Clutch & Transmission

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Part One: The Clutch

THE PURPOSE OF THE CLUTCH IS TO REGULATE THE RELATIONSHIP BETWEEN THE FREEWHEEL, WHICH PROVIDES THE POWER OF THE ENGINE, AND THE TRANSMISSION, WHICH SHIFTS THE MOTORCYCLE. WHEN THE CLUTCH IS 'ENGAGED,' THE ENGINE FORCES THE TRANSMISSION TO ROTATE. WHEN IT IS 'DISENGAGED,' THE TRANSMISSION DOESN'T ROTATE, ALLOWING FOR THE RIDER TO SHIFT GEARS

The pressure plate is pressed by three springs so that it pushes together the driving plate and the driven plates, located within the cluch basket, causing them to rotate together.

The springs naturally push on the plates, and are forced to slacken by a push rod (not shown), which is pushed by a lever controlled by riders pulling on the clutch cable


imgPlay

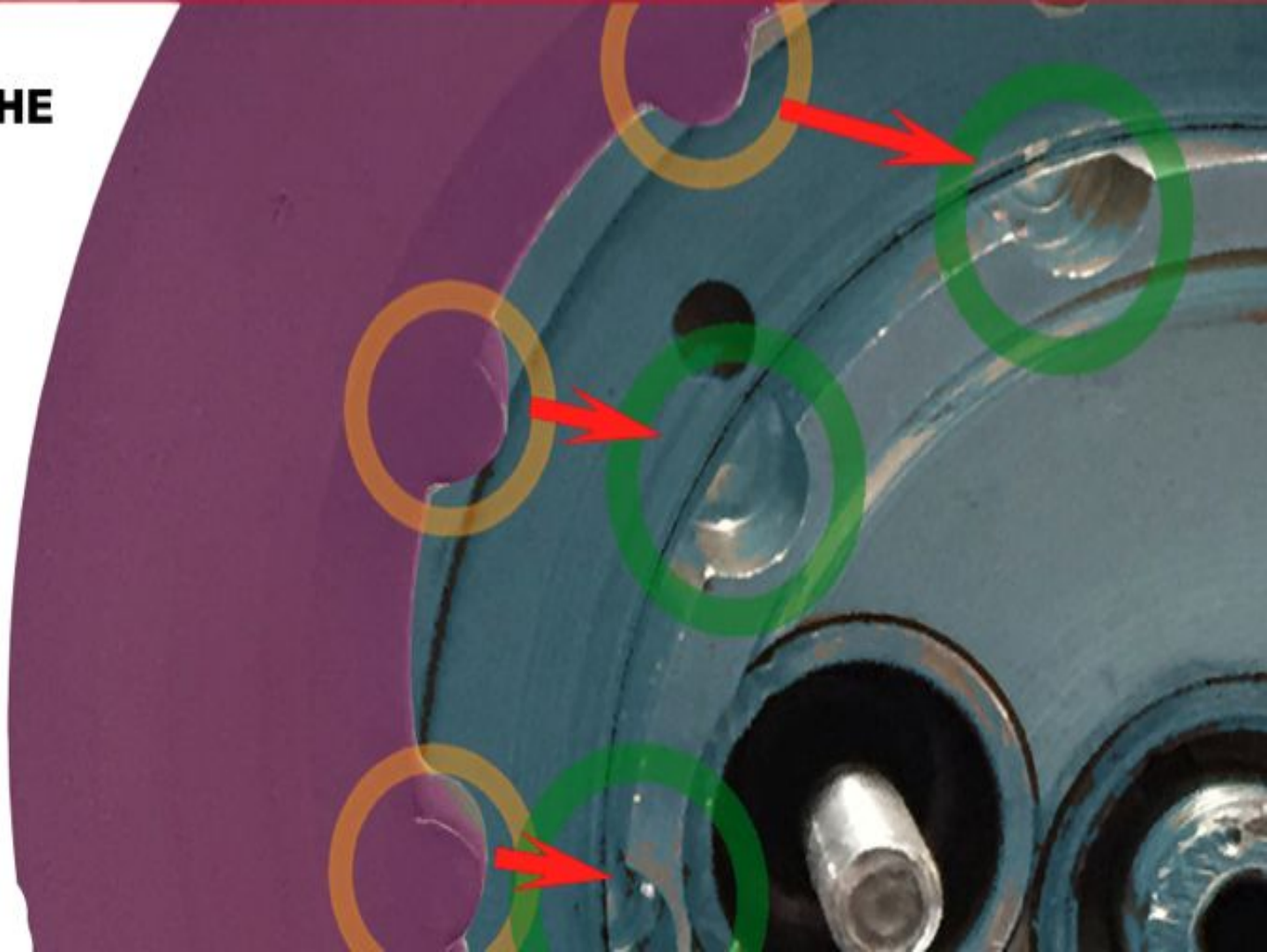
These six objects constitute the innards of the clutch basket: three ‘driving plate’ alternating with three ‘driven plates.’

Each driving plate has eight protruding teeth.

These teeth fit into the recessed teeth of the clutch basket.

This ensures that all three driving plates ALWAYS rotate with the clutch basket.

THE TEETH ON THE INSIDE OF THE DRIVEN PLATE FIT INTO THE RECESSED TEETH ON THE SHOCK ABSORBER, WHICH IN TURN ROTATES THE TRANSMISION (ON THE OTHER SIDE OF THE BOTTOM END)



Shock Absorber

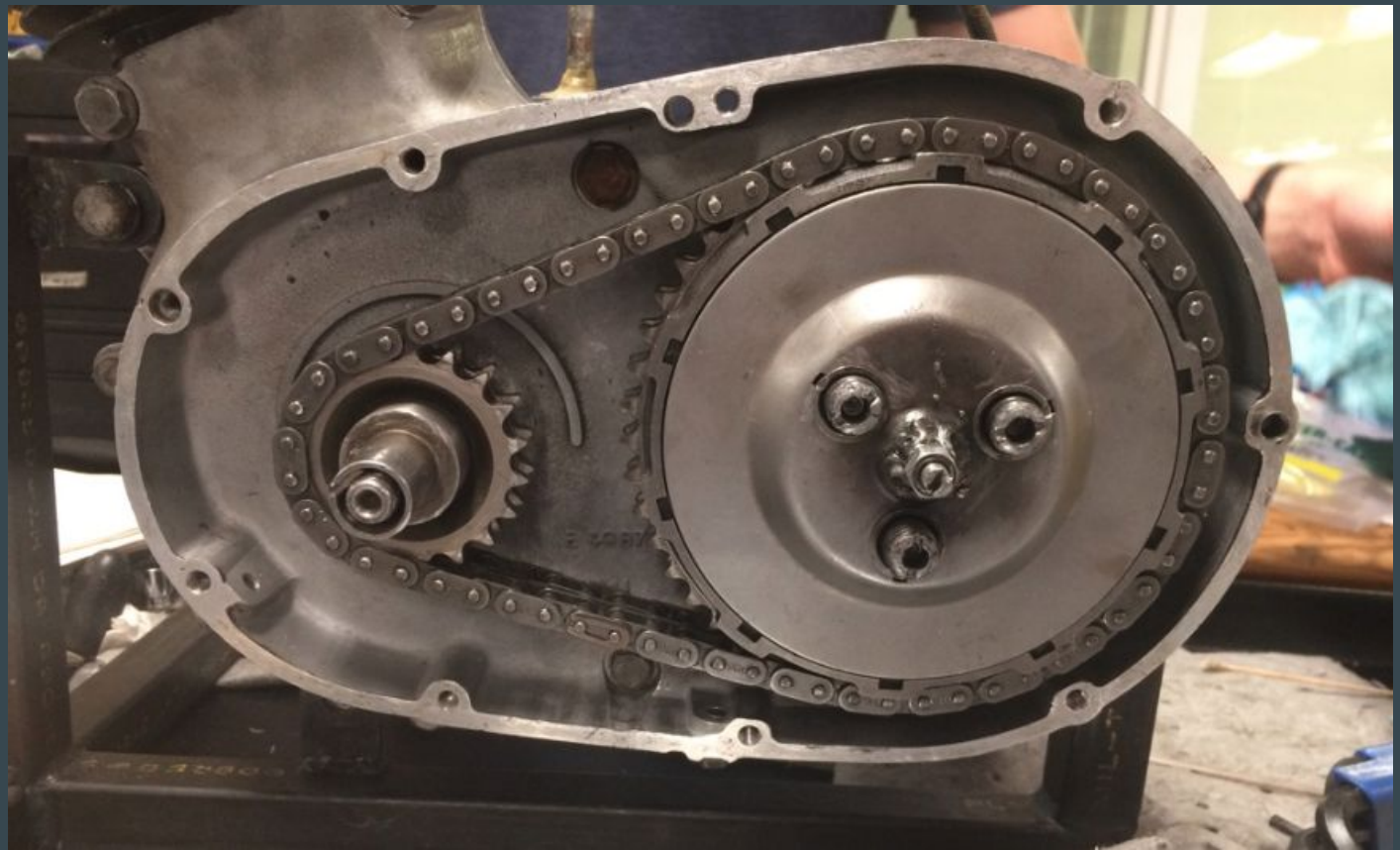
Acts as the base layer for the clutch basket.

The driving plate (at right) have four sections made of cork (one of which is outlined in purple).This means that when the springs on the pressure plate are in their default position of pressing the driving and driven plates *together,* the friction created by the cork quadrants on the driving plates *forces* all siz plates to rotate in unison.

HOWEVER!

When the rider pulls the clutch handle, a push rod relaxes the pressure plate and allows the transmission to STOP rotating, EVEN THOUGH the engine is still running

Clutch Side of the Bottom End

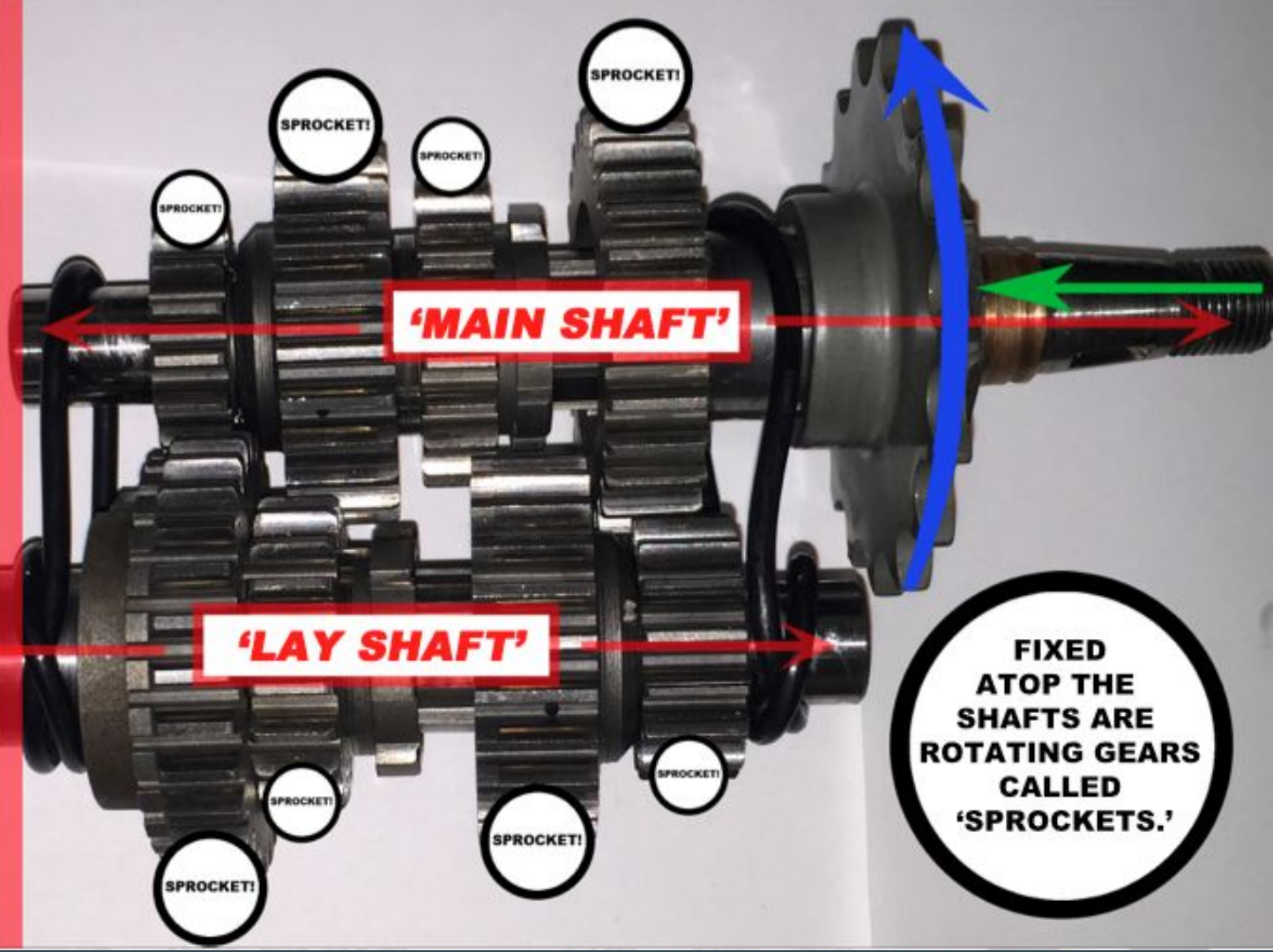


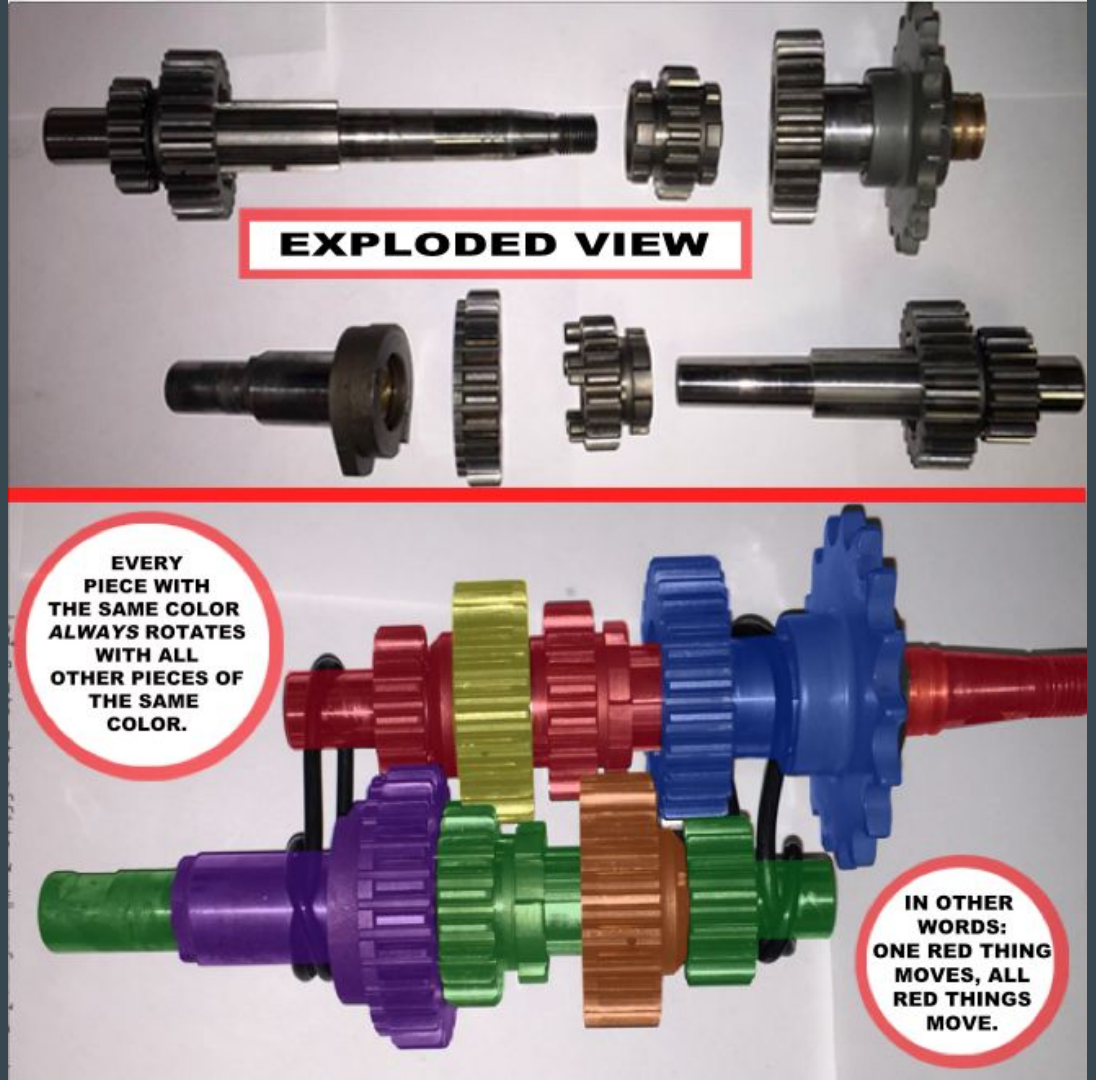
Part 2: The Transmission

THE JOB OF THE TRANSMISSION IS TO SHIFT THE MOTORCYCLE.

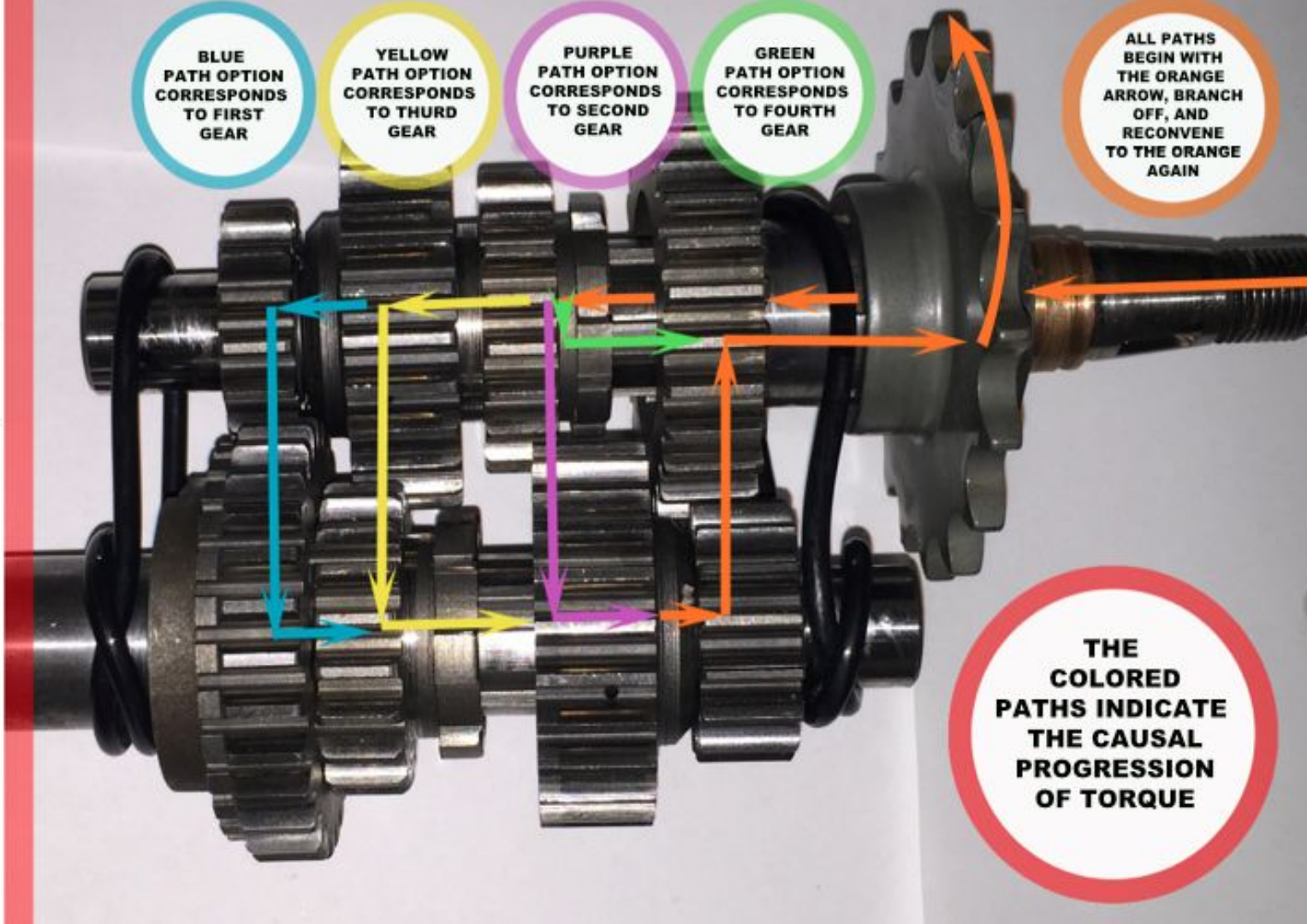
TORQUE ENTERS THE SYSTEM VIA THE GREEN ARROW, WHICH IS *INDIRECTLY* POWERED BY THE FLYWHEEL VIA THE CLUTCH BASKET.

TORQUE EXITS THE SYSTEM VIA THE RED ARROW, WHICH IN REALITY HAS A CHAIN ATTACHED TO IT THAT LINKS UP WITH AND MOVES THE REAR WHEEL.




EXPLODED VIEW
EVERY PIECE WITH THE SAME COLOR *ALWAYS* ROTATES WITH ALL OTHER PIECES OF THE SAME COLOR.
IN OTHER WORDS: ONE RED THING MOVES, ALL RED THINGS MOVE.

WHICH GEAR IS SELECTED IS DETERMINED BY WHICH SPROCKETS ARE 'ENGAGED,' WHICH CREATE PATHS THE TORQUE FOLLOWS.



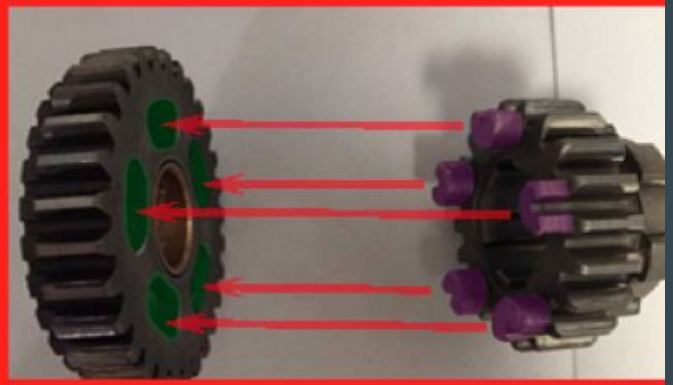
THE **SECOND SPROCKETS** ON BOTH THE MAIN SHAFT AND THE LAY SHAFT CAN MOVE RIGHT OR LEFT AND FIX THEMSELVES INTO THE GEAR DIRECTLY ADJACENT TO THEM.

EACH OF THE TWO HAVE GROOVES ON EITHER SIDE, CALLED **SPLINES**. THESE FIT INTO THE LARGER SPROCKETS ON EITHER SIDE, A PROCESS CALLED 'DOGGING.'

WHEN THE ONE SPROCKET IS DOGGED TO ANOTHER, THE TWO SPROCKETS ARE LOCKED TOGETHER, WHICH MEANS THEY ROTATE AT THE SAME RATE.

SECOND SPROCKETS!

THIS IS WHAT THE SECOND GEARS LOOK ON THEIR LONESOME

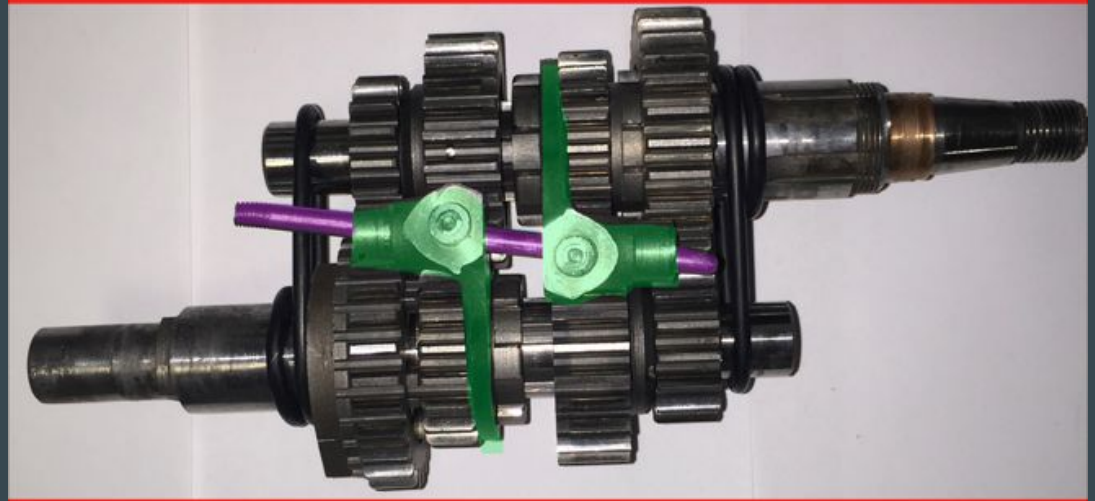


THE EXTERIOR TEETH ON BOTH SIDES OF THE SECOND GEAR FIT INTO THE RECESSED TEETH ON THE ADJACENT SPROCKETS

THIS IS WHAT THAT PROCESS LOOKS LIKE.

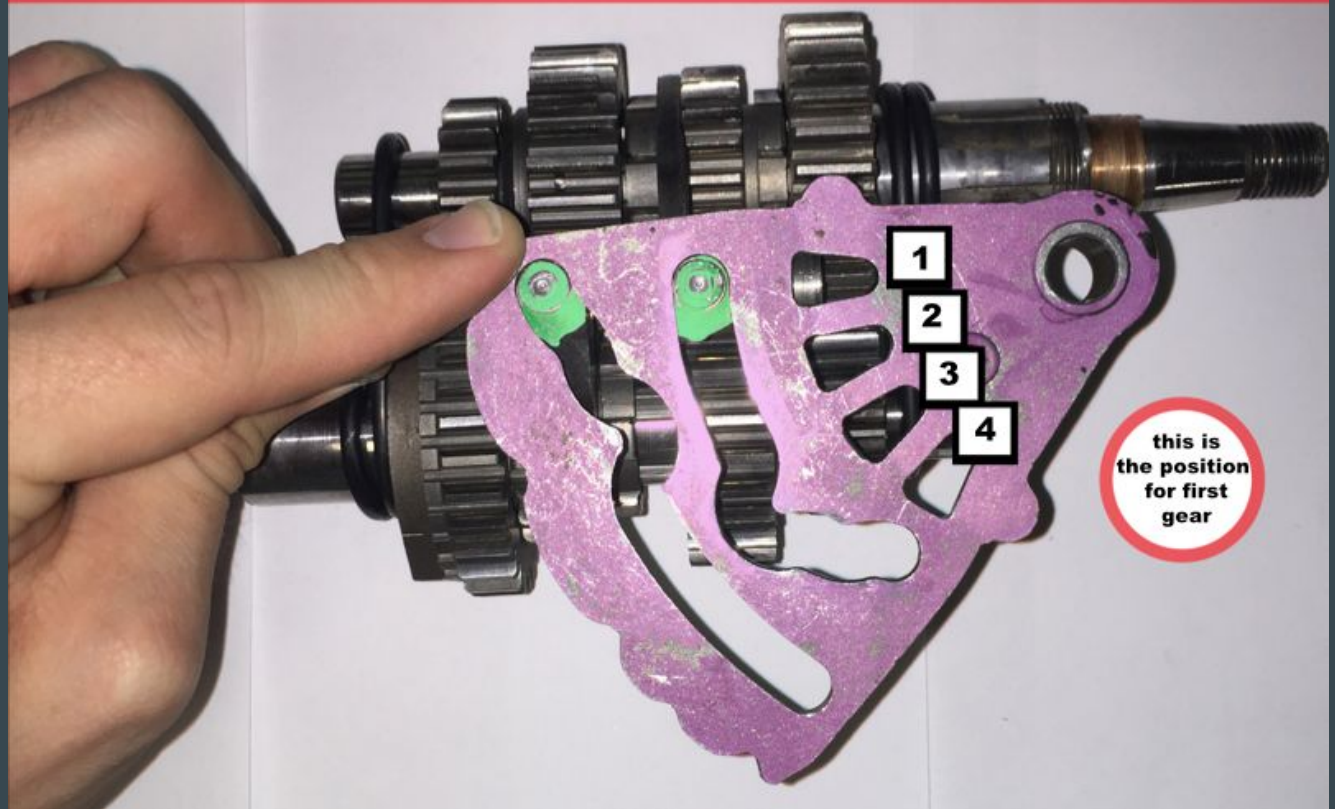
WHEN THE GEARS ARE 'LOCKED' TOGETHER LIKE THIS, THE TWO SPROCKETS ROTATE TOGETHER

These are the selector forks. They fit above the main and layshaft, and fit into the sides of the second gears on each shaft. They control the movement of the second gears.

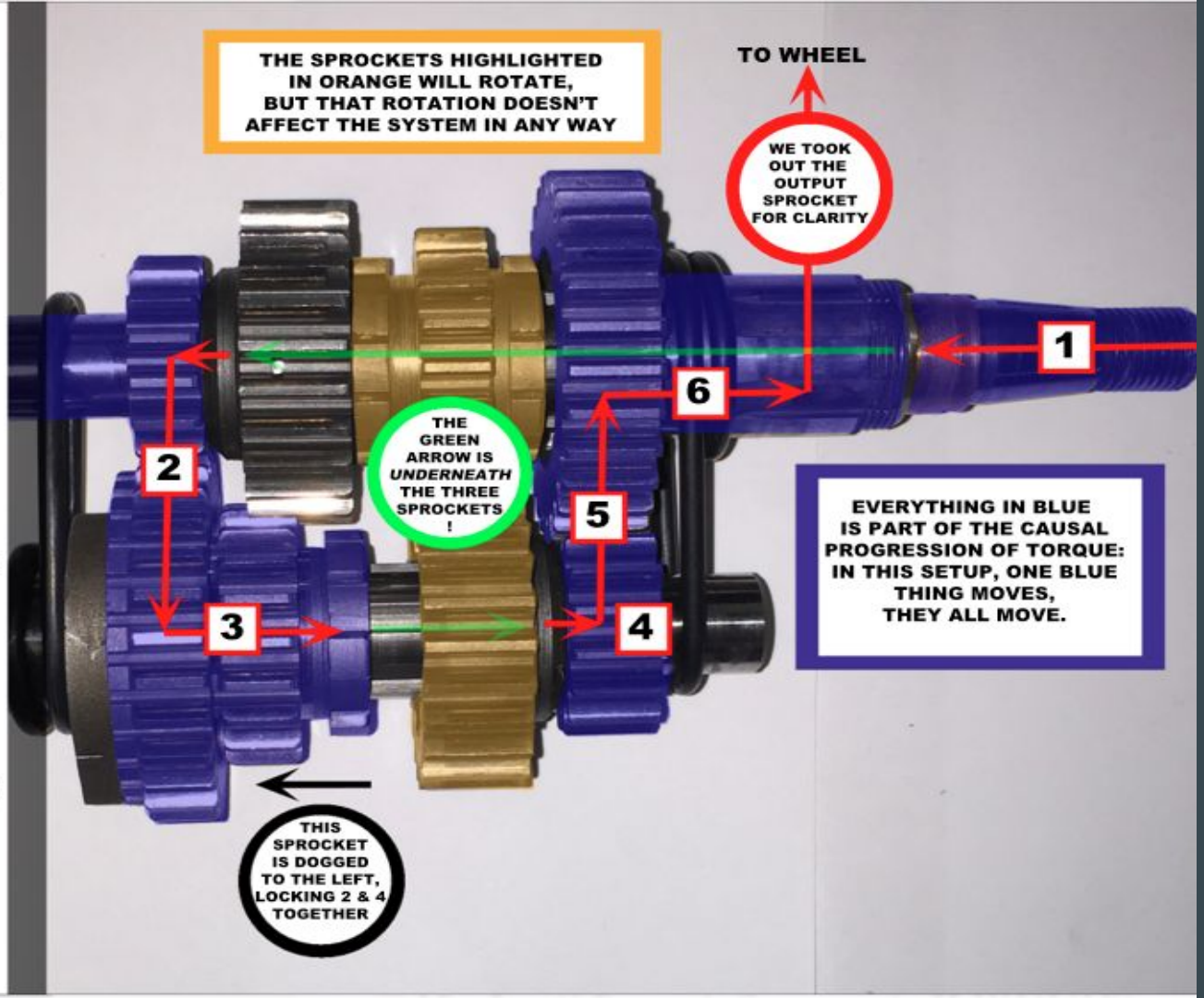


This is what the selector forks look like in place. The rod is attached to the inside of the engine case, ensuring that the forks move along the same, consistent line.

The compact plate moves the two selector forks. It has two chanels that move each fork individually. The compact plate is moved by the gearchange quadrant (not shown), which as two prongs that fit into the numbered holes. The gearshifter pedal moves the gearchange quadrant.



1:
THE TORQUE ENTERS THE MAINSHAFT AND TRAVELS TO THE FIRST SPROCKET,
2:
GETS TRANSFERED TO THE FOURTH SPROCKET ON THE LAYSHAFT,
3:
WHICH IS LOCKED TO THE SECOND SPROCKET OF THE LAYSHAFT,
4:
WHICH ROTATES WITH THE FIRST SPROCKET ON THE LAYSHAFT,
5:
WHICH ROTATES THE FOURTH SPROCKET ON THE MAINSHAFT,
6:
WHICH IS CONNECTED TO THE OUTPUT SPROCKET.



Gear	**Mainshaft** *(# of teeth)*	**Layshaft** *(# of teeth)*	**Ratio**	**Total Ratio**
1	16	29	16/29	256/841
2	20	25	4/5	64/145
3	25	20	5/4	20/29
4	29	16	29/16	1

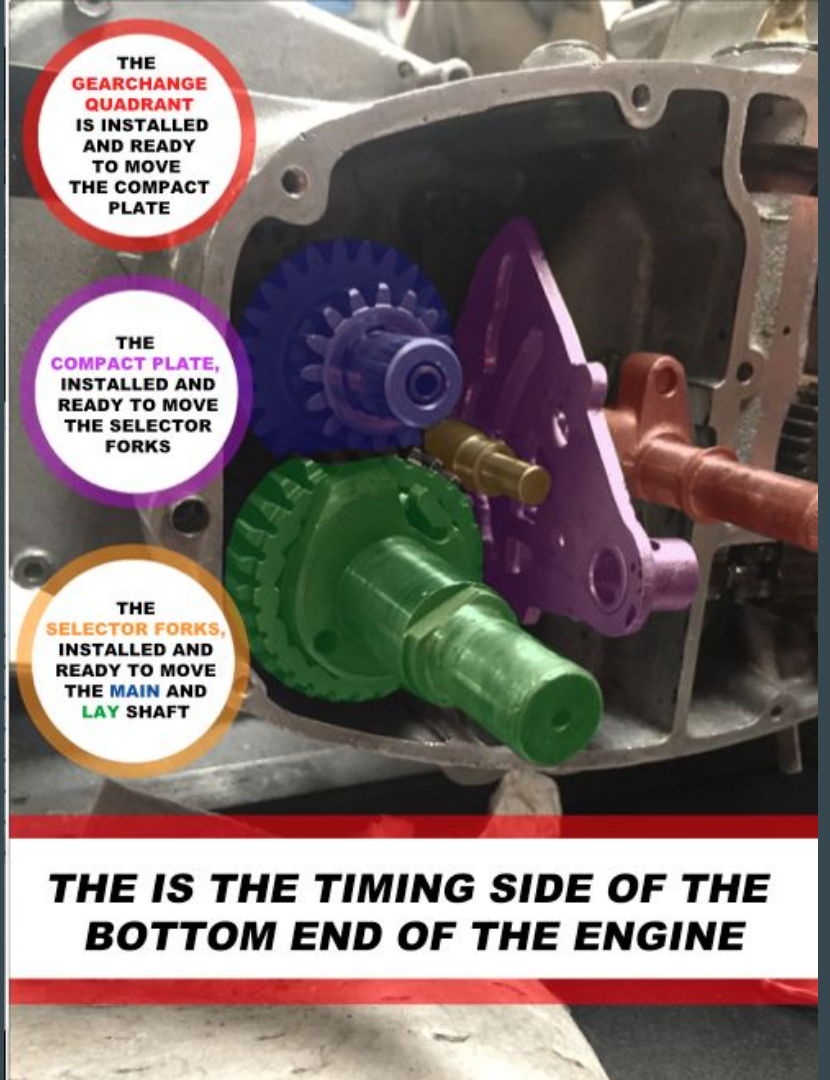
Total Ratio = the # of spins that the clutch basket will rotate per one rotation of the output sprocket

Engine sprocket = 19T
Clutch basket = 48T
Gearbox = 17T
Output Sprocket = 54T

Rear Wheel Specs: diameter = 18 inches
circumference = π(d) = 56.55 in.

Output Sprocket to Gearbox: 54T : 17T → clutch rotates at about ⅓ the speed of the gearbox
Engine to Clutch: 48T : 19T

Part 3 : Assembly




The lever of the clutch operating lever assembly is pulled by the clutch cable (on the handle bars) and pushes the pushrod, releasing the clutch
The kickstarter lever (in reality outside the next casing) is attached to the end of the layshaft
The gearchange pedal (in reality outside the next casing) is attached to the end of the gearchange quadrant, and is moved with the foot