



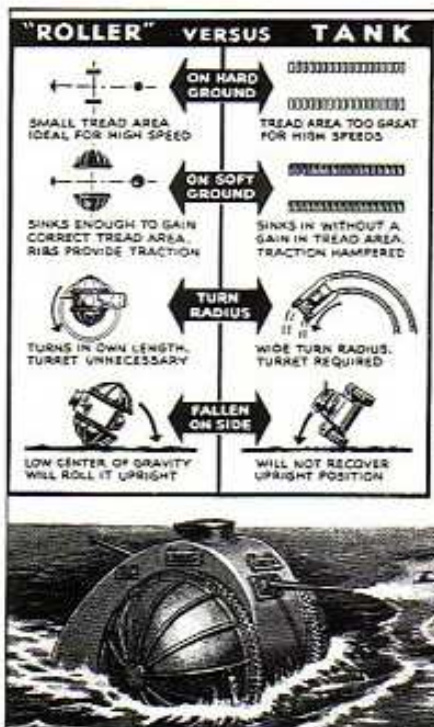
The 'Rhino' in Marmon-Herrington factory yard in the late 1950s. Note the swivelling hydrojet unit between the (rear) wheels.

# Hemispherical Wheels

## Aghnides 'Roller' and 'Rhino'

Most military vehicles run on conventional wheels or tracks, or a combination of the two. But several inventors dreamed up alternative modes and tried hard to get the military authorities interested. Examples include tandem axles with oval wheels on rocking beams and 'archimedian screws' (screw-like rotary pontoons which propelled the vehicle in either direction or sideways).

During World War II, a Greek engineer named Elie P. Aghnides, who resided in New York City, designed an amphibious armoured fighting vehicle which had two large, ribbed, hemispherical front wheels and a single spherical wheel at the rear for steering, all of which were empty and watertight, making the contraption — which he dubbed the 'Roller' — agile on land and buoyant in water. A 1943 publication described it as: 'intended for combat, reconnaissance and sea-borne invasion, it is designed to have automobile speed, to negotiate difficult terrain as well as a tank, to swivel as easily as an office chair, and to right itself automatically if upset. In mud, sand, or snow, it offers greater traction surface for less penetration; in water it will both float and propel itself.'



Sounding quite fantastic, the project remained a drawing board dream, although a scale model was probably made.

The invention was revived again in 1948, when the inventor turned to the Marmon-Herrington Co. in Indianapolis, Indiana, to have his vehicle project prototyped. Mr Arthur W. Herrington informed us at the time that 'although this vehicle was designed and built by Marmon-Herrington, it was not basically our product' and advised us to approach Mr Aghnides, who then lived on 46 West 54th Street in New York, for

The inventor's graphical comparison of his 'Roller' versus a conventional tank, with below it his rendering of the 'Roller' in combat action (1943).

additional information. This we did, but without success.

Mr Herrington implied that his company had considerably increased the length of the original design for more stability and added a pair of smaller wheels of the same type at the rear, for steering, and a Hanley-Kermath hydrojet unit for propulsion and steering in deep water.

The 'Rhino', as the amphibian was known, was ready for tests in 1954. It mounted a six-cylinder Ford industrial engine which developed 110 bhp at 3,000 rpm. The hemispherical wheels had rubber cleats set at right angles to the main rubber tread, for optimum traction. The front wheels, which did not steer, were set in a 'V' configuration and the centre of gravity was very low, the whole design being based on the theory that the machine would always right itself to the vertical position, regardless of how it tilted.

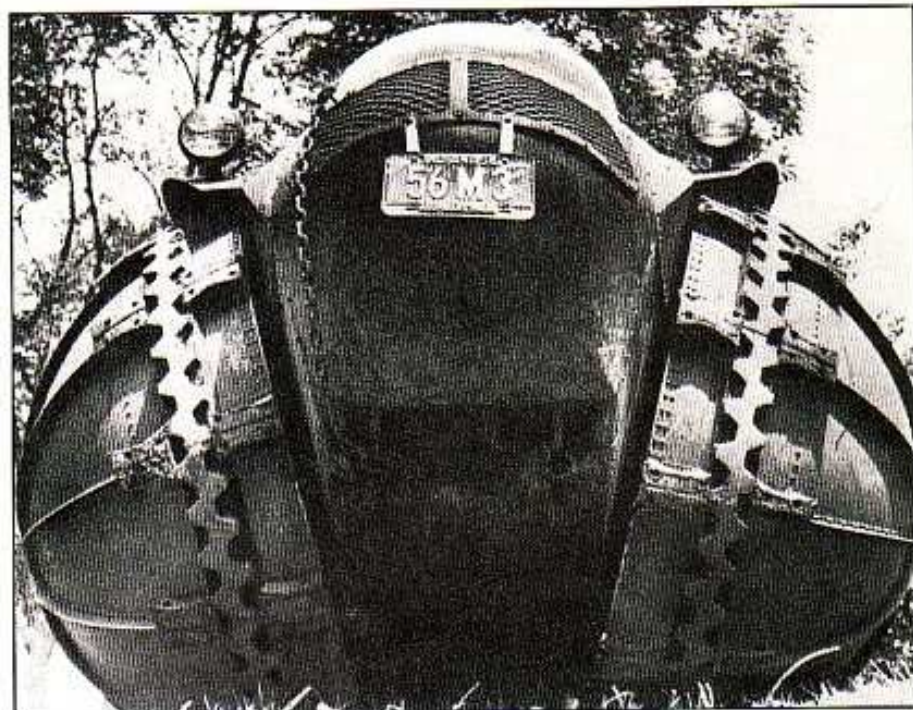
On surfaced roads, the 'Rhino' could achieve a maximum speed of 45 mph.

With the immense grip of its half-spherical wheels, the vehicle could charge confidently through thick river ooze, rolling without strain to deep water where it would wallow along with the aid of the hydrojet unit. The discharge nozzle of the latter, which was chain-driven from the engine crankshaft, could swivel through 360 degrees for steering and reversing.

Also known as the 'Aghnides Amphibious Roller' or the 'Polywog', the rig weighed about 10,000 pounds (4549 kg) and measured 205 inches long by 115 wide and 120 tall (5.20 x 2.90 x 3.00 metres approx.). It had a smallish cockpit, ahead of the mid-mounted engine, with a perspex bubble canopy which could be swung upward to allow access and exit for the operator.

The 'Rhino' was intended for tests as a possible platform for superstructures of various types but although it performed well as an amphibian, the military appear to have been scared off by the susceptibility of its wheels to puncture — and thus sinkage — from gunfire. Its road performance and behaviour must also have left a lot to be desired.

One contemporary press report said that American military experts were



*The 'Rhino' looked quite bizarre, if not fearsome, especially in full frontal view.*



*Three-quarter rear view, taken during trials in 1954.*



*The mechanical rhinoceros had excellent amphibious characteristics.*



*The half-sphere-wheeled 'Rhino' ploughing through soft sand. It proved near-unstoppable. We feel that for military service it could only have played a very limited rôle, at unjustifiable expense. An inventor's dream, but a soldier's nightmare?*

impressed by the possibilities of their 'mud baby' but we have yet to see evidence of the beast actually having been tested and evaluated by the US Army.

As well as the 'Rhino', a smaller version with the same basic characteristics appeared. Like its bigger brother, this machine was engineered, built and tested by Marmon-Herrington, but very little is known about it.

Both prototypes were still sitting in the grounds of the Marmon-Herrington plant in Indianapolis in the early 1960s but in 1963 the company's production facilities were moved to Knoxville in Tennessee and the two units were disposed of to be broken up. The scrap dealers who acquired them don't recall now what happened to the smaller amphib but the big one survived in the hands of antique truck buffs Eugene Pock & Son, Inc., of Indiana, who preserved it. The latest we have heard — from Don Chew, Marmon-Herrington historian — is that the Pocks (of 6350 So, 700 E, Lionville, Indiana 46077) are (or were) willing to pass it on for restoration.

Now there's an unusual relic with which to startle all comers at a rally! □

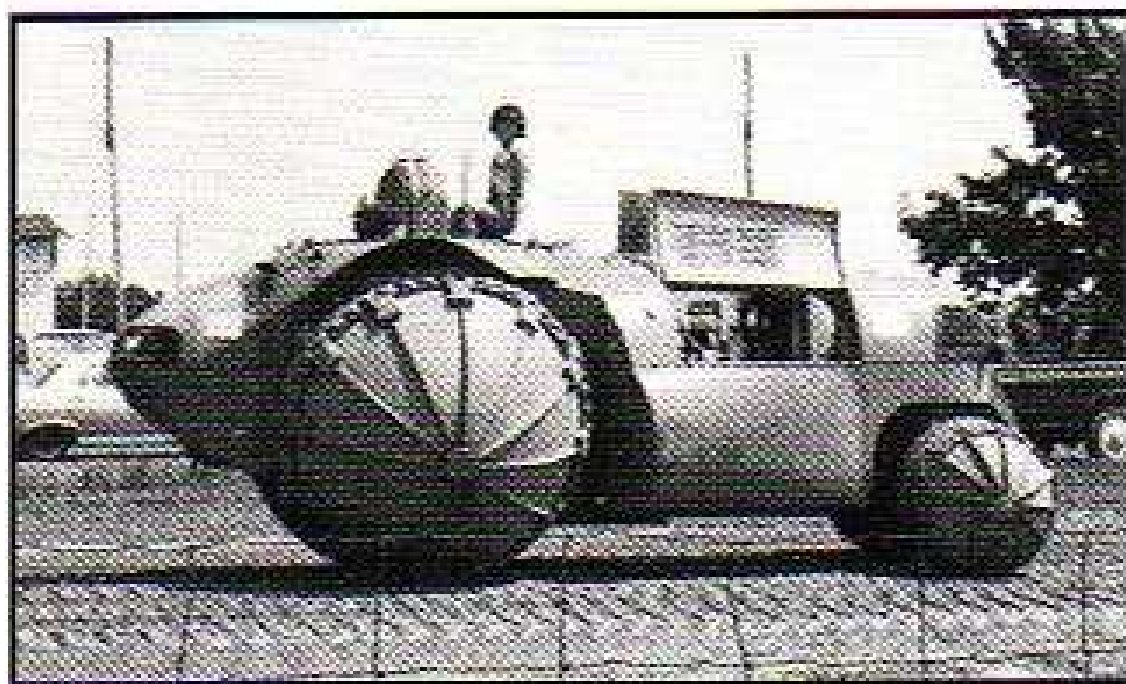
**◎VAL WHEELS  
WALK THROUGH MUD!**

NOW BEING TESTED FOR MILITARY USE,  
IT'S A NEW IDEA FOR CONQUERING MUD.  
OVAL WHEELS CAN GIVE A VEHICLE TWICE  
THE TRACTION OF ROUND ONES. BUT TO  
USE THEM AND STILL ACHIEVE A SMOOTH  
RIDE REQUIRES PERFECT SYNCHRONIZATION.  
SO THE WHEELS ARE FITTED WITH SPECIAL  
CHAIN DRIVES FROM B-W'S MORSE CHAIN.  
ONE WHEEL DIGS IN TO GIVE A "TOE  
HOLD" WHILE THE NEXT ONE GIVES  
"FLAT-FOOTED" SUPPORT.

DIAGRAM SHOWING  
SYNCHRONIZED  
WALK WHEELS

*Amongst other strange-wheeled MVs was this armoured car with oval wheels, which appeared in a Borg-Warner advertisement in the late 1940s. According to the ad's text, the system was actually tested. Can anyone confirm this? We rather suspect that it was tried only in the form of a scale model or test bed. Borg-Warner's involvement with this flat-foot experiment was the special chain drive for the tandem bogie.*

A very interesting letter arrived from **Eugene Pock Jr** of Zionsville, Indiana. We mentioned the Pocks at the end of our article Hemispherical Wheels in issue 16.



'In regard to the Rhino', Eugene writes, 'we have it in our collection of old equipment. It has a Ford six-cylinder engine. We get out and play with it every year and usually show it at Tipton in the second weekend of August at the Mid-America Threshing and Antique Show. It's my father's project.

'As for the smaller version of Rhino, we have what are believed to be the wheels for it but that's all. I saw it at the Marmon-Herrington plant at Lebanon, Indiana, but the motorcycle engine was out of it then. Someone beat us to it and scrapped it before we got to it. I saw some pictures of the smaller model and talked to a man who worked on it but have been unable to locate him anymore.'