C. POMILIO.

MONOCYCLE VEHICLE.

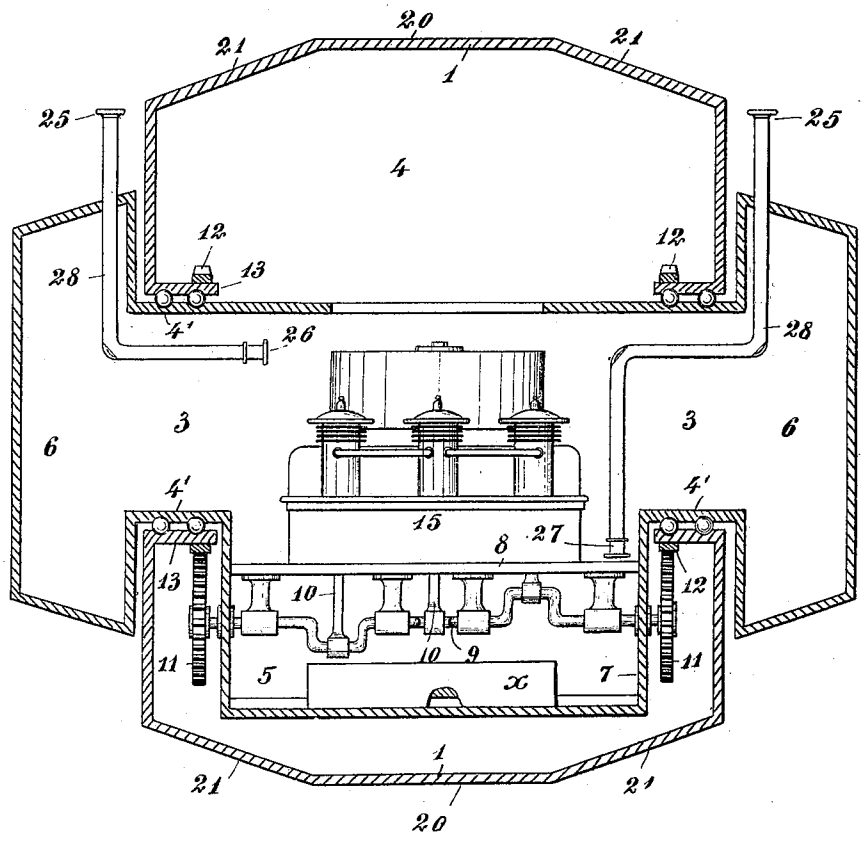
APPLICATION FILED AUG. 8, 1918.

1,374,761.

Patented Apr. 12, 1921.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

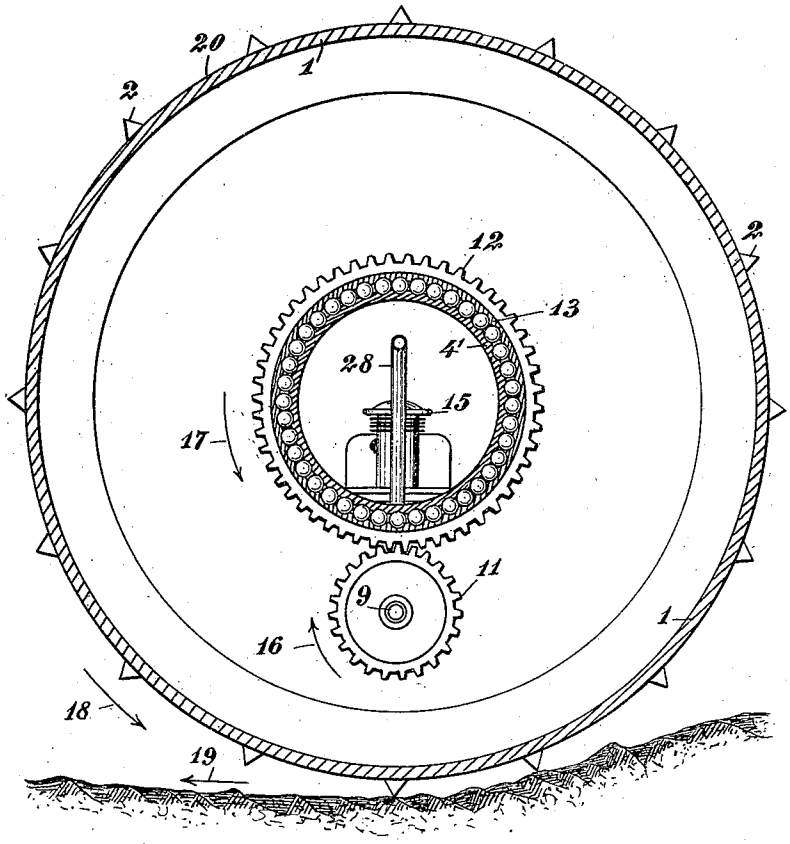
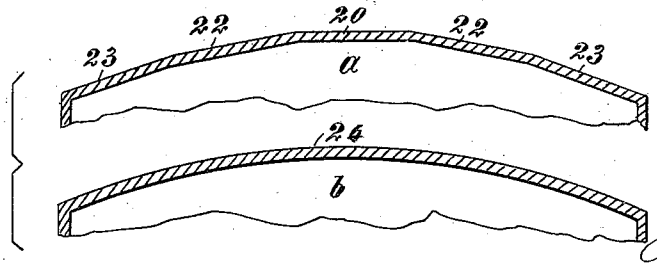


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

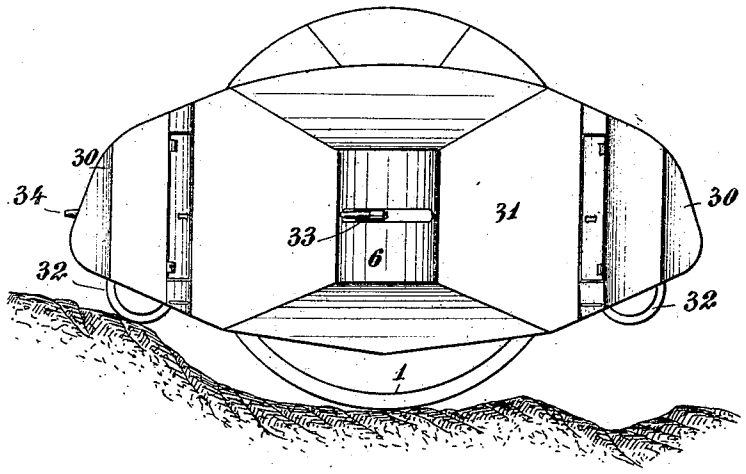
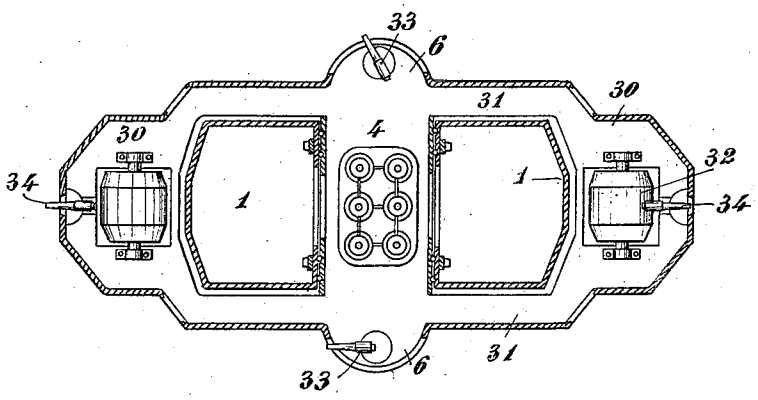


Fig. 5.



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UNITED STATES PATENT OFFICE.

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MONOCYCLE-VEHICLE.

1,374,761. Specification of Letters Patent. Patented Apr. 12, 1921.

Application filed August 8, 1918. Serial No. 249,038.

To all whom it may concern:

Be it known that I, CARLO POMILIO, engineer, a subject of the King of Italy, and residing at Rome, in the Kingdom of Italy, have invented new and useful Improvements in Monocycle-Vehicles.

The present invention refers to improvements in monocycle vehicles intended for the transport of passengers or materials on open land destitute of roads, the same being protected against external attacks, and provided also with means of offense when needed. It is shaped as a large roller or hollow drum of great diameter and of a width sufficient to contain the driving plant, the materials or passengers to be carried, powerful means of offense, and the necessary crew.

The forward movement is obtained by means of a heavy internal mass carrying the driving plant and compelling the large external drum to roll over the land through a continual displacement of the center of gravity. The said heavy mass may be arranged free within the roller so as to roll and climb continuously on the internal surface of the latter, thus directly setting up the rolling, but according to the present invention, it is preferred to have the heavy mass act on the drum through an interposed gear, the mass itself consisting of a frame carrying the motor, and other loads, such frame being suspended within the drum and hanging like a pendulum from a large hollow shaft integral with same and which extends through all the width of the drum to which the movement is transmitted through any convenient gearing.

The engine drives a couple of toothed pinions which mesh with two toothed crowns provided on the cheeks of the drum. The action of this gear causes the drum to roll forward or backward, as will be better explained afterward. The vehicle is steered from the interior taking advantage of the form given to the outer peripheric surface of the drum, which allows the vehicle to be turned to the right or to the left, according to whether the drum is keeled to one side or the other. This conformation of the drum's periphery, together with the method for obtaining the inclination of the vehicle's body constitutes one essential feature of the present invention.

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

Figure 1 shows diagrammatically in longitudinal section the arrangement of a vehicle according to the present invention.

Fig. 2 is a diametral cross section of same.

Fig. 3 shows two different forms of the external rolling surface of the drum.

Figs. 4 and 5 are respectively a side elevation and a horizontal section of a further embodiment of the invention.

The vehicle consists of a large external drum 1, the peripheric or rolling surface of which is partly cylindrical and partly conical or conoid, covered with steel plates, or with any other suitable material. The rolling surface of said drum may be quite smooth, but, if desired, cross ribs or claws 2, as shown in the drawing, may be provided for the purposes of preventing skidding and securing a better grip, particularly on slippery ground, and when climbing up hill.

The two cheeks of the roller have each a circular opening 3, the center of which coincides with the drum's axis. Said openings are left completely free.

Inside the drum is provided a chamber 4, having the shape of a large hollow shaft fitted laterally with projecting collars 4′ which carry two turrets 6 outside the drum. The hollow shaft has an extension 5 depending from it below the axis of the drum. The collars 4′ rest rotatably on the rims 13 of the openings 3, and conversely, the drum can rotate around the said collars. The movement is facilitated by providing a ball or roller bearing as shown in the drawing. The collars 4′, the turrets 6, the chamber 4, and the expansion 5 form a single piece completely rigid.

On the sides 7 of the expansion 5 is fixed a platform 8, on which the motor 15 is mounted. The platform provides also room for the crew inside the vehicle, and it may likewise be used, as all other free space, for storage of fuel, munitions, and the like.

The shaft 9 of the motor extends through the sides 7 of the expansion. On the ends of the shaft are mounted the pinions 11 which mesh with two spur gears 12 mounted internally to the flanges 13 of the openings 3.

The turrets 6 may be given any convenient shape. If they are intended for offensive purposes they will be designed so as to provide accommodation for gun-car-

riages or machine gun stands, and will have corresponding loop-holes, and will furthermore be armored.

The external outline of the said turrets is better made conical, in order to cause the projectiles striking the drum to rebound.

The above said vehicle works as follows:

At rest, the platform with all its load hangs under the drum's axle, and by suitably distributing the weight the said platform may be kept in the horizontal position. On starting the motor 15 the pinions 11 will revolve, for instance, in the direction of the arrow 16, and will tend to cause the drum to rotate in the direction of the arrow 17, but the drum resisting by reason of the friction resistance on the soil, will compel the pinions 11 to roll over the spur gear 12 thus raising the platform with all its load, and hence compelling the vehicle's body to turn in the direction of the arrow 18 and so roll over the ground advancing in the direction of the arrow 19.

Thus the forward movement of the vehicle is provided for. The direction is yet to be provided for. The vehicle is steered by giving a form partly cylindrical 20 and partly conical 21 to the external rolling surface of the drum, as shown in the drawing, and by providing means to enable the vehicle to be inclined to the right or to the left at will from its interior.

Said means consist of a heavy weight x which may be shifted in a cross direction by hand power, or by means of a motor. When the balancing weight is in the middle plane of the vehicle, the latter advances in a straight line by rolling on its cylindrical surface 20.

If, however, the weight is shifted to one side the vehicle will keel toward the same side, and by rolling on the conical surface 21 will turn to the right or left. On starting once in the new direction, this will be maintained by restoring the balancing weight to the normal position.

In Fig. 1, the outline of the rolling surface appears constituted, as above said, by three zones, a central cylindrical one 20, and two lateral symmetrical and conical ones 21. But it will be understood that this outline may be varied in several ways.

In Fig. 3, by way of example, other forms —*a*— and —*b*— are shown.

The form —*a*— comprises the same central cylindrical zone 20 aforesaid, and any convenient number of conical and symmetrical zones 22, 23 of increasing conicalness. The number of these couples of conic parts may be large or small at will. In the drawing two are shown by way of example. The other form consists of a single belt 24 curved symmetrically in cross section by means of which a turning radius gradually variable can be obtained in steering the vehicle.

The curved form *b* gives, however, less stability, and would give rise to continual lateral oscillations, with trouble to the crew, and greater difficulty in driving the vehicle. It is preferable to have a wide central cylindrical zone 20, between one or more conical belts and these might likewise be formed in curved surfaces.

The motor is fitted with means for reversing the movement so that the vehicle may be rolled forward or backward. On the driving shaft are provided in the usual way the connecting clutches for putting the motor in or out of gear. Some sort of brakes also may be applied for stopping the vehicle after the motor has been thrown out of gear and finally anchoring on the ground may be resorted to.

In order to control the direction from within, the vehicle is provided with periscopes 25 projecting from above the turrets 6, which periscopes, by means of mirrors or prisms, allow the inspection of the outside country from the vehicle's interior, either looking through the periscope at 26, as shown to the left in Fig. 1, or by means of a mirror 27, as shown to the right of the same figure. The tubes 28 of said periscopes are rotatable on their axes in such a way as to enable the inspection of the landscape in any direction. In the line of union of the movable piece with the fixed one, a graduated circle and a hand are provided for determining the direction of the visual.

In some cases the room left free, in the type of vehicle above described, for the crew, provisions, and armament proves rather scanty, and likewise the firing angle of the guns and machine-guns within the turrets is very limited, and unless the turrets project excessively out of the sides of the vehicle body two dead angles will result on the anterior and posterior sides of the moving direction, and these dead angles are even hidden from the view of the vehicle's occupants.

In order to avoid this inconvenience, in military applications, and also for giving more commodious quarters to passengers, as well as the possibility of observing all the ground traversed and to be traversed, the form of the turrets shown in the second embodiment of the invention and illustrated in Figs. 4 and 5 is employed, whereby the aforesaid inconveniences are completely eliminated.

In said embodiment the turrets while still suspended to the hollow shaft which carries the motor, are placed one before and the other on the back of the vehicle, that is, in a position diametrically opposed with respect to the drum's axle and outside of the latter, and are then connected between each other with suitable frames that pass along the flanks of the drum, and outside of same,

and are attached to the shaft where the latter projects from the two cheeks.

The two turrets thus arranged, have their view completely free, and they may be given any size whatever without inconvenience. They however, would remain isolated from each other, and during the journey the persons within them would not be able to communicate with each other, and with the vehicle crew except by electrical or acoustical means.

Even the latter inconvenience may, however, be eliminated by widening the connecting side frames in such a way as to transform them into two side walks passing close to the faces of the drum, and communicating with the hollow shaft thus allowing a passage between the two turrets in an easy and convenient way.

In a vehicle thus arranged, the internal chamber hanging from the shaft will remain reserved for the engineers watching the motor, and the commander, the crew, and the passengers would take their places in the turrets and in the side walks.

As will be perceived from the drawing, two chambers 30 are formed on the front and rear of the drum, and they, by means of the side walks 31 running along the flanks of the drum, are connected with the hollow shaft 4. Finally the side walks may be widened opposite the openings of the hollow shaft 4, as shown in the drawing, in order to allow room for two other lateral turrets 6 designed for passengers or for artillery 33. On the other hand, the side walks 31 may be done away with by reducing the connections between the turrets 30 and the shaft with two plain beams running along the drum's flanks.

All the system of turrets and walks is balanced in such way as to keep horizontal like a scale beam suspended to the shaft, but, in order to facilitate the passage over difficult and unequal ground, wide rollers 32 are provided at the lower portion of the chambers 30, and slightly projecting, which coming into contact with the ground help to facilitate the vehicle's running, and, by means of elastic suspensions, to deaden shocks and to avoid skidding.

There may be one roller for each extremity of the vehicle, and in such case it is well to give them a curved or doubly conical external surface to tally with the drum's form 1. But there may even be two rollers at each end placed symmetrically with respect to the middle plane, and in such case the double conicalness is not necessary, since each of them acts when the vehicle turns on one side only.

When artillery 34 be mounted also in the chambers 30, as seen in the drawing, the ground may be beaten and surveyed on all sides without dead angles in any direction.

The vehicle as above described is of great simplicity and compactness, because the articulated plates and chains adopted in other similar vehicles, have been done away with, and so the vehicle may be of great dimensions, and of great stoutness. It is suited to go over broken ground, rough soils, and those destitute of roads, passing over obstacles, inequalities of the land, as well as over furrows and small trenches It is adapted for transport of materials in desert localities destitute of communications, where ordinary vehicles could not gain access. For war purposes it acts by means of the armed or armored turrets, and, by advancing over the ground where the enemy is, it acts through the shock of its great weight, breaking up and beating down obstacles, dismaying and carrying away men and materials, as well as destroying the enemy's means of offense and defense.

Claims:

1. In a monocycle vehicle the combination of an external drum-shaped rolling body, with the rolling surface convex toward the outside in cross section, and central openings in the two side cheeks, a hollow shaft rotatable in the said central openings, turrets outside the drum and carried by the said shaft, a chamber suspended from the said shaft, means of propulsion in said chamber adapted to cause the external drum to rotate and means for inclining the drum on one or the other side.

2. In a monocycle vehicle the combination of an external drum-shaped rolling body with the rolling surface convex toward the outside in cross section, and central openings in the two side cheeks, a hollow shaft rotatable in the said central openings, turrets outside the drum and carried by the said shaft, a chamber suspended from the said shaft within the drum, means of propulsion in said chamber adapted to cause the external drum to rotate, means on the shaft for observing outside the drum, and means for inclining the drum on one or the other side.

3. In a monocycle vehicle the combination of an external drum-shaped rolling body with the rolling surface convex toward the outside in cross section, and central openings in the two side cheeks, a hollow shaft rotatable in the said central openings, side frames connected to the hollow shaft, turrets carried by said frames fore and aft the drum, and means within the rolling body for propelling and steering the vehicle from the interior.

4. In a monocycle vehicle the combination of an external drum-shaped rolling body with the rolling surface convex toward the outside in cross section, and central openings in the two side cheeks, a hollow shaft rotatable in said central openings, means

within the rolling body and carried by the hollow shaft for propelling and steering the vehicle, turrets carried fore and aft the drum by side frames connected to the hollow shaft and providing side walks for the communications between the turrets and the interior of the drum.

5. In a monocycle vehicle the combination of an external drum-shaped rolling body with the rolling surface convex toward the outside in cross section, and central openings in the two side cheeks, a hollow shaft rotatable in said central openings, means within the rolling body and carried by the hollow shaft for propelling and steering the vehicle, turrets carried fore and aft the drum, side frames connected to the hollow shaft and supporting the turrets, and widenings of said side frames providing room for other lateral turrets.

6. In a monocycle vehicle the combination of an external drum-shaped rolling body with the rolling surface convex toward the outside in cross section, and central openings in the two side cheeks, a hollow shaft rotatable in said central openings, means within the rolling body, and carried by the hollow shaft for propelling and steering the vehicle, turrets carried fore and aft the drum by side frames connected to the hollow shaft, and contact rollers under the fore and aft turret supplying auxiliary support in traveling through difficult ground.

In testimony whereof I have signed my name to this specification.

CARLO POMILIO.

Witnesses:

LETTERN LABSUETTA,

AUGUST E. EGGENSCHWILE.