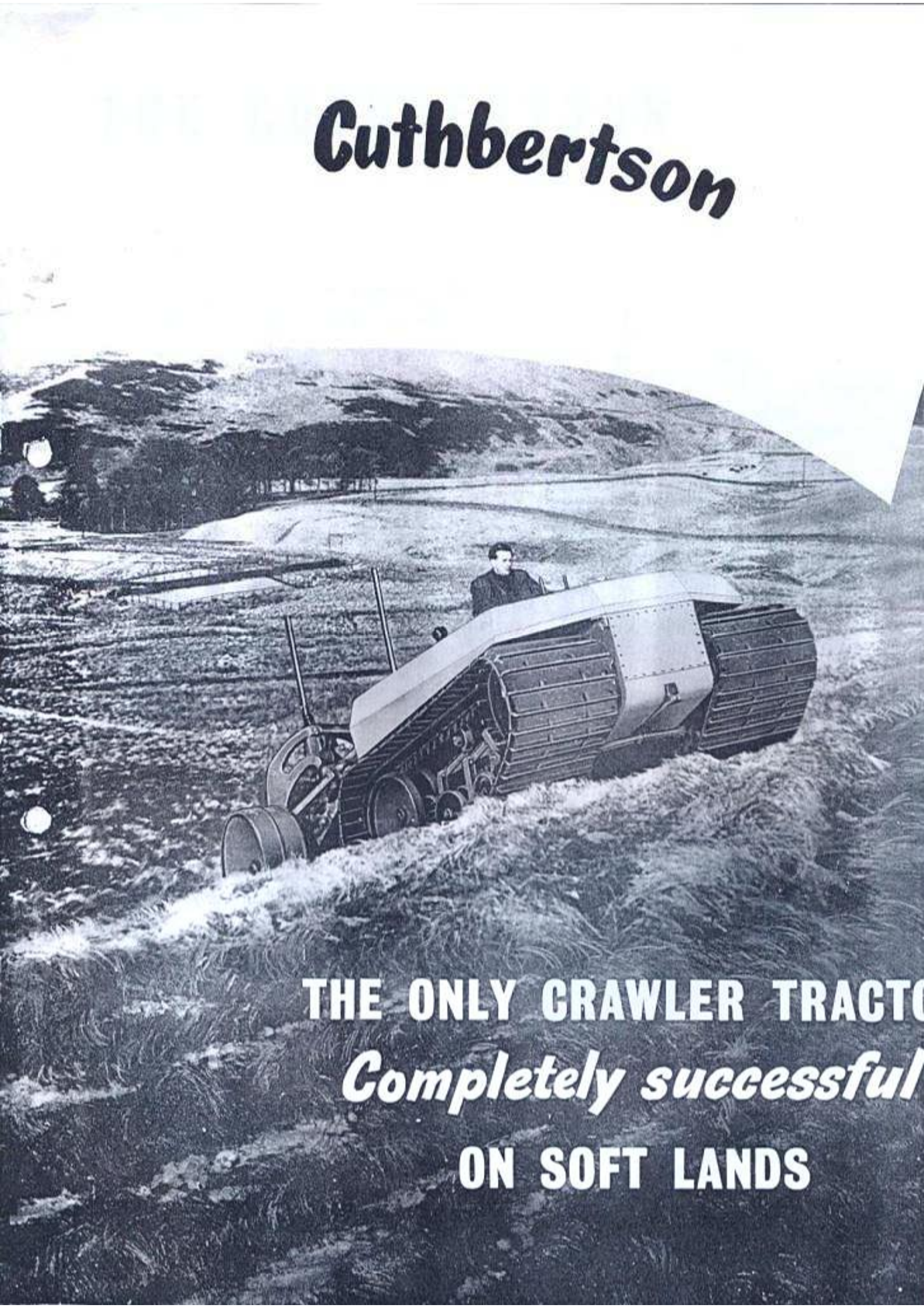
Cuthbertson



THE ONLY CRAWLER TRACTO

Completely successful

ON SOFT LANDS

WHAT THE WATER BUFFALO IS—

The advent of the Water Buffalo tractor, powered with a 75 h.p. diesel engine, was described in the technical press as "one of the most interesting developments in tracklayer history with a hill and bog performance which must be seen to be believed".

Throughout the world, large tracts of waste land hitherto impossible to reclaim mechanically have become valuable potential areas for reclamation and development. The Water Buffalo has proved in many overseas territories it can undertake work on this land and do it speedily and efficiently.

Two main features explain its unqualified success. The first is the Cuthbertson patent flexible rubber track, which gives astonishing ground adhesion by "enveloping" the ground surface instead of riding the high spots, with a ground pressure of as little as 1·5 to 2·5 lb. per square inch according to width of tracks.

The second feature of the Water Buffalo is the watertight hull which ensures that the engine, transmission and steering are dry even when the tractor is operating in 4 feet of water and prevents it from sinking in peat or mud.

As a result of the success of the original type of tractor, a much larger and more powerful version of the Water Buffalo has been brought into production.

The larger machine retains the two most important features incorporated in the original model, i.e. the 'Cuthbertson' patented flexible rubber and wire rope tracks and the watertight hull. The hull has been developed still further, and a special body can be fitted which makes the tractor fully amphibian and enables it to travel over marshes, swamps, through free water and pull heavy loads.

Light type Water Buffalo hauling drainage plough during drainage operations.

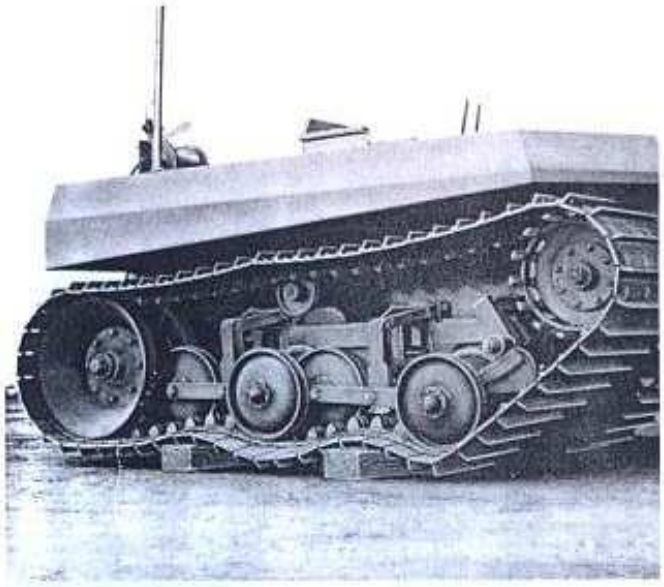
Large Water Buffalo without amphibious body winding itself out of marshland.

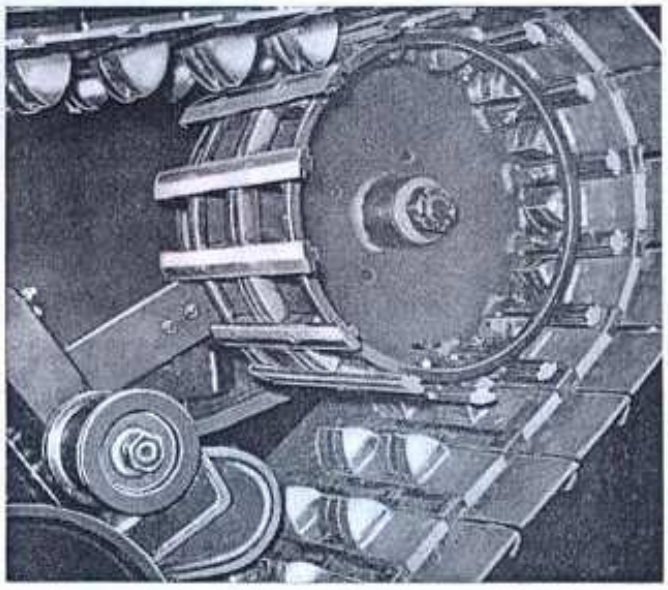
THE CUTHBERTSON

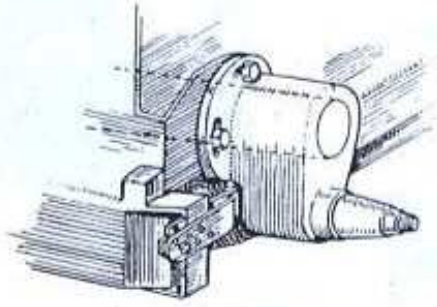
Revolutionary, fairly describes this unique track. Rectangular rubber pads of half-inch thickness are reinforced by endless steel cables which, as shown in bottom-right illustration, are free to slide over ferrules so that **the track flexes freely in every direction.** Steel grousers outside, and steel plates carrying driving dogs inside, connect the pads together to form the track. Full flexing is permitted by the independently mounted and spring loaded intermediate rollers. A rear roller supports the rear weight of the tractor on the track and is itself carried on a stub axle which includes a tension-adjusting arrangement. The locating bolt for the latter is designed to shear and so slacken track tension in the event of large stones becoming trapped inside the track.

The drive sprocket is at the front (contrary to common practice) and the track top consequently is in tension and the bottom run therefore, is free to mould itself closely to the ground undulations and so develop a ground adhesion far greater than the best previously attained.

Drawbar pulls 10% in excess of deadweight have been registered . . . a performance made possible solely by the tracks' exceptional flexibility.

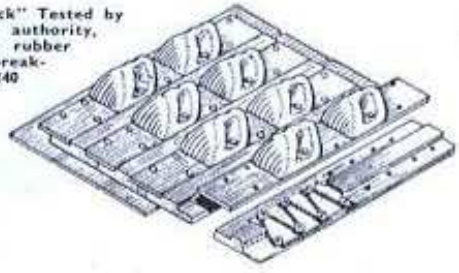




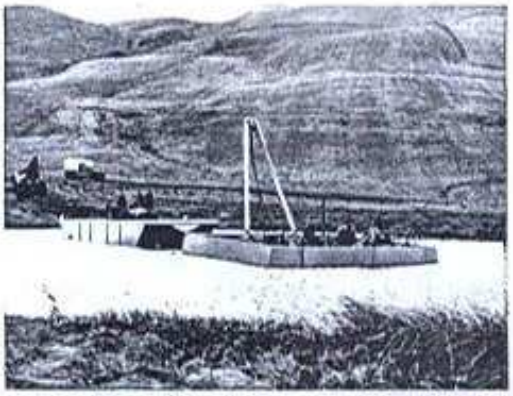


Shearing Device

"Section of Track" Tested by an independent authority, Water Buffalo's rubber track showed a breaking strain of 58,240 pounds.



THE NEW LARGE

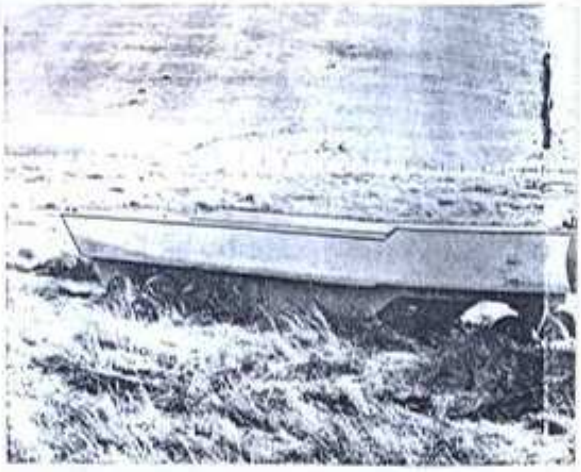


The large Water Buffalo, with amphibious body and hauling a 10-ton slipe, winches itself through free water.

Safely across the water course. The capstan winch runs at track speed in all gears and the tractor can run on a permanent cable.

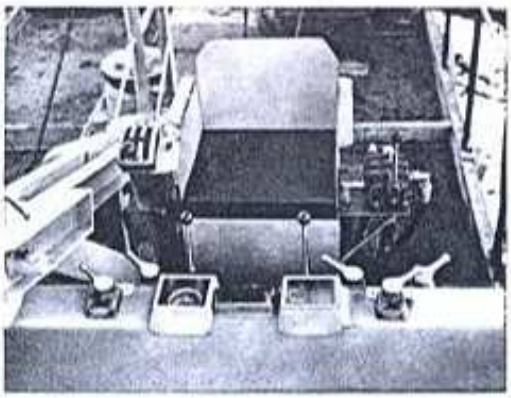
Coupled up to a 10-ton slipe, the Water Buffalo is sh

The large tractor, without amphibious body negotiating a stretch of marshland.

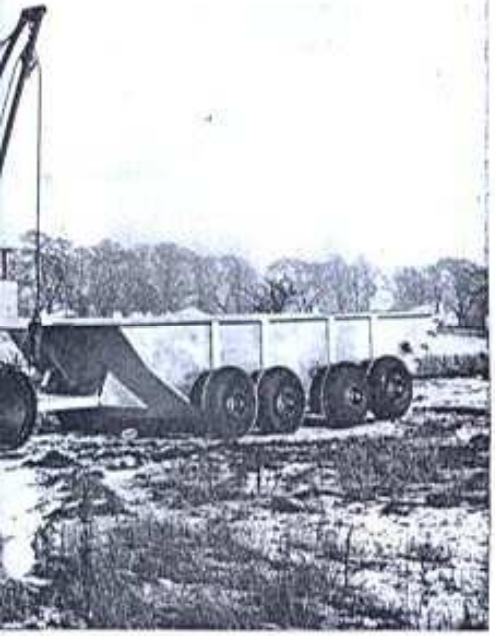


The large Water Buffalo with amphibious
crossing difficul

The driver's seat showing all controls —steering, braking, capstan, winch, etc. —which are air pressure operated.



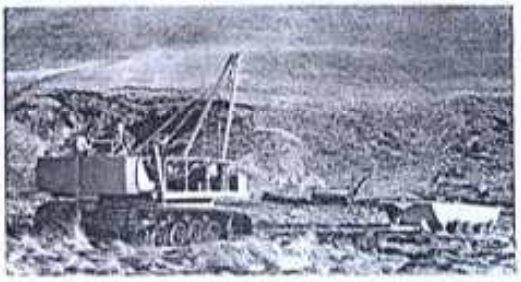
TRACTOR



vn with bulldozer blade in travelling position.

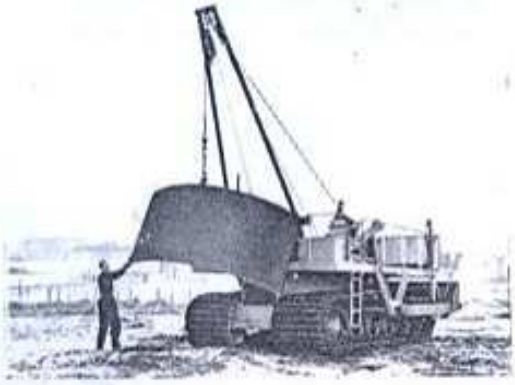
ody and hauling a laden 28-ton slipe marshland.

View showing the watertight tailboard of 10-ton slipe in loading position. It is operated by hand winch.



The tractor winching a slipe through difficult land conditions.

For oil exploration surveys, the tractor is fitted with special oil-field winch and gin-poling arrangement at rear. It has a lifting capacity of 10 tons.



Rear view of large Water Buffalo showing oil-field winch and jaw-end to take drawbar of slipes.

The larger and more powerful Water Buffalo tractor is designed for operation under the most difficult conditions. It has proved itself, particularly in the transport of heavy oil-drilling equipment and materials over some of the worst terrain in the world, and has penetrated areas impassable to vehicles a fraction of its weight. It has a tread far lighter than man, exerting 1·5 to 2·5 lb. per square inch, as against the 6·5 lb. per square inch exerted by a man.

Working length	23 ft. 4 in.
Width—normal	11 ft. 6 in.
Width—complete with amphibian body	16 ft. 0 in.
Working height—excluding exhaust pipe	11 ft. 0 in.
Ground clearance on hard surface	1 ft. 4 in.
Drawbar height	1 ft. 8 in.
Drawbar lateral movement	1 ft. 6 in.
Weight on 48 in. tracks (fully equipped with bull-dozer, gin-pole, winches etc.)	24-ton approx.
Working ground pressure	2·5 lb. per sq. in.
Drawbar horse power	145

The machine is powered with a high efficiency Leyland diesel engine. The relative data for this unit is as follows—

Type	AU680
No. of cylinders	6
Bore and stroke	5 in. × 5·75 in. (127 mm. × 146 mm.)
Cubic capacity	677 cu. in. (11·1 litres)
Compression ratio	15·75 to 1
Brake horse power	165 at 2000 r.p.m.
Maximum torque	500 lb ft. at 1100 r.p.m.

A 5-speed S.C.G. pneumo-cyclic gearbox operating through a centrifugal clutch.

	Gearbox Ratio	Tractor Speeds	Tractor drawbar pull with 48" tracks
			lb.
1st	6·32 to 1	1·14	47,700
2nd	4·28 to 1	1·68	32,400
3rd	2·43 to 1	2·86	19,000
4th	1·59 to 1	4·5	12,100
5th	1 to 1	7·2	7,550
Rev.	5·97 to 1	1·2	—

The special hull of the "Water Buffalo" ensures that the tractor is capable of fording up to 4½ ft. of water with safety. This feature is provided by the use of an all-welded sheet steel construction, with provision being made for removable covers for inspection or servicing.

To this hull can be fitted an amphibian body, which enables the tractor to float in free water, and ensures that the machine can be used with safety for crossing delta areas, etc.

The power from the engine is transmitted through the centrifugal clutch and gearbox, to a cardan shaft. This shaft transmits the power to a distribution gearbox, which divides the drive into two parts. The power is then transmitted and controlled by 2 independently operated clutch and brake mechanisms, each of which drives one track only, through a worm-type drive unit, to a spur gear final drive.

The tractor is supported on 2 large unsprung idler wheels at the rear, and 10 sets (5 on each side) of idler wheels on sprung crank axle assemblies. These axle assemblies are able to move vertically under the weight of the tractor on the tracks, and maintain the tracks in contact with the ground.

The forward moving part of the track between the rear idler wheel and the front driving sprocket is supported by 4 small idler wheels. All of the idler wheels are fitted with Timken bearings and oil seals, and grease nipples are fitted to aid lubrication.

The tracks fitted to this tractor are the most important feature around which the design is built. These patented tracks have eliminated the conventional link pins and bushes, and instead of pins and bushes, the track links are joined by means of flexible rubber pads, which are moulded round a series of wire linked ferrules, to take the track bolts. This arrangement provides an extremely flexible track, which is able to conform accurately to the undulations of the ground surface. The track design also greatly reduces track wear.

In order that the machine can be satisfactorily handled by semi-skilled European or native labour, all controls, including steering, braking, operation of capstan winch and gin-pole winch, have been arranged by air control methods. A heavy type air compressor is fitted on the vehicle, which gives an adequate air supply for gearbox controls and all other units. No manual control is employed on this machine, and this feature greatly simplifies the operation of the various items of equipment.

A hydraulically operated bulldozer blade can be fitted to the tractor to enable the machine to blaze trails through virgin country, forest land, and swamp conditions. This feature gives the machine the ability to clear roads into oil drilling sites, and also to level off areas of forest land at the site, for the erection of drilling rigs. The bulldozer equipment is robustly constructed to enable it to meet the extremely wide range of land conditions, normally experienced in virgin country.

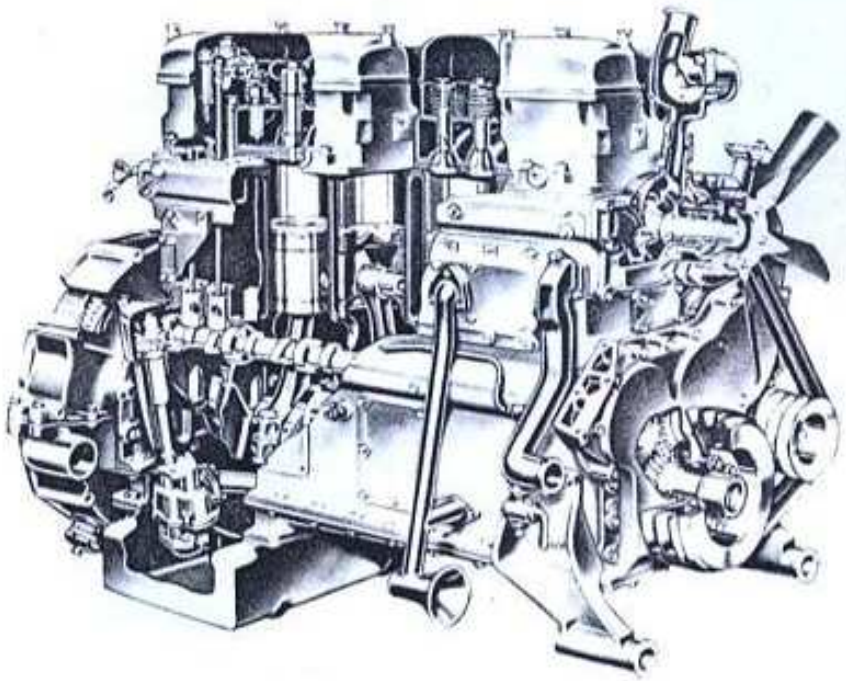
It should be clearly understood that the bulldozing equipment is an attachment to the tractor for the purpose of making preliminary roads into inaccessible sites, and that the machine is not primarily designed as an earth mover to compete with conventional crawler tractors in areas where these conventional tractors can operate satisfactorily.

To enable the "Water Buffalo" tractor to undertake various operations required in oil exploration surveys, as well as the erection and transport of drilling rigs, the tractor has been fitted with a special oil-field winch, and gin-poling arrangement at the rear. With this winch, and gin-poling arrangements, a lifting capacity of up to 10-tons can be obtained. The winch is specially geared to enable lifting and transport of drilling components, and has a sufficiently low operating speed to assist in the erection of these components when being used as a crane.

One of the most interesting features of the new tractor is that it can be fitted with a capstan winch, specially designed to run at track speed in all gears. This means that in land conditions, where the surface of the land is unable to transmit the drawbar pull exerted by the tractor, the winch can be used as an additional means to gain the necessary tractive effort. By a special arrangement on the winch, the tractor can run on a permanent cable, as for instance when a section of free water is encountered and the tracks of the tractor cannot assist in propulsion. This feature of winch and tracks being incorporated is also of the greatest use when operating in particularly difficult land conditions, where the tractor may, on occasion, become bogged. By the use of the winch, the "Water Buffalo" is able to extricate itself from the most difficult situations. For exceptionally high drawbar pulls in soft conditions, the winch and tracks are operated together to pull any implements or loads.

It has been found that the most satisfactory method of transporting loads by the use of the "Water Buffalo" is in the form of barges, slipes or tracked trailers, which are pulled behind the machine. The slipes can be offered in a range to take payloads of 5, 10 and 20 tons. All of these slipes can be fully amphibian when loaded, so that the loads can be transported by water as well as land. All slipes are fitted with large wheels. These wheels protrude approximately 9 inches below the base of the barges, and when on hard ground, the slipe runs on wheels. When on soft ground the wheels penetrate 9 inches into the surface, and the base of the barge takes up and spreads the load, to give an extremely low ground pressure. All slipes are fitted with rear doors, to facilitate loading and unloading. In general, it is advisable to construct barges or slipes to suit the type of load to be transported, but as these slipes are relatively simple and cheap in comparison to tracked trailers, it is sometimes advisable to have a range of barges for use in various conditions.

A range of towed trailers, fitted with tracks to give a low ground pressure, and capable of carrying loads of up to 20 tons is also available. These tracked trailers are fitted with our special patented track design, and the trailer body is manufactured by R. A. Dyson & Co. Ltd., of Liverpool.



An economical unit of high efficiency—the Leyland 165 b.h.p. 6-cylinder vertical diesel engine.