

Reprinted from
MOTOR CYCLING
October 5, 1961

“ High-Performance Scrambler ”

Description of the Cotton Cougar 250 c.c. Motor Cycle with Cross
Linerless Aluminium Light Alloy Cylinder.

Cross Manufacturing Company (1938) Ltd.

33 Midford Road, Combe Down,

Bath, Somerset.

Telephone: Combe Down 2355

HIGH-PERFORMANCE SCRAMBLER

**Big power output claimed for
Cross-modified engine of
new Cotton 'Cougar'**

WITH a nice sense of timing, Cottons choose this week of peak interest in trials riding to announce a model designed for that other form of tough cross-country sport—scrambling. This 246 c.c. newcomer, which heads the Gloucester company's 1962 programme, is called the "Cougar." It is powered by what is basically a Villiers 34A crankcase and gear unit with a cylinder and piston of unusual design giving, it is claimed, a considerably higher-than-average power output, together with a commensurate endurance capacity.

These qualities are achieved by using a semi-slipper type light-alloy piston in a linerless light-alloy barrel so obtaining the benefits of equal expansion coefficients. The inherent difficulties associated with this principle are said to have been overcome by a special piston ring assembly and a bi-metal skirt, the two combining to keep the surfaces of the piston and bore out of direct contact and separated by a film of oil. (The recommended mixture, incidentally, is 20 : 1 of Castrol "R.")

Piston/barrel clearances are thus reduced, and remain almost constant regardless of heat variation.

A further safeguard against the "mysterious" compression fall-off sometimes experienced in a hot two-stroke is the use of a coil-type spring "piston ring" providing a seven-tier knife-edge contact with the bore. This is assembled together with a supplementary spiral ring, which is deeper and of slightly smaller diameter than the knife-edged ring, and acts as a spacer (see sketch).

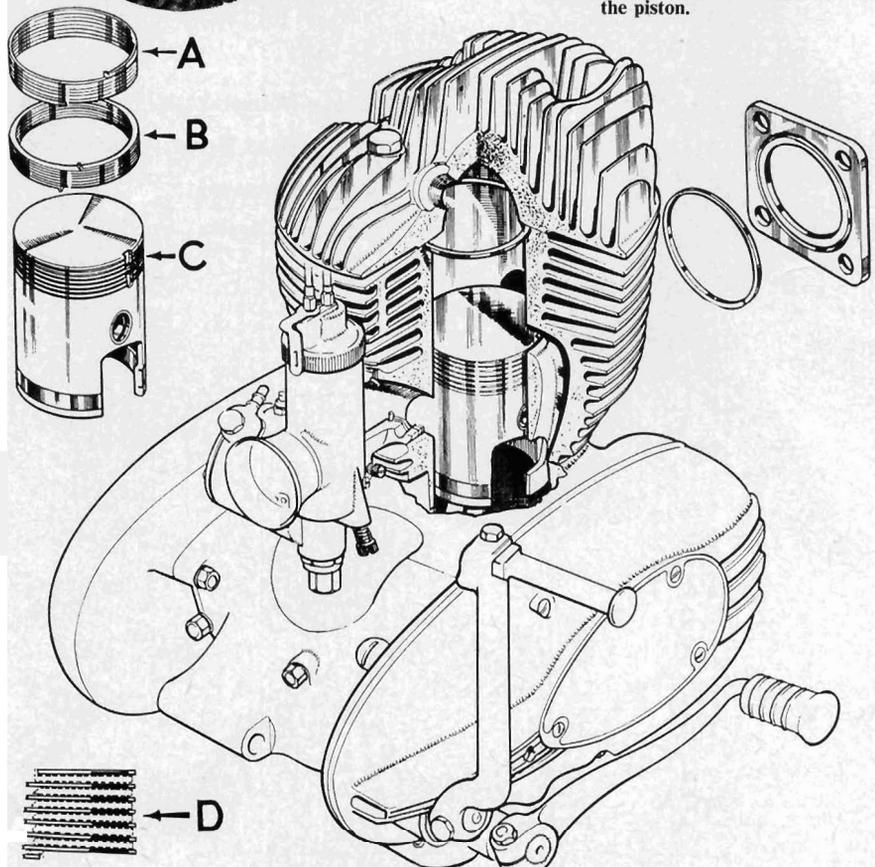
The supplementary spiral also serves to locate the piston radially, isolating it from the bore without markedly stepping up radial pressure and friction under working conditions. The two-part assembly provides an expandible multi-point compression seal approximately 1 in. deep.

Lower piston-skirt bearing areas are provided by two high-carbon-content steel pads riveted into machined recesses, the working faces standing proud by approximately .004 in. The piston is carried on a standard Villiers Mk. 34A connecting rod, with a 10-roller caged big-end, and is secured to the gudgeon pin by Seeger circlips.

The barrel, an LM8 casting, provides for a 66 mm. by 72 mm. bore and stroke and is conventional, with single rear inlet port and offset front exhaust port, and is cored with twin opposing transfer ports. A cylinder-base gasket is used but, at the top of the bore, there is an unorthodox steel-ring sealing arrangement. Instead of a gasket or ground joint, Cottons use a split ring with a 45° face bedding down into a similarly angled



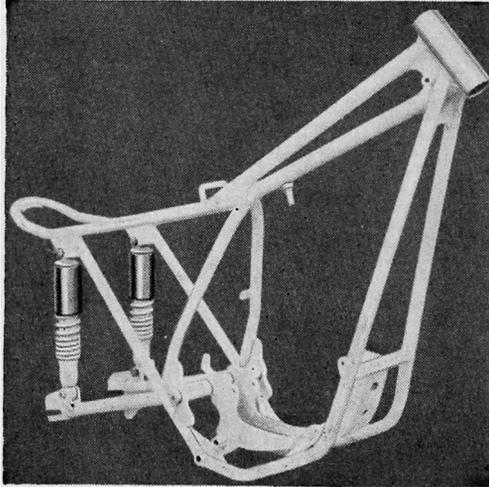
The "Cougar" scrambler; the prototype illustrated is fitted with an experimental air cleaner. Drawing below shows the Cross unlined light-alloy cylinder barrel and piston fitted to the Villiers Mk. 34A crankcase-gearbox unit. Inset at top left shows how the helical spacer ring "A" is assembled to interleave with the knife-edge ring "B," and the two are located by the spiral groove at "C." At "D" is a diagrammatic sketch of the seven-tier effect when the two coils are wound together on the piston.



chamfer. It is designed to close up, biting fractionally into the chamfer as the head is tightened down. (This ring is made by Cross)

A similar arrangement seals the exhaust port, the outer face of which is drilled and tapped to accept a special adaptor plate to which the exhaust pipe is brazed. The inner adaptor face, machined with a dished land, accepts a stainless steel split ring which beds into the light alloy of the cylinder to form a perfect seal as the assembly is bolted up.

An Amal "Monobloc" $1\frac{3}{8}$ -in. bore



Duplex cradle frame of the "Cougar."

carburettor is specified. The swept-down tract is highly polished.

A standard Villiers "A"-range 246 c.c. cylinder head is secured by four $\frac{1}{2}$ -in. bolts screwing into coil-type thread inserts. The compression ratio is 12:1.

The new piston and cylinder are the results of development work by the Cross Manufacturing Co. (1938), Ltd., Bath. Head of that establishment is R. C. Cross, M.I.Mech.E., A.F.R.Ae.S., M.S.A.E., known the world over for his contributions during the past 35 years to i.c. engine development. He was the originator of the Cross rotary valve. The components to be used by Cottons are covered fully by the Cross Company's patents.

The unit goes in a new duplex frame and, to meet the tough usage envisaged, standard cup-and-cone head bearings are replaced by Timken taper roller journals. Armstrong leading-link front forks—standard on all Cottons—are retained and the swinging-fork rear suspension is controlled by Armstrong AT6/7 hydraulic suspension units.

With the "Cougar" is announced a redesigned British Hub component. It is exclusive to the new machine for the time being and is used instead of the light-alloy hubs of Italian origin employed on the "Continental" and "Corsair" models. Both brakes are 6 in. by $1\frac{1}{4}$ in.

The rear hub embodies a vane-type cush drive, with a unit of moulded rubber instead of separate inserts. A hollow central assembly, with two ball-journal bearings and outer oil seals, is carried on a q.d. knock-out spindle. A third outrigger bearing supports the sprocket, which fits up to the cush-drive

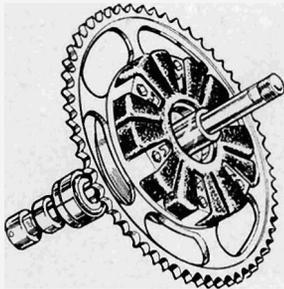
outer plate and is secured by six $\frac{1}{4}$ -in. nuts and bolts.

The specification includes Dunlop sports tyres—3 in. by 21 in. at the front and 4 in. by 18 in. at the rear—a $1\frac{1}{2}$ -gal. light-alloy tank and an air cleaner which is still in the course of development. Gear ratios are 9.3, 11.8, 16.5 and 27.3:1. Wide, cross-braced handlebars, with ball-ended levers are fitted. Turned out ready for the start-line, the model weighs 231 lb.—14 lb. lighter than the existing "Scrambler" model with the Villiers Mk. 34A engine.

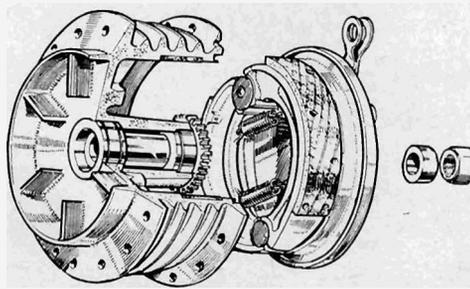
This "Scrambler," together with the 10 other sports and roadster models, is continued without major change. A mid-season newcomer, the "Corsair," is powered by the roadster-type 246 c.c. 31A Villiers engine. Two more "250" roadsters are the "Double Gloster" and "Herald Twin," both powered by the Villiers 2T engine, with specifications which include a single-down-tube, cradle-type frame with swinging-fork rear suspension, Armstrong front forks, British "Motoloy" hubs, Miller lighting and, for the "Herald," a deep rear enclosure. With the general specification of the "Herald," the "Messenger" is powered by Villiers 324 c.c. 3T twin engine.

The "Double Gloster" led the way to last year's Show surprise—the "Continental," with a tuned Villiers twin housed in a new duplex frame. Cotton's own cush-drive insert sprocket, developed primarily for scrambles, was also used for the first time on this lightweight sports machine.

The "Vulcans" are a trio of 197 c.c. Villiers 9E-powered singles available with three- or four-speed gear clusters and a general sports-roadster specification.



The new light-alloy British Hub assembly incorporates a cush drive with single-piece element.



PRICES, INCLUDING P.T.

	£	s.	d.
197 c.c. "Vulcan" 3S t.s.	162	11	3
197 c.c. "Vulcan Sports" 3S t.s.	162	11	3
197 c.c. "Vulcan Sports" 4S t.s.	171	2	11
197 c.c. Trials t.s.	171	15	3
246 c.c. Trials t.s.	180	7	0
246 c.c. "Scrambler" t.s.	202	8	8
246 c.c. "Cougar" Scrambler t.s.	241	14	1
246 c.c. "Corsair" t.s.	188	6	6
249 c.c. "Herald" t.s. twin	196	6	0
249 c.c. "Double Gloster" t.s. twin	196	6	0
249 c.c. "Continental" t.s. twin	215	6	4
324 c.c. "Messenger" t.s. twin	207	19	1

E. Cotton (Motor Cycles), Ltd., Quay Street, Gloucester.