

A STUDY ON THE LOOPFRAME 4-SPEED SHIFTING PAWLS.

I have been working on the 4-speed transmission of a LoopFrame V7-Special. Searching a variety of Internet and library resources, I have found confusion and inadequate instruction regarding the installation of the spring-loaded pawls which drive the shift drum for changing gears. I decided that there must be an engineering or empirical way to determine how the parts are to be installed. I set out to study the positions and contact surfaces of each of the parts and this is a report of my findings.

EARLY VERSION

Part of the problem arises because the very earliest version of the 4-speed uses different pawls and a different camplate than the more common Later versions. The Early version uses two identical and symmetrical pawls with a single part number from Guzzi. They have a generally rectangular shape and a complete, flat surface both top and bottom. Can't install those backwards or upside down. The matching camplate has cutouts where the end walls of the cutout are splayed away from each other and neither end is aligned radial to the shift drum's pivot shaft. Some manuals and some Internet reports have pictures of these pawls in the installed position. This leads to confusion because one can achieve the same visual appearance with the Later pawls by installing them upside down.

LATER VERSION

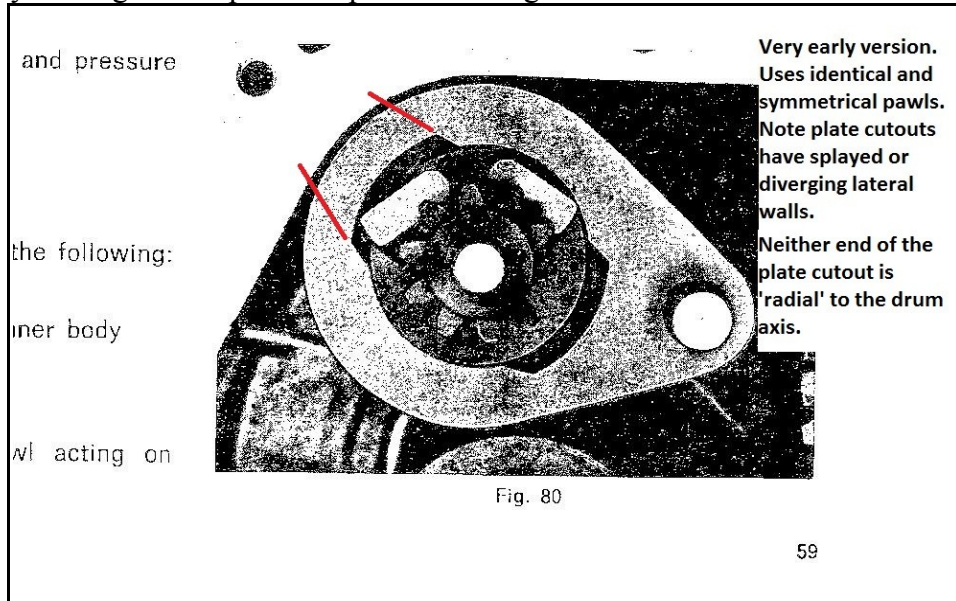
The more common Later 4-speed transmission uses two pawls which have an angular notch ground halfway into one end and the two pawls are mirror images of each other. Two separate part numbers from Guzzi. You must use one of each shape. Also, the mating camplate now has the rotational travel limit end of each cutout oriented so that it is directly radial to the shift drum pin. The pawls look vastly different if you install them with the ground notch DOWN or with the ground notch UP. If installed with the ground notch DOWN, they look exactly like the Early version pawls and therein is the confusion.

ORIENTING THE LATER VERSION PAWL PAIR

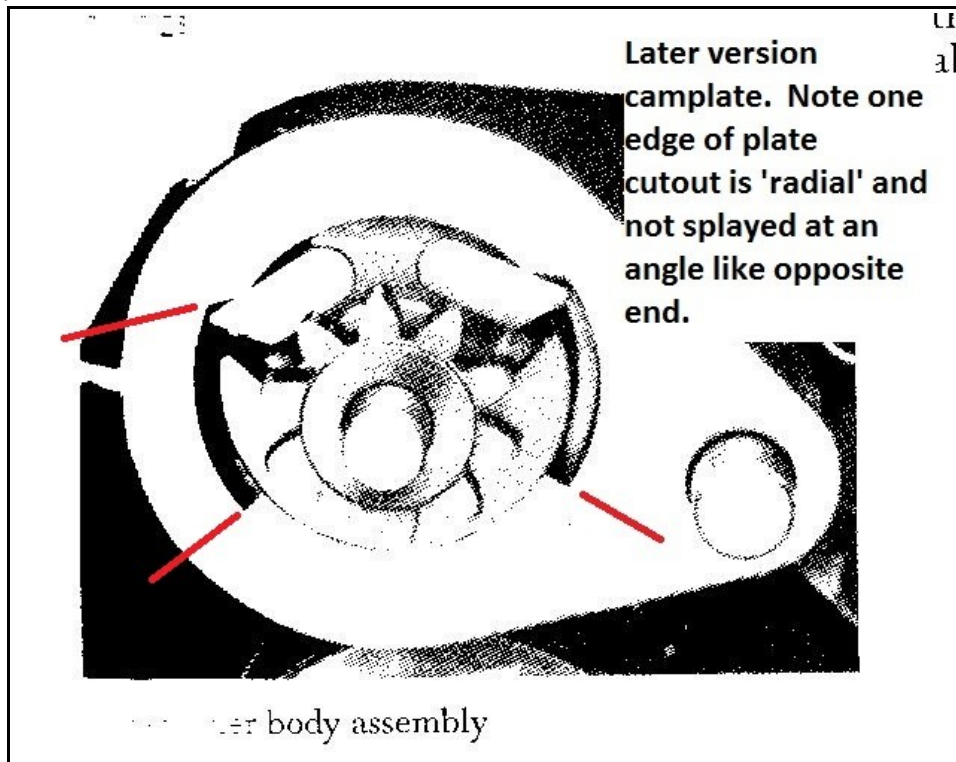
So, how do we orient this 'notch' end of each spring-loaded shift pawl? Normally, the transmission is assembled while it is standing vertically on its nose on the bench. I will refer to UP and DOWN as a reference to the transmission in this repair position on the bench. IN and OUT will relate to the pivot axis pin of the shift drum. My findings verify that the correct orientation of each pawl is with the ground notch on the UP and IN directions. Other orientations 'might' work the transmission but would ultimately lead to premature damage and failure of parts. The notch UP and notch IN position is the only orientation which shows logically engineered contact between the parts.

PHOTOS AND RESOURCES

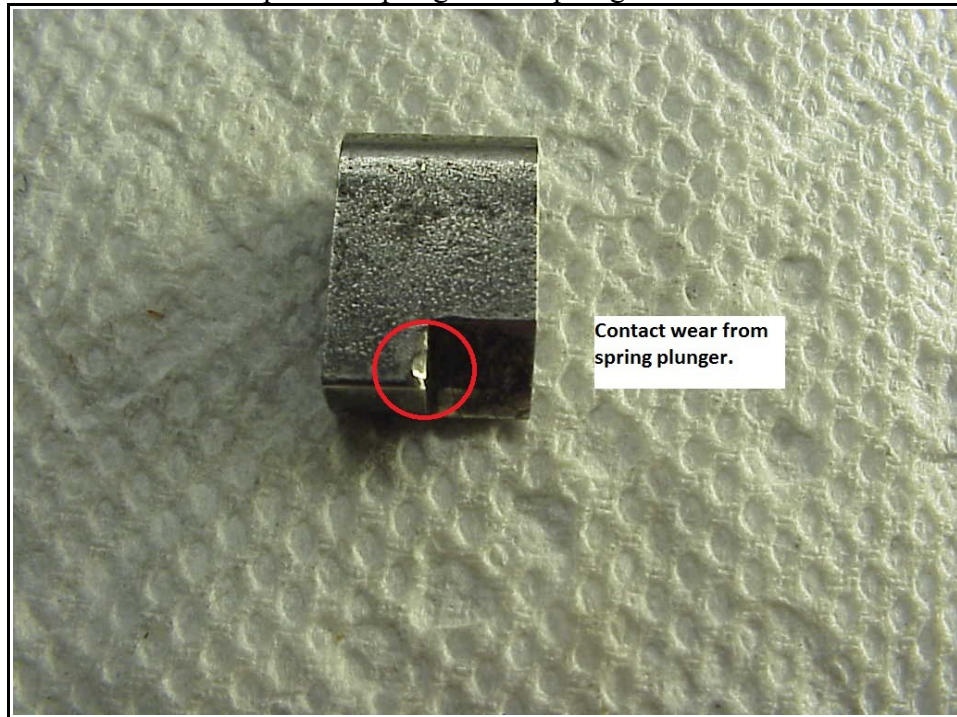
The very Early version with identical symmetrical pawls and with camplate cutout ends splayed apart. Note the mostly rectangular shape of the pawl with no ground notch.



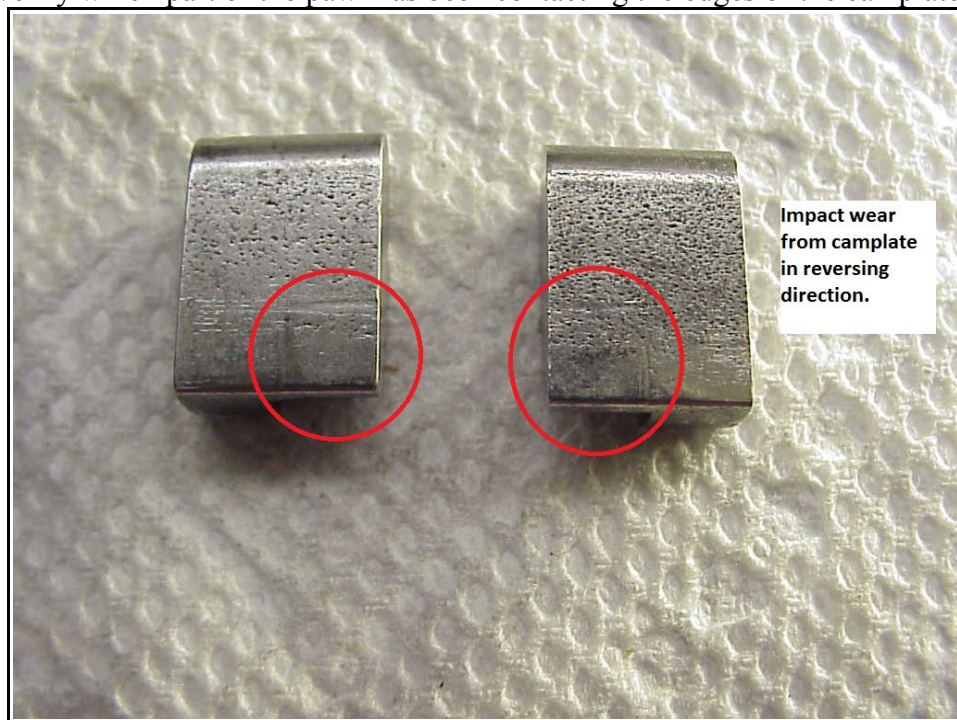
The more-common Later version notched pawls with the travel limit end of the cutout aligned radial to the shift drum.



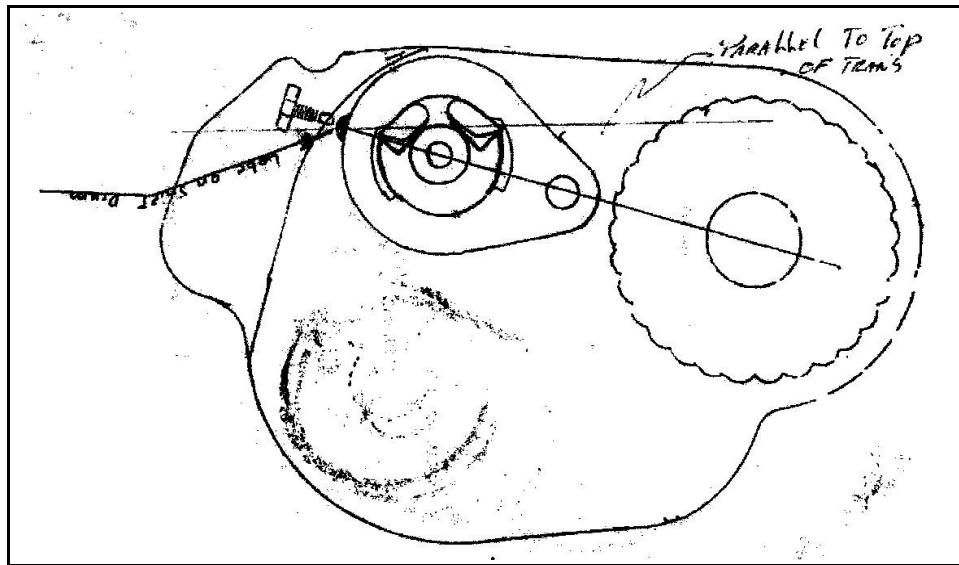
Incidental contact wear from the tip of the spring-loaded plunger.



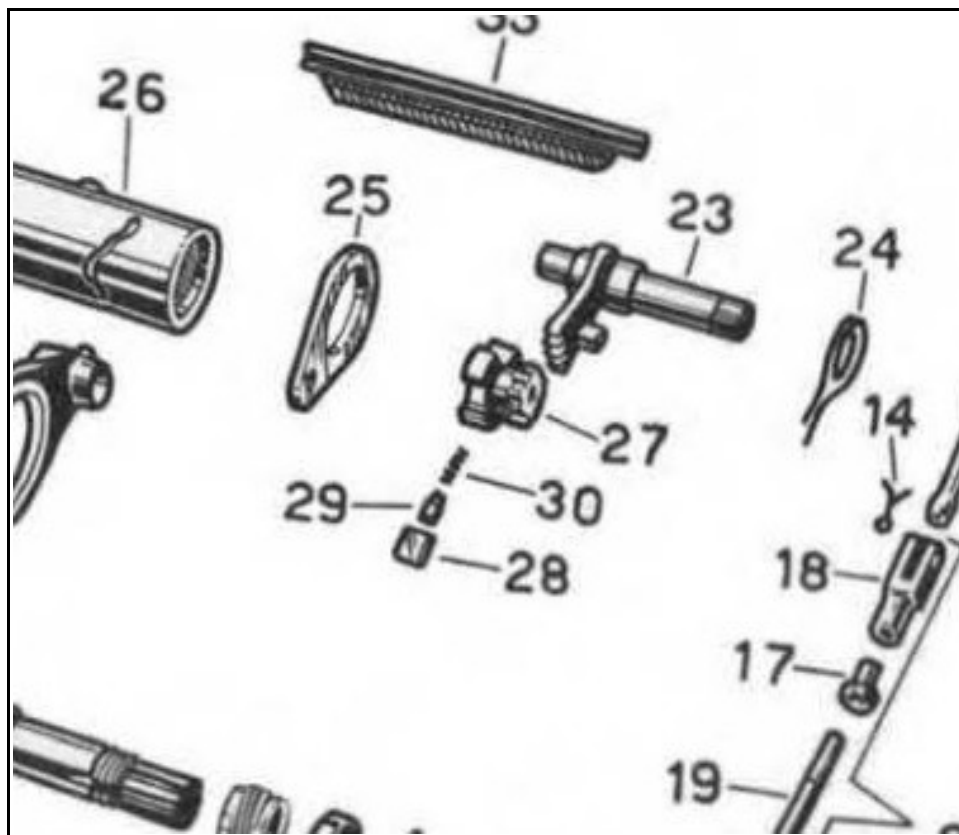
Incidental contact wear from the pawl's backside contact with the closing end of the camplate cutout. This helps to verify which part of the pawl has been contacting the edges of the camplate.



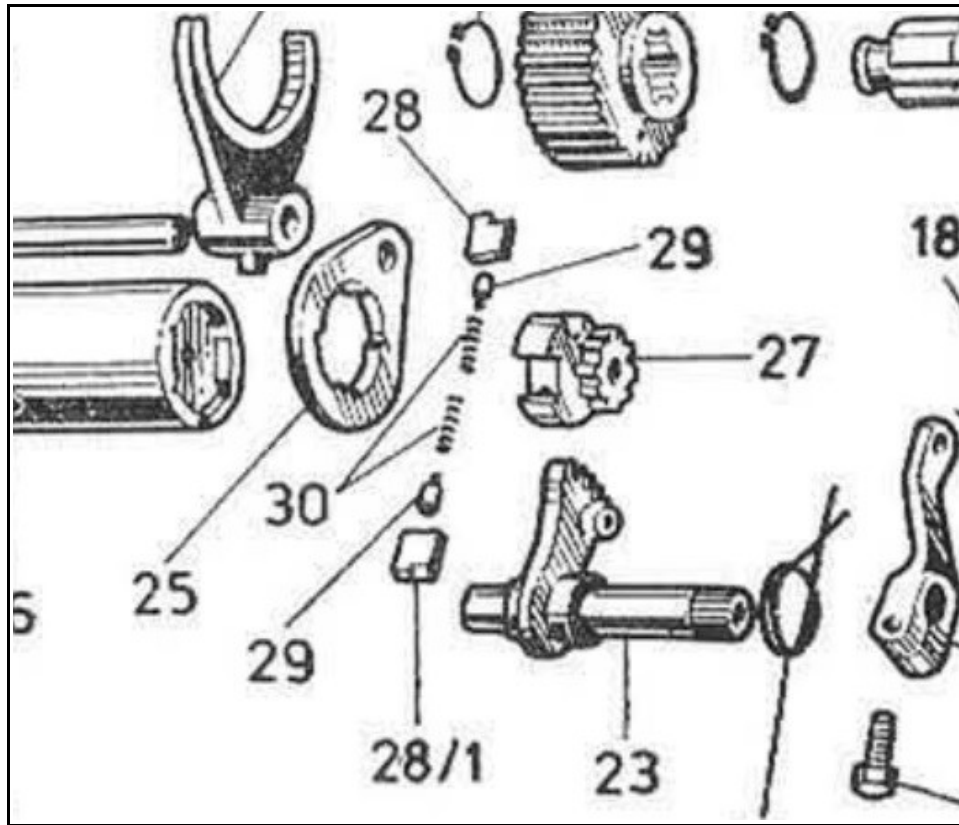
An alignment diagram from the late BJ Schwartz, a highly respected mechanic of the early import Guzzi.



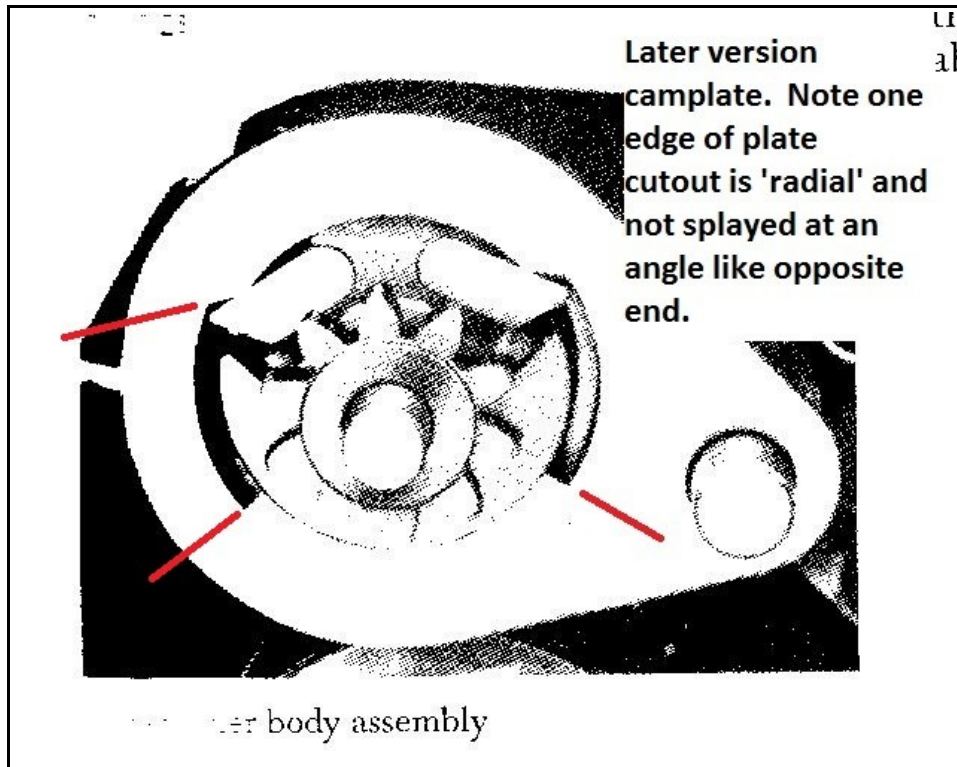
Parts explosion from the Early version showing only one part number for two identical, un-notched pawls.



Parts explosion from the Later version showing two mirror image pawls with ground notches. Note that the orientation of these pawls drawn in this picture would be UP and OUT. That is incorrect. The pawls should be installed UP and IN.



An image from the CHILTON manual showing the Later version mirror image notched pawls and the later camplate with the travel limit ends radial to the shift drum. This is the correct installation.



A reference from Guzziology where Dave Richardson alludes to the symmetrical shape of the Early version pawls. The narrative confuses when it speaks about "... once assembled and in place, the notches cannot hardly be seen." I believe that if installed correctly, the angular notches are actually quite visible.

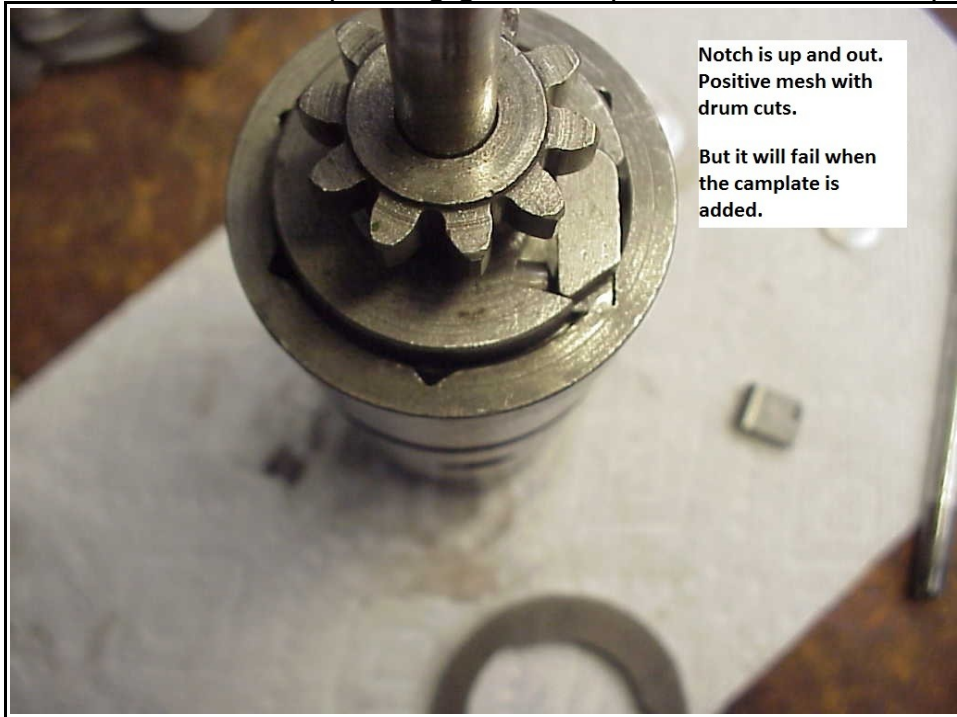
The shift detent mechanism can give me more fits during assembly than the rest of the transmission combined. On all but the earliest V7s, each selector pawl (1223 7900) has a notch that is assembled against a spring and plunger. In other words, once assembled and in place, the notches cannot hardly be seen. I find it best to leave this part of the assembly until all other components are in the transmission case and I'm ready to install the back cover. This is because any jarring of the transmission will likely send the detent pieces flying. Worse yet, because the notches in the pawls don't seem to align with the spring plungers, they tend to slip out of alignment towards the back cover, making them more likely to fly apart. I assemble the entire detent mechanism in my hand with the pawls purposely mis-aligned towards the shift drum so as to eliminate their tendency to slip backwards. Then, while holding down the pawls with my fingers, I place the detent mechanism into its receptacle on the back of the shift drum but only about half way in. That way there is room for the purposely out-of-alignment pawls. I leave it to the transmission's back cover to push the detent mechanism into position. This way there's a better chance that nothing will fall out of position - as long as the cover is installed gently (with small taps with the dead-blow hammer if necessary).

As far as positioning the shift detent in the correct position, just follow the picture in the factory manual. It correctly shows the detent positioned symmetrically left-to-right with the sprung plungers pointing to 10:00 and 2:00.

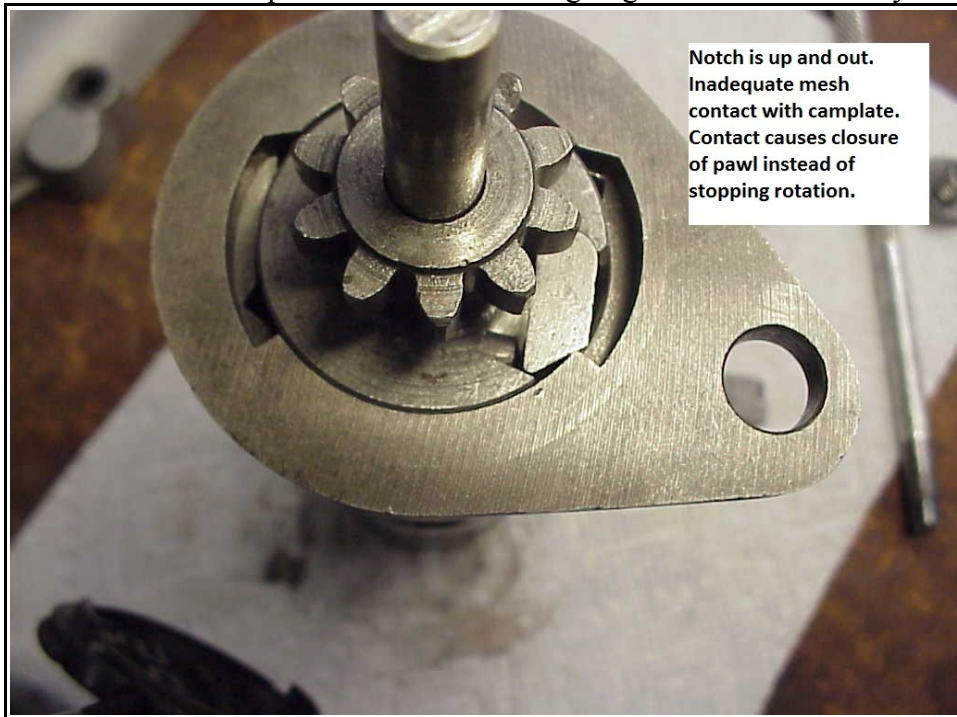
In the *main part* of the factory service manual (1292 0120), the picture showing the orientation of the steel plate that surrounds the detent mechanism is backwards. It can only go in two ways so do the opposite of what the book says. A correction of the picture exists in the *back* of most versions of the manual.

One last suggestion specifically for the earliest four-speeds: if the spring on the input shaft is made of round material (1221 1500) it would be best to update it to the later square-sectioned spring (1321 1500) as used on all later 750-1000 (but not 1100) big-twin transmissions.

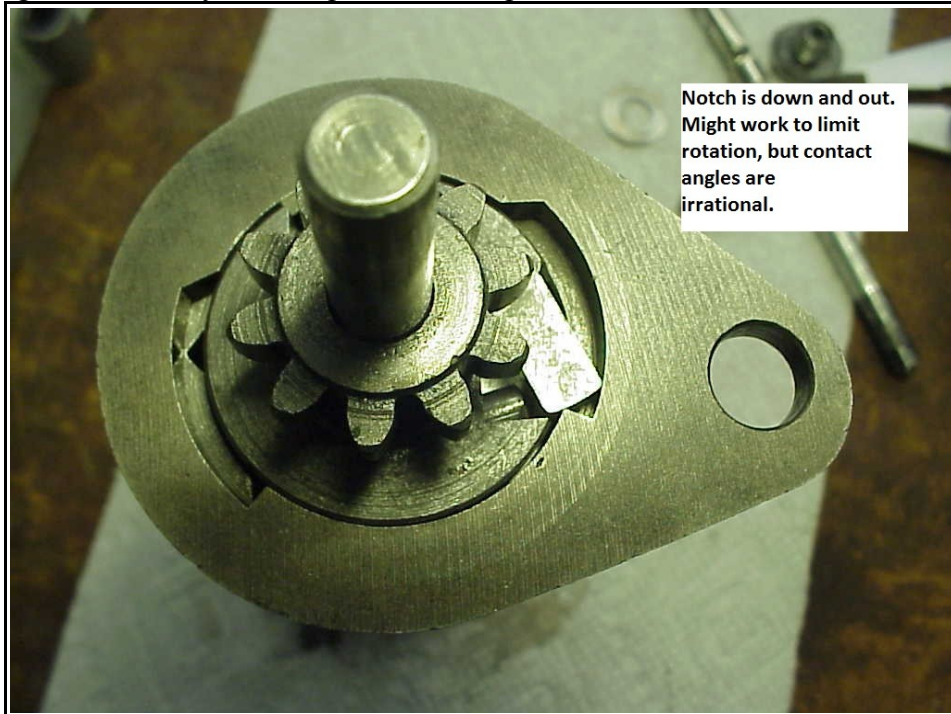
Pawl with the notch UP and OUT. The pawl engages the receptacles of the drum wall quite well.



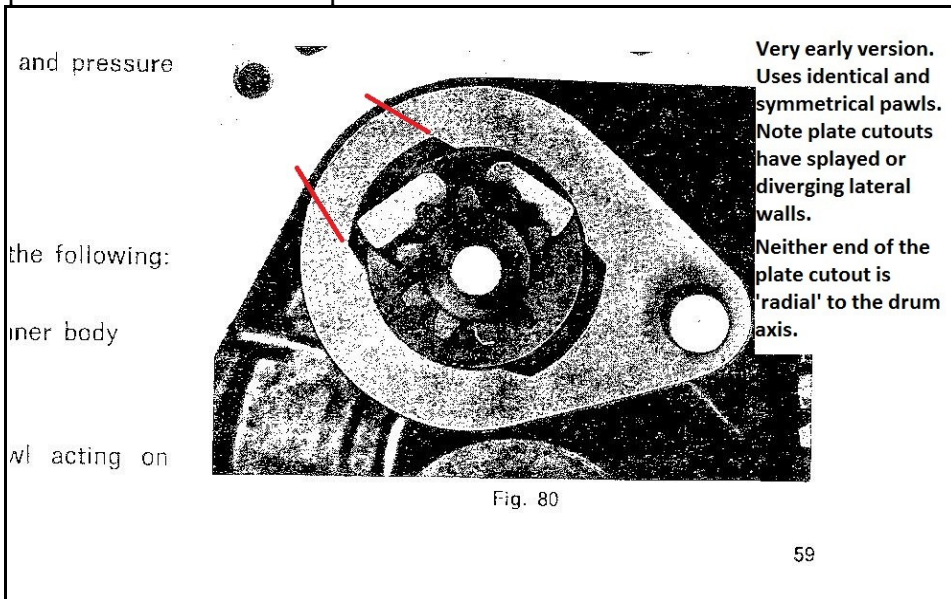
Pawl with the notch UP and OUT. Now that the camplate is installed, there is virtually no contact with the travel limit end wall of the camplate cutout. This isn't going to function correctly.



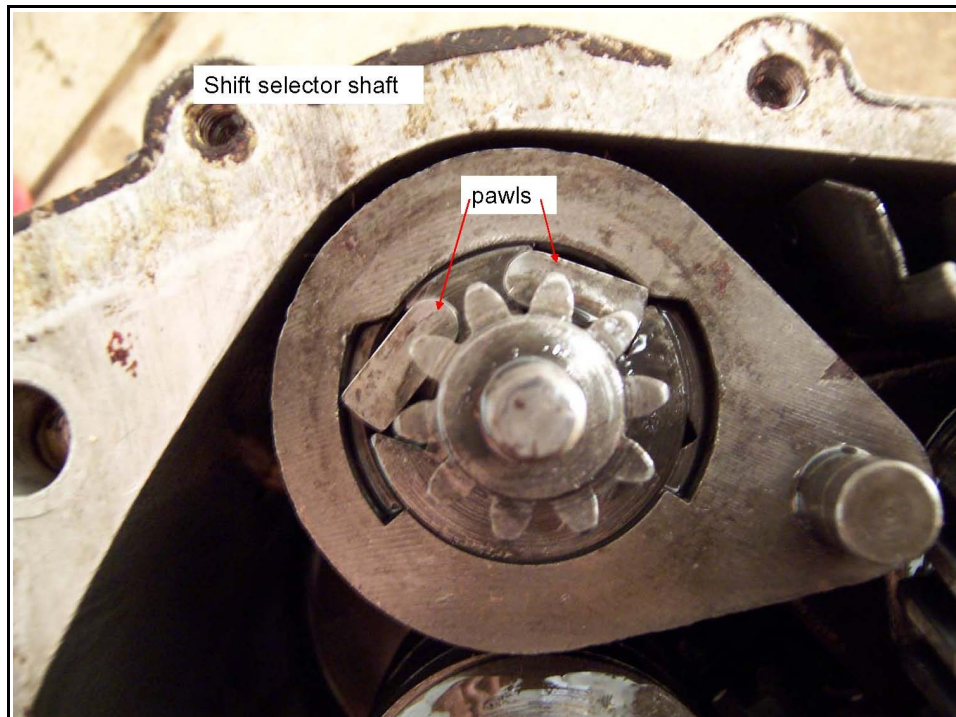
Pawl with the notch DOWN and either IN or OUT. This 'might' function, but not for long. The off-angle contact between the end face of the pawl and the travel limit end of the camplate cutout is surely going to damage parts in the long run. Note how this pawl installed with the notch DOWN makes it appear like images of the Early version pawl and camplate.



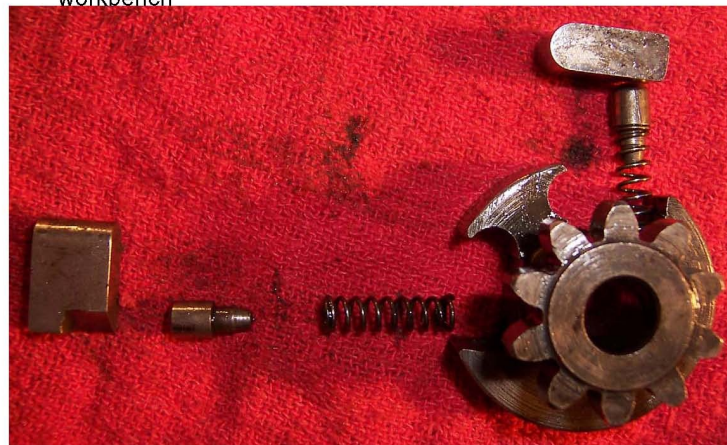
An image from the PREMIER importer service manual showing the Early version pawls and camplate. likely this camplate has been installed upside down.



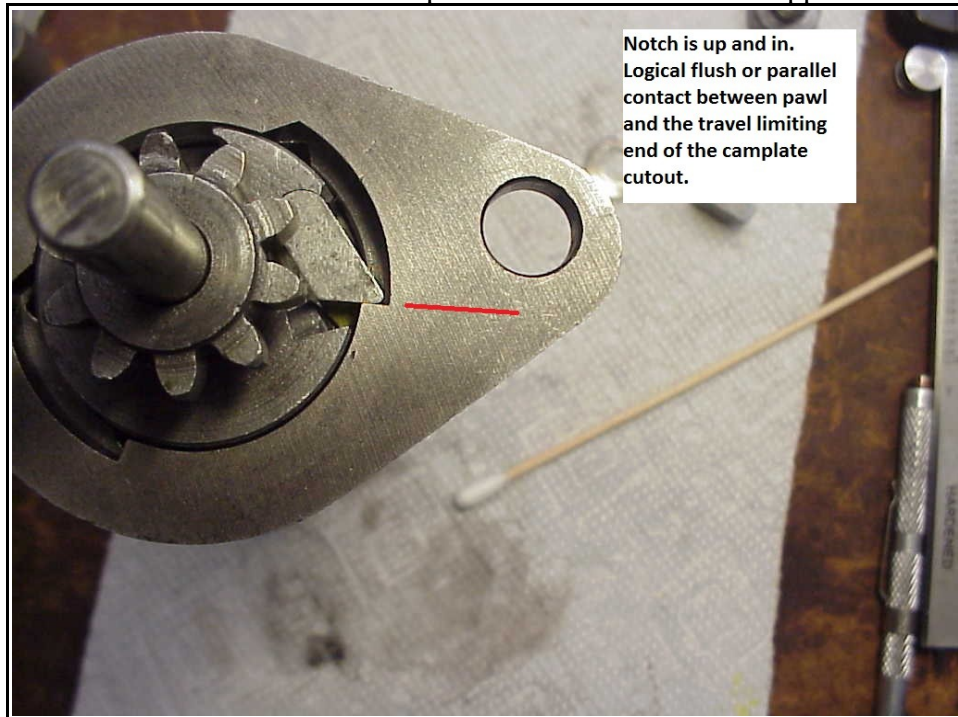
Two images taken from Greg Bender's website which show the Later, notched pawls but installed upside down and backwards. The notch must be UP and IN.



Selector inner body - the cause of much transmission rebuild anxiety; small spring-loaded parts that could sail into a dark corner never to be found. In reality the springs aren't quite that strong, although they will move the parts across your workbench



In summary, this is the way you want the notched pawl to sit within the shift drum and its covering camplate. The notch is UP and IN. Mirror the position for the one on the opposite side.



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