said tail is normally depressed toward a lower point, by the inherent resiliency of the apron. Thus when depressions in the surface of the ground are being passed over, such tail follows the surface of such depressions and continues to close any passageway for air beneath said rear wall and thereby prevents the suction inward through such mouth from becoming weakened. As indicated in the drawings, this apron may be integral, with said baffle plate, but they may be separate members if preferred.

In the event the debris and litter to be gathered is wet or damp, the suction mouth is preferably approximately as wide as the thickness of the skids, and the latter are arranged to provide the size of said mouth, suitable for lifting such wet or moist material. When such material is dry, and particularly when composed of dry leaves or paper, it is advisable to provide a wider mouth, for the easy and rapid flow of such material therethrough. To accomplish this, the screws 14 and 15 and said head are removed from said skids. Suitable spacer shims or liners 27, are then placed over such skids, and the head reattached by said screws as before. Said mouth will be widened thus in proportion to the thickness of said shims. The resiliency of said apron is such that the tail portion will continue to be pressed downward and continue to close all the simultaneously widened rear entrances for air beneath said rear wall.

On top of the head, and around said neck 21, is mounted an extension, of suction tube 28, which is carried upward and forward a desired distance, and there connected by means of a flexible collar or sleeve 29, with any suitable suction fan-housing 20. Within said housing is rotatably mounted in the ordinary manner, a fan with blades 31—31', of suitable proportions for providing a suction current of air through such tube and mouth, for sucking up such debris and litter as may be desired.

Said fan may be driven by any suitable power, applied to the ordinary stub shaft 32, extended from the said housing, on which said fan is attached. For convenience I prefer to adapt and use for power, the ordinary drive shaft 33, preferably of the double universal type. Such drive shaft is projected from the engine on any light automobile or car chassis, from which the body has preferably been removed. In the use of such car shaft, the rear end thereof is disconnected from the ordinary differential housing, and such rear end, or the ordinary universal attachment 34, thereon, is connected by any ordinary manner onto the front end of said fan shaft 32.

In the adaptation of such chassis, the rear axle 35, and wheels 35', are preferably moved forward from the usual position thereof, and a supporting brace or bracket 36, attached respectively to and between the ordinary side frames 37 and 37'. The fan housing is then mounted upon this bracket, in suitable manner and position for said connection with the rear end of said drive shaft 33.

Drop hangers 38 may be extended outward from the lower corners of such bracket to points approximately in front of said respective skids, and are flexibly connected as by cables 38' with said skids, for towing the same with such suction head, over the ground, behind said chassis. For drawing such chassis and such skids, I prefer to use any ordinary power truck, the rear end whereof is indicated as 39, connected to said chassis by any removable bar or cable as 40. Said truck is provided with a body 41, thereon to be covered with a screen mesh 42, to permit the escape of air therefrom but to prevent the escape of any such litter and debris, when deposited therein from said fan housing.

For the conveyance of litter and other debris from said fan housing, a metal tube 43, is connected over the usual opening in the top thereof. Such tube is extended upward to a point approximately level with the rear end of such truck body 41, and terminated with an elbow 44. To this elbow is connected the rear end of any suitable flexible hose 45. The front end of said hose may be provided with any desired form of nozzle as 46, which may be extended forward and projected into the rear end of such truck body for depositing therein the said debris and litter, as gathered and propelled forward by said fan. Suitable side posts 47 and cross bars 48 may be extended above the frame of said chassis, for supporting the body of said hose by adjustable hangers 49, 50, and 50', between said fan and said truck. Said nozzle may be connected to the truck by hooks 46'.

For ordinary use, in gathering such litter and debris, the said chassis and suction means are towed about by said truck over the ground to be cleaned until the body of said truck has been filled or loaded with such litter, etc. Said truck is then disconnected from said chassis, and nozzle and the load of litter hauled and dumped where desired.

Under circumstances where leaves or light litter has accumulated on grounds over which such truck or skids might cause injury as to the soft velvety surface of the "greens" or starting areas, of golf grounds, then the hose is used in a different manner. In such cases said chassis is stationed at the edge of such grounds, and said hose removed from said truck and supporting bars; and the said nozzle manually carried about, and blasts of air therefrom, directed against said litter, till such litter has been scattered and driven from said grounds thereby.

Having described my invention, I claim as new:

A suction nozzle for use with ground cleaning apparatus including a head open at the bottom, spaced parallel skids secured to the bottom edges of the sides of the head, a conveyor tube open to suction communicating with the upper end of the head, a baffle plate within the head and in-

clining upwardly and rearwardly from the mouth of the head, the forward wall of the head having an outturned lip at its lower end to define with the skids an entrance or mouth for the head, the relation of the lower end of the baffle plate and lip compelling an increased suction effect at the mouth of the head as compared with the remaining portion of the head, a flexible apron extending from the lower end of the baffle plate rearwardly with respect to the mouth of the head, said apron having a width substantially equalling the distance between the skids and a length to compel a considerable portion to rest on the ground surface, said apron being resilient and adapted to be yielding pressed against the ground surface, below the plane of the lower surfaces of the skids in the movement of the apparatus.

JAMES E. HUBBART.