

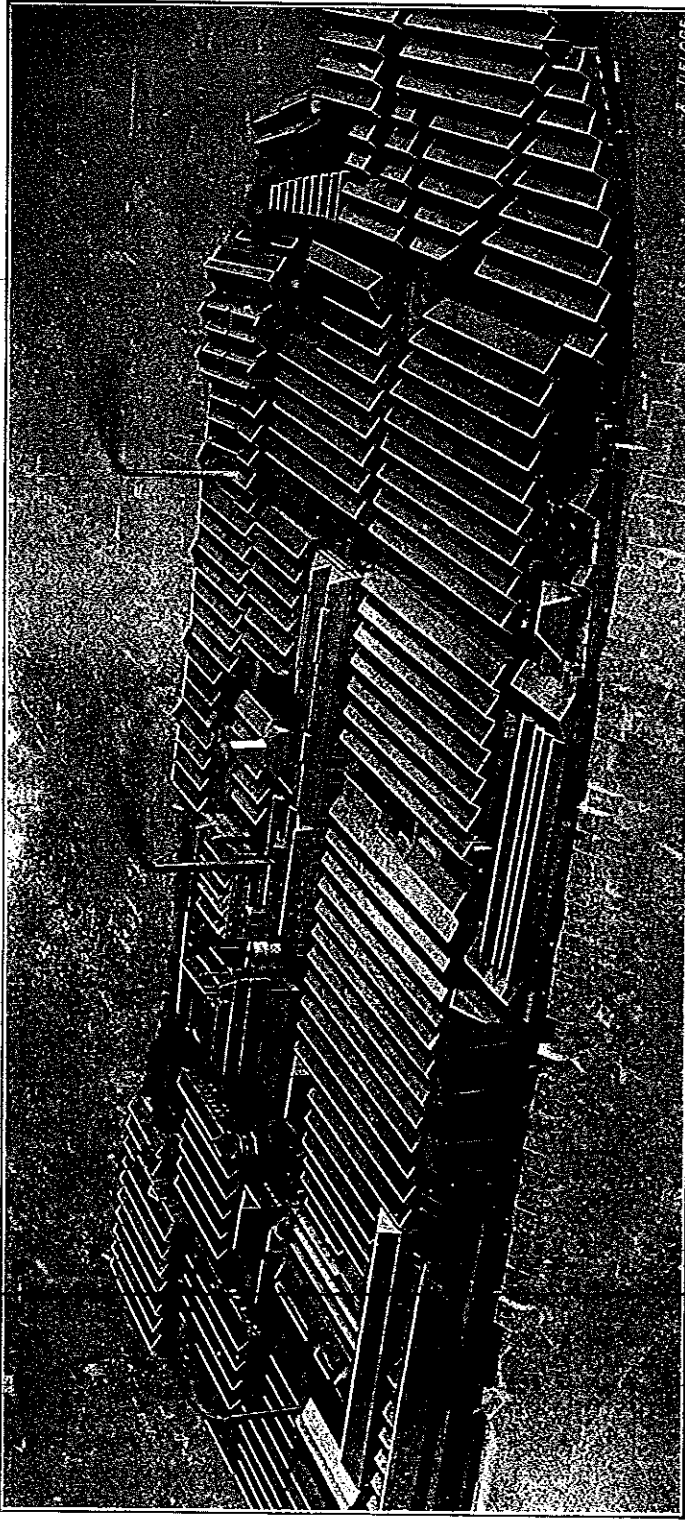
Fabrique Nationale d'Armes de Guerre, Herstal-lez-Liége (Belgique)

MOTORCYCLE 500 cc.

M. 67 C.

INSTRUCTION BOOK

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Birds eye view of the F. N. Works

MOTORCYCLE „M. 67 C” — INSTRUCTION BOOK.

BRIEF SPECIFICATION

Engine: Single cylinder, monobloc, O.H. valves. Bore and stroke $85 \frac{m}{m} \times 87 \frac{m}{m}$. 496 cc.

Clutch: Multiple plates working in oil.

Gearbox: 3 speed, controlled by direct lever.

Lubrication: Automatic by mechanical pump.

Ignition: Variable by high tension magneto.

Carburettor: Automatic with pilot jet, controlled by two levers, or twist grip for throttle and lever for air.

Transmission: By pinions from engine to gear box; by $5/8'' \times 3/8''$ chain from gear box to rear wheel.

Gear ratios: With 37 teeth rear sprocket : 10.25 7.07 4.83
With 45 teeth rear sprocket : 12.46 8.60 5.90

Forks: Druid pattern with shock absorbers.

Brakes: 8" internal expanding.

Valve lifter operated by lever on left handlebar.

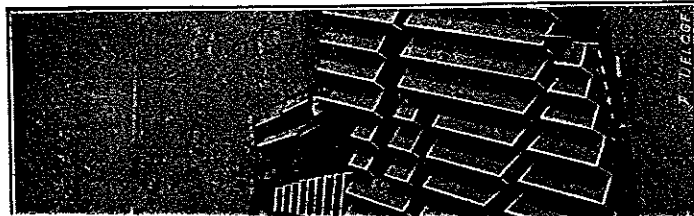
Tyres: Standard 675 x 100.

 Balloon 715 x 115.

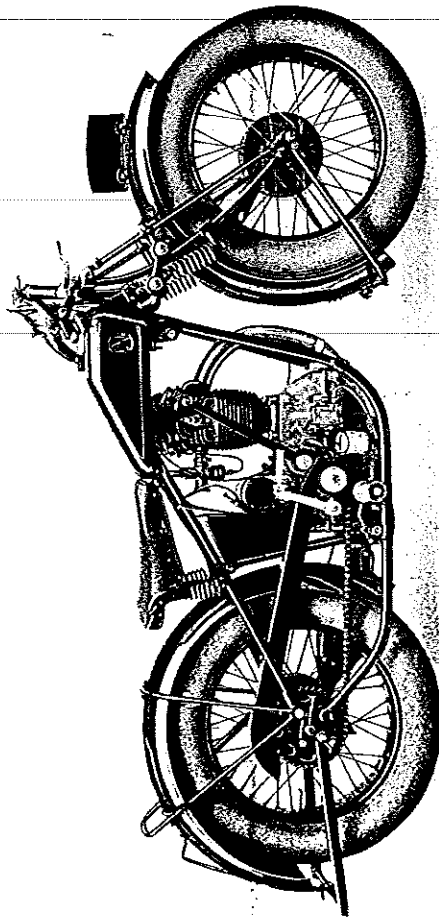
Tank: Petrol $2 \frac{1}{2}$ gallons.

 Oil 3 pints.

Accessories: Tyre pump, screw driver, 4 set spanners and tyre levers.



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Single Cylinder 500 cc., type M. 07 C., right side view

DESCRIPTION

The main characteristic feature of the "M. 67 C." motor cycle is its monobloc unit, thus named because it embodies, in the same casting, the engine itself, the clutch and the gear box, thus eliminating one of the main sources of trouble and noise, namely the front chain.

The engine: Is a four stroke single cylinder of the O.H. valves type with push rods.

The cylinder head: Is detachable and fastened to the cylinder barrel by five bolts. Perfect compression is ensured by a special copper and asbestos washer.

The sparking plug: Is located in the centre of the cylinder head.

The valves: Of special steel, are easily accessible for grinding in. The cylinder head being removed, decarbonizing can be carried out in a few minutes.

An interesting novelty is the protection of the valve rockers against water of mud. The accessibility of the rockers and valve stems remains unaffected, when the cover, simply fixed by a flat pivoting spring, is taken off.

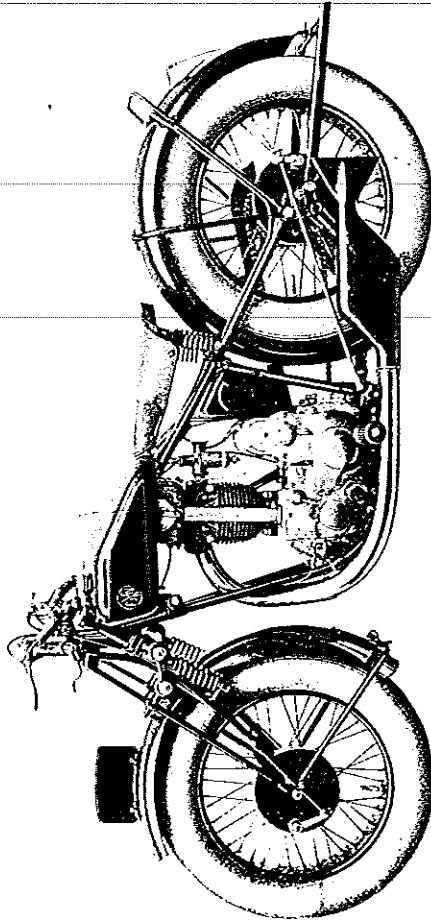
The connecting rod: Of H section is fitted on a double row of roller bearings at the big end. The small end bush is of bronze and housing a gudgeon pin of large dimensions.

The piston: Is of a special aluminium alloy remarkably free from slap. The gudgeon pin is secured by two safety spring rings. Three rings of special cast iron are fitted and effectively seal the compression.

Flywheels: On the "M. 67 C." machine the flywheels are enclosed and the main shafts run on large ball bearings.

The pinions: The geared transmission and magneto drives are both placed on the left of the crankcase and driven from two pinions keyed to the main shaft.

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Single Cylinder 500 cc., type M. 67 C. left side view

The oil pump: A pilgrim pump is fitted on the right side of the crankcase and driven from the flywheel shaft. The oil supply is adjustable through a milled screw and the flow can be checked by the aid of an oil gauge hole.

The lubrication: The oil pump forces the oil in the crankcase, from whence the engine is lubricated by splash. Special oil ways lead a portion of the oil into the timing case which lubricates adequately the valve gear and the transmission, clutch and timing gears.

The gearbox lubrication is by engine oil or a mixture of oil and grease. The large filler cap on top of the box is easily accessible.

The transmission: The transmission from engine to gearbox is of the rigid type, by straight gear wheels. It comprises the main or driving pinion keyed to the main shaft, an intermediate pinion running on ball bearings and the ratchet crown clutch wheel.

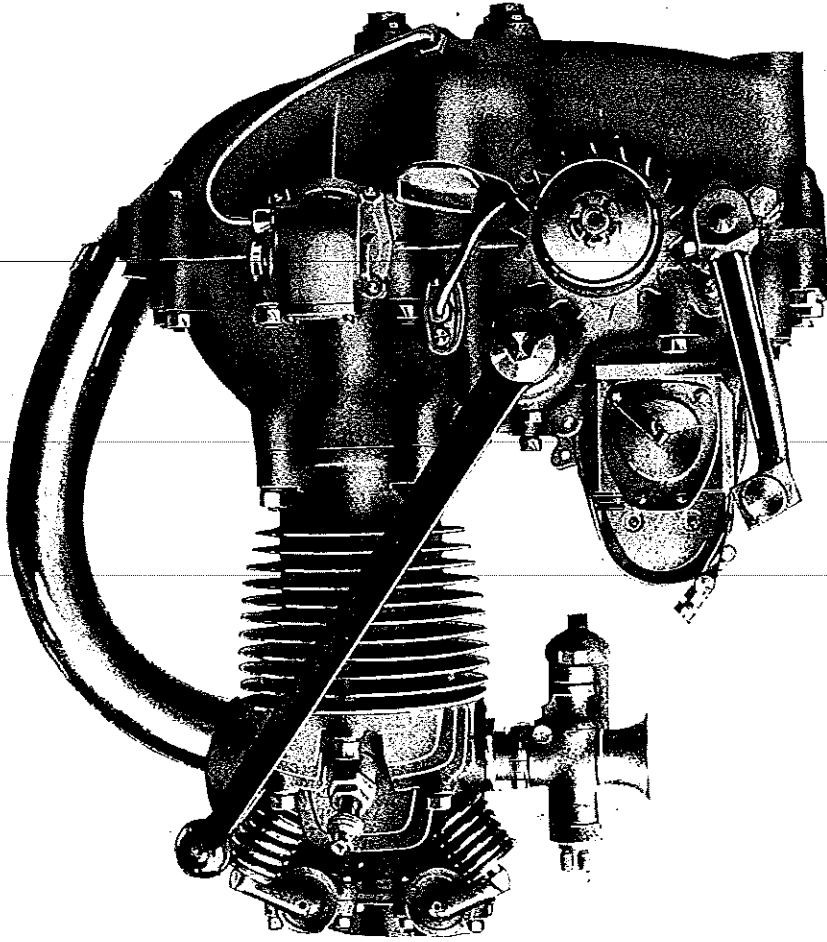
The clutch: Metallic clutch with multiple discs in oil bath. The ratchet crown clutch wheel revolves freely on the clutch hub, its inner side is hollowed and fitted with six notches driving the interior discs. These alternate with seven interior discs sliding in the driving grooves on the clutch hub.

The driving and driven discs are held in contact by a strong spiral spring. An internal clutch dog member conveys the movement to the top gear pinion.

By compressing the spring, through a quick thread operated by the clutch lever on the handle bar, the clutch is released and free engine thus obtained.

The gearbox: The 3-speed gearbox is of the sliding pinion and dogs type. The top and low gear pinions are free on the transmission shaft and in constant mesh with the triple pinion of the layshaft.

Engine Unit right side view



The middle gear wheel slides on four grooves on the transmission shaft, and rotates with it. Low speed is obtained through the dogs of the middle gear or sliding pinion engaging with the dogs on the low gear pinion, thus transmitting the movement of the transmission shaft to the triple set of pinions on the layshaft. The meshing of the sliding pinion with the middle pinion of the layshaft gives second gear; and the engaging of the sliding pinion with the top gear pinion gives top gear.

Final drive: An 18 teeth $5/8 \times 3/8$ sprocket is keyed on the right end of the transmission shaft. Final drive is then by chain coupled with an efficient shock-absorber.

The kick starter: Mechanism is simple and effective. The k.s. crank engages with the pinions on the lay-shaft, which move the high gear pinion geared to the clutch wheel and thus turn the engine.

A return spring brings the crank back in its original position. At the same time a cam, acting on the crank, forces the teeth to separate.

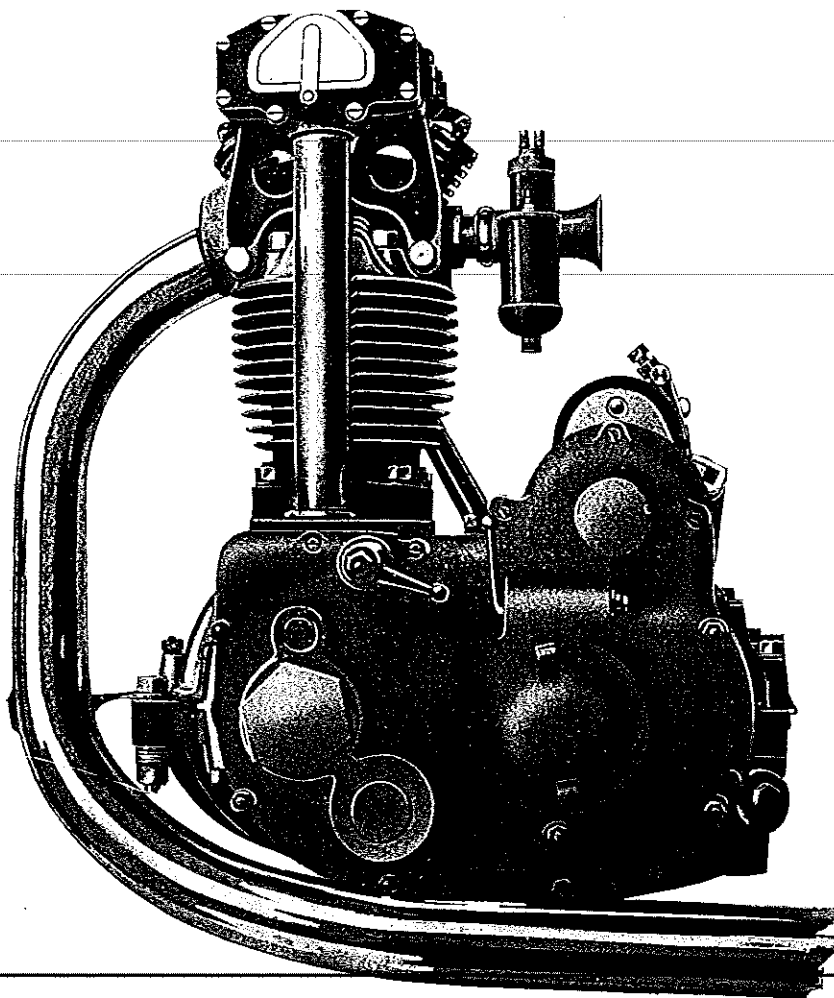
The carburettor: Is automatic and placed at the rear of the cylinder. It is controlled by levers fitted on the right handle bar.

The ignition: By high tension magneto with variable advance and retard controlled by lever on left handle bar.

The magneto is held down by a flange and driven at engine speed by a pinion meshing with the clutch wheel.

The exhaust system: Is by a straight through pipe to a sheet steel silencer with fishtail at the inside end of the machine.

Lighting set: A magdyno with battery — lamps etc., can be fitted to order.



Engine-Unit left side view

The frame: completely triangulated, is extremely simple and strong and fitted with sidecar lugs.

The front forks: are resilient, rigid laterally and fitted with shock absorbers. They are of the girder type with two spiral springs working in compression and long connecting links.

The handlebars: are adjustable; a steering damper is fitted as standard.

Front and rear stands: Are standard fittings.

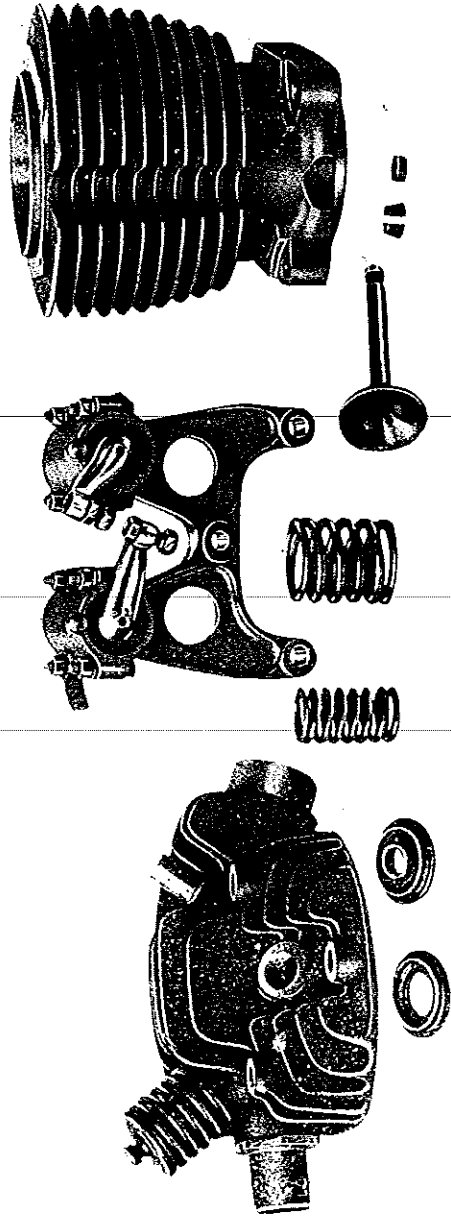
The saddle: Of the supple type, insures a very low riding position and long distances can be covered without undue fatigue.

The foot rests: Fitted with rubber blocks, easily replaced, are mounted on adjustable spindles. Aluminium foot boards can be fitted to order.

Mudguards: The top part of the front mudguard is fastened to the front girders of the forks by two brackets, and the bottom part is held in position by the front stand. The guard can be removed from the machine in about one minute. The rear mudguard is fastened at five points, namely- at the cross piece joining the two rear stays, at the saddle spring lugs and at two special supports. These supports have been designed as pillion seat anchorage, and allow the pillion seat to be fitted at practically the same level as the saddle, thus rendering pillion riding particularly stable and safe.

The chain guard: The chain guard of sheet steel is fastened to the crankcase and to a lug on the carrier tube.

Brakes: Both brakes are internal expanding of 8" diameter, powerful and strong in action. The front brake is operated by a long lever on the right handle bar and the rear brake, by rod, by the left foot.



Cylinder, head, valves and rockers carrier of the motorcycle M. 67 C.

USE OF THE MACHINE

Owing to the great simplicity of construction of the "M. 67 C" machine, coupled with its remarkable solidity, the chances of breakdowns or defective working are reduced to a minimum.

Yet, we deem it useful, to draw the attention of "F.N." riders to a few points so as to enable them to get the very best results out of their mount and make their riding a continual pleasure.

The old saying "Prevention is better than cure" is always true and it is in the spirit it suggests that we give the following hints:

PRECAUTIONS NECESSARY BEFORE STARTING

Oil: Never start your engine before having ascertained that there is oil in the tank.

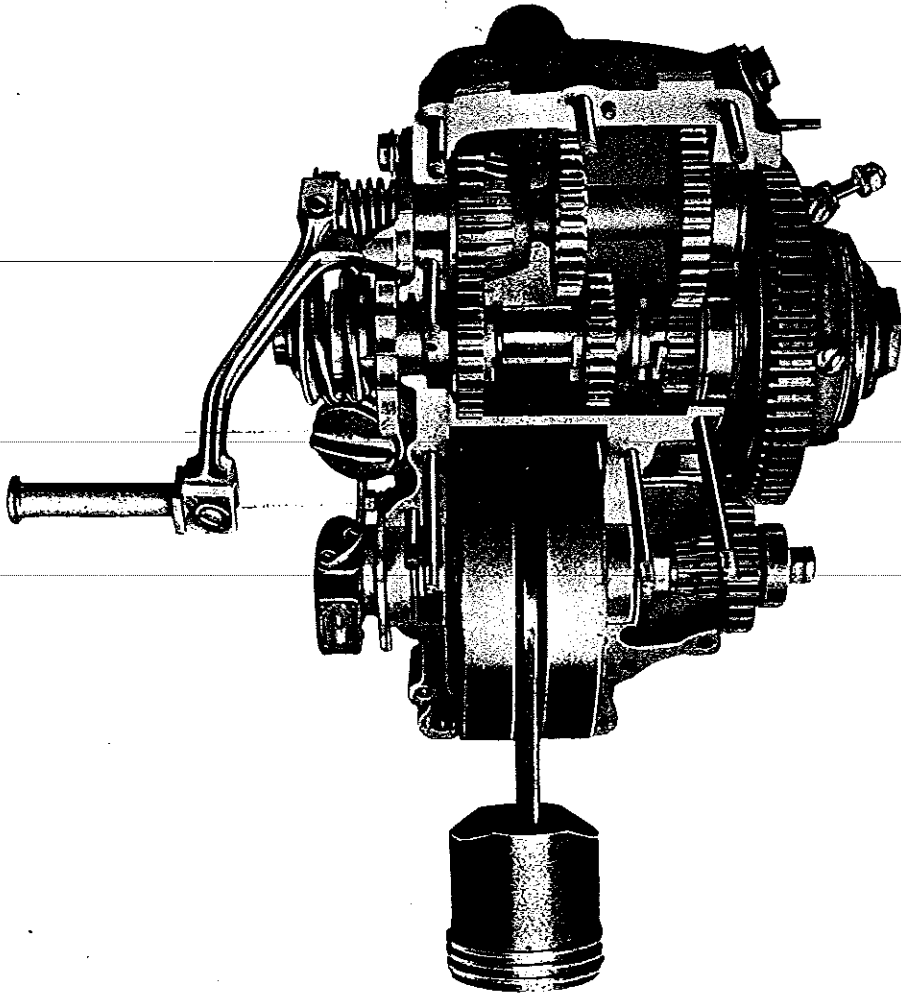
It is always advisable to keep the oil tank full or nearly so. It is a great preventive of seized engines.

Working of oil pump: We strongly urge "F.N." riders to check the working of the oil pump as soon as the engine is running. A glass oil gauge is fitted on the top of the pump for the purpose. Never take the road, if the pump is not working.

Brakes: Keep your brakes well adjusted and in good working order.

Tyres: The right pressure in tyres is extremely important. Keep the front tyre inflated to 1 8/20 lbs and the rear tyre to 2 lbs.

View of the engine with the upper half of the crank case and the cylinder taken off.



OF SECONDARY IMPORTANCE:

Filling oil tank: The oil tank is full when the oil level reaches about 1" from the filler cap. Ascertain occasionally whether the gearbox contains enough oil. Remove filler cap and insert a piece of wire long enough to reach the bottom of the box, — one inch and a quarter from the bottom is the proper and necessary level. Use good quality oil, — BB in winter, B in summer; too thick an oil will cause clutch drag. Always filter your oil.

Tappet clearance: Correct adjustment of tappets is as follows: .004" inlet, .006" exhaust. For adjustments see chapter "Adjustments".

Chain tension: Keep the chain on the tight side, without binding. $3/4$ " up and down play at the tightest place is sufficient.

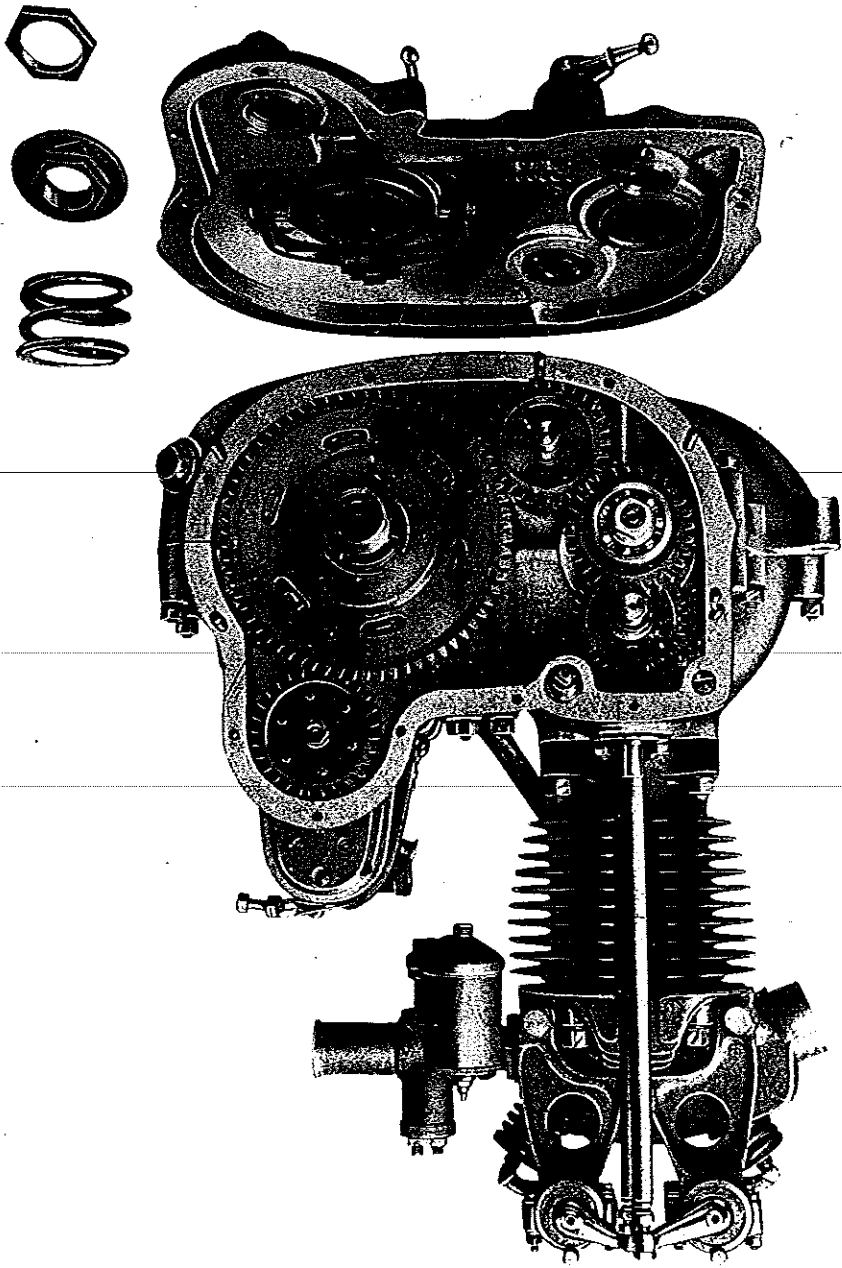
Control wires: Keep all wires oiled. Most garages will do the necessary for a charge of a few pence. If a Bowden wire becomes frayed, replace it at once, or it may let you down away from anywhere. (See chapter on "upkeep".)

Bolts and nuts: It is wise to check all nuts and bolts occasionally, especially when the machine is still new.

STARTING**Starting the motor:**

1. Put the gear lever in the neutral position.
2. Open petrol tap and if the engine is cold slightly flood the carburettor.

View of the engine with timing case taken off.



3. Shut air lever and open throttle slightly, as soon as the engine fires the air lever can be opened right out.
4. Retard magneto fully.
5. Lift the exhaust valve, give a vigorous dig on the kick starter at the same time releasing the exhaust valve.

or

with the kick starter bring the piston against compression, then lift the exhaust valve and press the kick starter down about 1". Release the exhaust valve and give a good kick at the kick starter. This method is usually very certain. Of course, the easiness of starting is greatly affected by the climatic conditions and the tune of the engine, but each rider soon finds out the best setting for starting his machine easily. Do not let the engine run idle, especially on the stand, for any length of time, that is, more than two or three minutes. If it is necessary, such as in traffic jam, throttle the engine down to the slowest tick over.

Starting the machine: When the engine fires evenly, kick the stand up and mount.

1. Lift the clutch by lever on the left handle bar. In cold weather it is advisable to let the engine run idle for about half a minute *with the clutch lifted* to free it completely by warming the oil.
2. Put gear lever in bottom gear position, that is right back. Never force the lever. If it does not engage easily move the machine slightly forward and backwards until it falls in.
3. Release the clutch gradually at the same time opening the throttle evenly, and the machine will start smoothly.
4. When under way, advance the ignition fully. Similarly engage second gear, then top. Always declutch while changing gear.

NORMAL RUNNING ON THE ROAD

A new machine must be run in carefully to get the best results and the greatest enjoyment out of it subsequently. For the first 500 miles a maximum speed of 30 m.p.h. on top gear, 20 m.p.h. in second and 10 m.p.h. in bottom should not be exceeded, and full use should be made of the gear box. The following hints will help the novice to get the best out of his machine from the start.

Position of carburettor levers:

(a) *Normal jet in carburettor.*

Air control lever always open, and the throttle position according to the speed required.

(b) *Small jet in carburettor.*

Air control wide open for normal running on the level, but shut slightly for hill climbing in top gear, and when the machine is driven all out.

Ignition advance: Practically always run the machine with the ignition fully advanced. Cool engine, good petrol consumption and preservation of tune depend upon it. Whenever the engine begins to labour or knock in either gears in hill climbing or driving against a strong wind, or very slow traffic running, retard the ignition slightly.

Use of gearbox: Knocking, and consequently overstrain of the engine, will occur if the rider attempts to climb too steep a hill on too high a gear for the gradient. The gearbox is made to be used. Besides, a climb in second gear is usually faster and certainly easier for the engine and transmission, than a persistent clinging to top gear.

Especially with the single cylinder O.H.V. machine it is wise to keep in mind that the power delivered is in direct proportion to the number of revolutions. To keep your engine running on hills, use your gearbox.

Slow running: Similarly if you wish to travel slowly and avoid straining your engine, use second or even bottom gear and little throttle.

Use of the clutch: To make slow running more pleasant and free from transmission snatches, the clutch may be slipped very slightly.

On the other hand clutch slipping should not be indulged in indiscriminately, especially for hill climbing, or to accelerate violently in top gear. Here again use a lower gear.

In a traffic jam declutch and engage bottom gear again, keeping the engine just ticking over. You will then be ready to move at the first opportunity.

Use of the brakes: The best way to stop quickly and safely is to apply *both* brakes simultaneously and evenly, avoiding the locking of the wheels. On greasy roads apply the front preferably, keeping the rear brake as a kind of emergency help. A skidding wheel has lost effective adhesion to the road and consequently renders the brakes practically useless.

STOPPING

To stop the machine :

1. Shut the throttle.
2. Declutch.
3. Apply the brakes evenly.
4. Put the gear lever in neutral.

If a long stop is contemplated turn the petrol off and use the stand in preference to the curb or wall to rest the machine.

Storing: If the machine is not to be used for a considerable time, say through the winter, it is advisable to apply the following instructions to keep it in the best possible state.

Empty the petrol tank.

Smear all plated parts with vaseline.

Remove tyres and tubes from the wheels, remove all traces of rust and moisture, paint the inside of the rims if necessary.

Replace tyres and tubes and inflate them to $\frac{3}{4}$ pressure.

Oil all outside moving parts such as forks, spindles, brake, bushes, chain, wires, cables etc.

Choose a garage as dry as possible, and cover the machine with a dust sheet.

UPKEEP

Filling up with petrol and oil and cleaning the machine constitute the upkeep of an "F.N." motor cycle.

Keeping a motor cycle spotlessly clean, is regarded by some as a fad,— It is not! It is really a very wise policy, giving, apart from the pride of ownership, a greater market value to the machine.

Hereafter are a few tips to keep the machine in a trim and smart condition.

POWER UNIT

Lubrication: The lubrication of the engine, clutch, primary transmission and magneto drive is entirely automatic. Providing the pump is working and correctly adjusted, lubrication will look after itself. (See Chapter on "Adjustment").

3/4 to 1. pint of oil in the gearbox will last for several thousand miles.

Cleaning engine and crankcase: First clean with brush and petrol or paraffin to remove any oil; then wash thoroughly with brush, soft soap and water. In that way engine and crankcase will always look brand new. The best way to keep the cylinder black is to clean it once a week with a 50/50 mixture of petrol and oil.

Lubricating the chain: As often as time permits remove the driving chain; scrub it clean with a stiff brush in a paraffin bath, let it drain, then place it in a bath of melted grease, leaving it in until the grease is set again, or let it soak in an oil bath as long as possible.

Wheel hubs The wheel hubs and bearings are filled with grease at the factory. Replace once a year. A few drops of lubricating oil forced through the oiler occasionally are always beneficial.

Front forks: Keep the front forks well lubricated. It takes but a few minutes, reduces wear to a minimum and increases riding comfort.

Control wires: Remove all control wires occasionally, and while keeping them vertical, pour thin oil at one end, until it runs right through.

Cleaning frame and cycle parts: A sponge, a bucket of water with 1/3 pint of paraffin, a chamois leather will thoroughly clean the machine and keep it smart in appearance.

Plated parts: Either keep them well greased with vaseline or a 50/50 per cent. mixture of oil and petrol, or clean them regularly with any good metal polish.

ADJUSTMENTS

Just a word of advice, never dismantle the power unit needlessly.

Timing of magneto and valves: When assembled at the Works, the timing gears are carefully marked as follows :

1. pinion on engine shaft marked 1 engages between the marks 11 on intermediate pinion.
2. Mark 2 on intermediate pinion meshes between the marks 22 on the clutch pinion.
3. Mark 3 on clutch pinion engages between the marks 33 on magneto pinion.

Behind the engine shaft pinion there is a smaller pinion marked 0 which meshes between the marks 00 on the cam wheel.

Tappet clearance: To adjust the tappet clearance shut both valves by bringing the piston against compression ; unscrew the lock nut on rocker arm, screw (or unscrew) adjusting bolt until correct clearance is obtained (.004" , .006" exhaust) then tighten lock nut again.

Oil pump: To *increase* the oil supply, turn small graduated knob on the right of the pump, in the direction of the arrow. To *decrease* the oil supply screw the knob in the opposite direction.

Lubrication is correct if a faint trail of blue smoke appears on suddenly accelerating in the lower gears.

Carburettor: The carburettor is carefully adjusted for normal running at the Factory. How-

ever, we supply three jets with each machine, to enable the rider to either reduce petrol consumption or obtain maximum speed.

Normal jet 40 : for normal running.

Small jet 39 : for hot weather or reduced consumption.

Large jet 41 : for winter or maximum speed.

Pilot jet: The carburettor is fitted with a pilot jet controlled by a milled screw on the carburettor side. To obtain a slow tick over when the engine is running in neutral and well warmed up, nearly shut the throttle and screw (or unscrew) the milled screw until the slowest *even tick* over is obtained.

Stretching of the carburettor wire controls can be corrected by the adjusting screws provided on the top of the carburettor.

Clutch: The clutch lever should have at least $1/4$ " play to insure that the clutch gets right home. A screw adjustment is provided on the crankcase for the purpose.

The tension of the clutch spring can be adjusted to very fine limits. To do this, remove the clutch cover on the crankcase, loosen the lock nut on the clutch shaft. The second nut on the shaft controls the spring tension. By screwing it, it diminishes. Always keep the spring at the *minimum* tension that will allow full clutch grip on hills, without slipping. Maximum spring tension makes declutching hard, places undue strain on the clutch and may cause it to drag.

Slipping clutch: If the clutch slips any of the following may be the cause ; check each in turn :

1. clutch wire too tight or sticking.
2. spring tension insufficient.

3. plate out of its notches or clutch wrongly reassembled after dismantling.

Clutch harsh or dragging:

1. Too much play at the clutch lever.
2. Spring tension too great.

Brakes: Keep the brakes adjusted so that they just fail to lock the wheels when full on. If the front brake becomes inefficient shorten the wire. A fly nut adjustment is provided for the rear brake.

Front and rear wheel spindles: The adjusting cones are inside the brake drums so that it is necessary to remove the wheels from the frame and the brake drum covers to effect the necessary adjustments.

Handlebars: Can be easily adjusted to any desired position by loosening the bolt on the handlebar lug.

Frame head: Loosen lock nut underneath the handlebar lug and tighten the cup by means of the hexagonal nut provided. Tighten everything up again.

Connecting links: Owing to the shock absorber device provided on the bottom links, the forks are scarcely affected by side play. However, side play can easily be taken up by screwing up the indented spindle nuts which control both the tension of the Ferodo discs of the shock absorber and the amount of lateral play.

The top links are adjusted by loosening the lock nuts on each side of the spindles and screwing (or unscrewing) the spindles themselves.

DISMANTLING AND REASSEMBLING

The present chapter will show the quickest and only way to dismantle and reassemble the various components of the F.N. motorcycle.

We have confined ourselves to such operations as may be carried out easily by anybody with the set of tools provided with the machine, but we strongly urge F.N. riders to avoid any unnecessary dismantling of their machines.

Front wheel: Place the machine on both stands. Remove the brake control wire, unscrew the lock nuts and counter nuts of the spindle, and then pull the wheel out, keeping it slightly on the slant.

To remove the spindle and ball bearings, unscrew the adjustable cone and pull the spindle out. When replacing the ball bearings use thick grease and do not forget that the adjustable cone is situated on the left, i.e. on the brake side. For reassembling, proceed inversely, and screw all the nuts right home.

Rear wheel: First remove the chain and brake rod, then proceed as for the front wheel.

Chain: Remove the safety spring link with the help of a screwdriver, or a pair of pliers, and pull out the half link. When replacing the safety spring link, make sure its open end faces a direction opposite to the travel of the chain. Keep both sprockets in line.

Front forks: Put the machine on the rear stand, and place a block of wood or box underneath the crankcase, so as to raise the front wheel clear of the ground. Remove the front wheel, and

(1) Remove the steering damper.

- (2) Loosen the handle bar lock nuts. Remove levers and pull handlebars out.
- (3) Remove the two top links and spindles.
- (4) Loosen the cotter pin holding the top links collar and remove the latter.
- (5) Unscrew the nut holding down the top ball race in the head.
- (6) Pull the whole of the forks downwards.

To reassemble, proceed inversely and tighten all nuts as you go.

Cylinder head: To remove the cylinder head, proceed as follows.

- (1) Remove exhaust pipe, carburettor and sparking plug.
- (2) Remove the rocker arms assembly bodily and the push rods.
- (3) Unscrew the five holding down bolts of the head. A light blow to unstick the washer and the head will come off easily.

When reassembling, make sure that the C and A washer is in good condition. Get the five holding down bolts hand tight first, then tighten each alternately by a quarter of a turn until screwed right home.

After the first run it is advisable to tighten all bolts while the engine is still hot.

Valves: The head being off the cylinder, it will be easy to remove the valves. To do this, place the head on a piece of wood that will press firmly on the valve heads, with the help of a couple of long screw-drivers compress the valve springs, and remove the two conical half splints. The valves will then come off easily.

Grinding in valves: Provided the valves are not pitted, but have their faces bright and well seated, do not grind them in unnecessarily. If they require grinding, the very best way for an

amateur is to use a little grinding paste, (sold by most garages) and a lot of elbow grease. Smear the seating of the valve with very little paste, add a drop of paraffin oil, replace valve in the head, clamp the valve stem with any appropriate tool, such as a hand vice, then turn the valve each way, keeping it tight on its seating. Raise the valve occasionally while grinding, and renew the paste as often as necessary, till a perfect seating is obtained.

The grinding operation being finished, wash the valve and valve seat thoroughly with petrol or paraffin, until no trace of grinding paste remains.

Before reassembling, examine the valve guides for wear. If the play between the valve guides and valve is excessive, renew the former. It is often advantageous to renew the valve springs (especially the exhaust springs) occasionally.

Decarbonizing: Any blunt tool (such as a screw-driver, or old file) will serve to remove the carbon deposit in the head, on the valves and piston. Finish off with a piece of emery cloth, until all parts are metal-bright. A good metal polish may be used with advantage for the piston, instead of emery cloth.

Decarbonizing should be carried out every 1500 miles, to keep the engine in perfect tune, but the machine will still give very satisfactory running after 3 to 4,000 miles without decarbonizing.

Cylinder barrel: While the cylinder head is off, remove the four holding down nuts, keep the piston at dead bottom centre, then lift cylinder barrel up.

Gudgeon pin: Remove the spring rings which hold it in position in the piston, and pull or push it out.

Piston rings: Well fitting piston rings are essential to good compression. If the rings are of

even brightness all over, it shows they are bearing evenly on the cylinder walls. If they show any black markings on their outside circumference, they need replacing.

When fitting new rings it is important to leave a gap at their extremities, to allow for expansion in the cylinder when hot. Place each ring successively in the cylinder and measure the gap. It should be between $1/2$ to $1^{m/32}$. If insufficient, file one of the ends carefully. Too small a gap results in a broken piston ring, when the engine gets hot.

Magneto:

- (1) First remove the make and break cover and ignition advance wire.
- (2) Unscrew the round plug on the gear cover on the other side of the machine.
- (3) Through the opening, unscrew the nut which holds the magneto driving pinion.
- (4) Loosen the nut of the band which holds the magneto in place, and pull the magneto out.

When refitting, keep in mind the instructions given in the Chapter "Adjustments" in relation to timing by guiding marks.

Clutch: (1) remove the flanged round cover below the magneto. Through the opening remove the nut and lock nut holding the spring and remove the latter.

- (2) Remove the valve lifting and clutch wires.
- (3) Remove the valve lifting lever.
- (4) Remove the driving side cover of the crankcase.

The clutch will then be uncovered, ready to pull out. When the clutch is dismantled, wash it thoroughly in petrol.

When reassembling care should be taken to replace the discs in their former position, that is, start by a disc with inside teeth, then one with outside grooves, and so on, alternately.

Monobloc: Removing the whole unit from the frame is a simple operation. Proceed as follows :

(1) Remove all fittings, viz, exhaust pipe, carburettor, exhaust and clutch wires, and rear chain.

(2) Unscrew the three bolts holding the crankcase to the frame, and then lift the unit out. When replacing, make sure that the three bolts are screwed right home.

Dismantling the unit: This operation, though easy enough, is important, in as much as it allows a thorough inspection to be made of the whole mechanism, flywheels, transmission, cam-wheels, shafts, gearbox, kick starter and bearings.

(1) Remove cylinder, magneto and all fittings.

(2) Remove the driving side cover as for clutch inspection.

(3) Remove all nuts and bolts holding the crankcase together.

(4) Lift up top half of casting.

Practically the whole of the mechanism is then opened to inspection.

When reassembling, make sure that the claws on the casting fit in their respective grooves. After having ascertained that all the parts fit properly in their right places, tighten all nuts and bolts, without however forcing them. A good jointing compound should be used to get an oil tight joint.

Special care must be taken that the gear lever fits well in the fork groove and that the timing of the different pinions is correct, as per instructions in Chapter "Adjustments".

SOME DEFECTS AND THEIR REMEDIES

The few remedies given hereafter, though very useful, are not necessarily infallible, and of a nature to allow the veriest novice to find immediately the true cause of the defective working of a machine, but they are a helpful guide. Skill in finding faults is a matter of experience and of knowledge of the machine.

The F.N. M. 67 C, motorcycle is a real first kick starter, provided it is kept in reasonable tune, that is : decarbonized at regular intervals, with a carburettor and magneto kept clean and adjusted, a good plug and reliable petrol and oil used.

Easy starting is a matter of knack, and every machine has peculiarities of its own which the rider will soon find out.

If the engine does not fire readily with the usual setting, or refuses altogether to start, check everything methodically. It is the best way to learn how to detect quickly the cause of the defect.

The sparking plug : Apart from inexperience with the machine, the sparking plug is the cause of most cases of difficult starting. If the sparking plug is dirty or damp, clean and dry it thoroughly.

Incidentally, such a state of the plug denotes either too much lubrication or too rich a carburation. To remedy the first, cut down the oil supply by adjusting the oil pump. To cure the second, adjust the pilot jet, or/and give more air to the engine, and/or fit a smaller main jet.

If both the lubrication and the carburation are correct, the central electrode of the sparking plug will be of a light brown colour and perfectly dry.

If the insulation of the plug is cracked, a new plug is necessary. To ascertain if the plug is working, connect it to the high tension wire and place the plug body on the cylinder or any convenient place on the casing, and depress the kick starter. If an intense blue flame jumps from the electrode, all well and good. If the spark is very weak or non-existent :

(a) Test the high tension wire as follows. Remove the H.T. wire from the plug and hold the terminal close to the engine. Kick start vigorously and if everything is O.K. a spark will jump from the terminal to the cylinder. If no spark occurs, or if no shock is felt while holding the H.T. terminal in the hand, the magneto is at fault.

(b) Examine the platinum points. If they are worn down to the steel, renew them. If they are merely dirty and pitted, clean them with petrol or a smooth magneto file if necessary, and reset the gap carefully.

(c) Make sure that the make and break is working properly and not sticking. If it sticks, ease the moving arm in the fibre bush.

(d) Examine the carbon pick-up brush at the magneto end of the H.T. wire, and clean the split ring with a clean rag.

(e) Make sure the rubber of the H.T. wire is not perished or has not been rubbed away, leaving the wire bare, and so causing short circuit through the frame.

If a spark occurs at the H.T. terminal, but not on the plug, a new plug is needed.

The sparking plug gives a good spark :

Turn your attention to the carburettor ; ascertain

1. If there is petrol in the tank.
2. If it reaches the float chamber and the jet.

If necessary dismantle and clean thoroughly. It may be full of grit or water.

Adjusting the carburettor: Do not "drown" the carburettor by over-flooding. Besides the danger of setting fire to the machine, it will be almost impossible to start the engine. If the carburettor has been over-flooded accidentally, open both the throttle and air lever and give a few kicks with the exhaust valve lifted, to empty the cylinder of excessive fuel.

In a general way, the better the tick-over, the easier is the starting. Therefore in case of difficult starting, begin by adjusting the pilot jet.

Sticky valves: If the magneto, sparking plug and carburettor function perfectly, and the engine does not start, the difficulty probably lays in a sticky valve, or too fine an adjustment, which does not allow the valves to seat properly when cold.

DEFECTIVE WORKING ON THE ROAD

The defects which affect the starting of the machine may also be the cause of a breakdown on the road. The remedies will also be those already stated.

Lack of power: Insufficient compression. One or both valves do not shut properly through bad adjustment, or they need grinding in.

Broken or worn out piston rings.

Bad quality Oil.

Cylinder head and piston dirty with excess of carbon.

Ignition lever not fully advanced.

The machine slows down: It may happen sometimes that after a few minutes fast run on full throttle, the machine slows down and nearly stops, but picks up again when the throttle is partially closed. It is a certain sign of an unsuitable plug unable to stand the heat. Change over to a plug of different type.

Bad slow running:

1. Slow running jet needs adjusting.
2. Air leak through worn valve guides or head gasket.
3. Defective sparking plug.
4. Dirty platinum points or excessive gap.
5. Badly seating valves.

Slipping clutch:

1. Want of play at clutch lever. There must be about $1/4$ " play at the clutch lever before it takes up the clutch pressure.
2. Clutch spring too weak. (See chapter on ADJUSTMENTS.)

The oil pump fails: The best thing to do is to call at the nearest garage and have it examined by a mechanic.

SPARE PARTS

Owing to an accident, or to normal wear, it may become necessary to replace some damaged or defective parts by new ones.

In spite of all advices to the contrary, makers spare parts are always cheapest in the long run. They are made skilfully, to fine limits, of the most suitable materials and especially treated for the work they will have to carry out.

Customers would be well advised, therefore, when requiring parts, to apply to our Spares Department, where a large stock of spares is held.

Parts will always be dispatched in the shortest possible time, and are guaranteed to fit exactly, and to be equal to the worn parts in workmanship and quality.

When ordering, always give type of machine, frame and engine numbers, and order spares by the denomination and number found in our spare parts lists.

ACCESSORIES AND VARIOUS PRODUCTS

Accessories and products of all kinds are on the market today. Some are excellent, some good, some useless and a few sometimes rather bad.

As those articles are offered daily to the motor-cyclists we deem it necessary to suggest to our customers, to consult us before adopting them for use, in spite of the testimonials that will no doubt be submitted with them.

Our advice will always be perfectly disinterested, and certainly most qualified as far as our machines are concerned.

It is our sincere wish to see all F.N. riders always completely happy and contented in the possession of their machines. Therefore we are always ready to help them with our advice to get the most out of their mounts.

