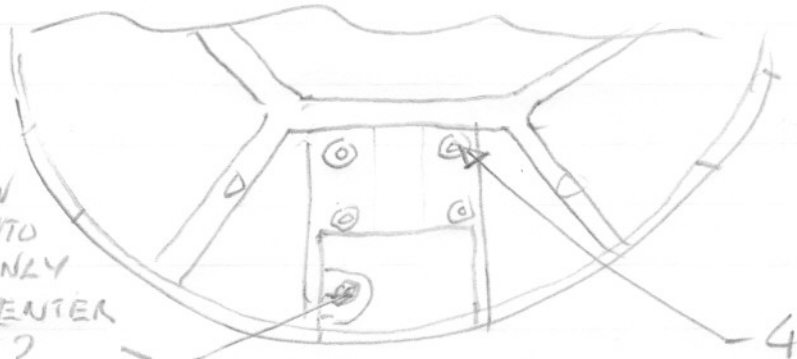
ZEISS MICROSCOPE

4291104

20-11-06 PROBLEM - FINE TRAVERSE NOT WORKING.

(A) REMOVED 5 - 4MM PAN HD SCREWS FROM UNDERSIDE OF BASE. TO RELEASE THE VERTICAL STAND.

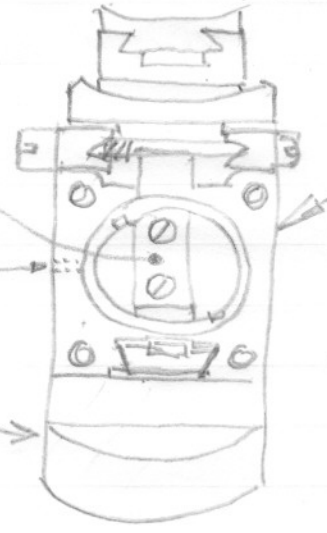


NOTE THIS SCREW IS TAPPED INTO THE BASE ONLY & DOES NOT ENTER THE V/STD. ? EARTHING SCREW ?

1-4MM X 5 P/H & PLAIN WASHERS-2

4-4MM X 13MM LG PAN HD & LOCK WASHERS

(B) THE UNDERSIDE OF THE V/STAND:-



RISE & FALL BLOCK ASSY. SEE NOTE 1 PAGE 7

LOCKING SCREW TO RING NUT

V/STD

THIS SUB-ASSY. DOES NOT SLIDE OFF OF THE V/STD. AT THIS STAGE, AN END STOP NOT OBVIOUS PREVENTS THIS.

(C) THE OPPOSITE END OF THE ABOVE S/ASSY:-

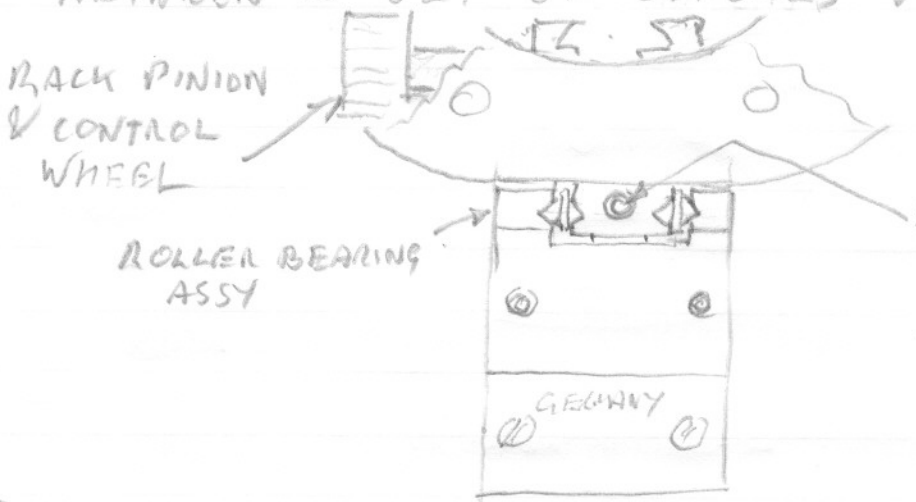
2-3MM X 6MM CHEESE HD. SCREWS

THIS PLATE WAS REMOVED & PROVED TO BE THE END STOP, THUS ALLOWING THE S/A TO BE REMOVED FROM THE V/STAND. :-

RACK ON V/STAND NOW EXPOSED.

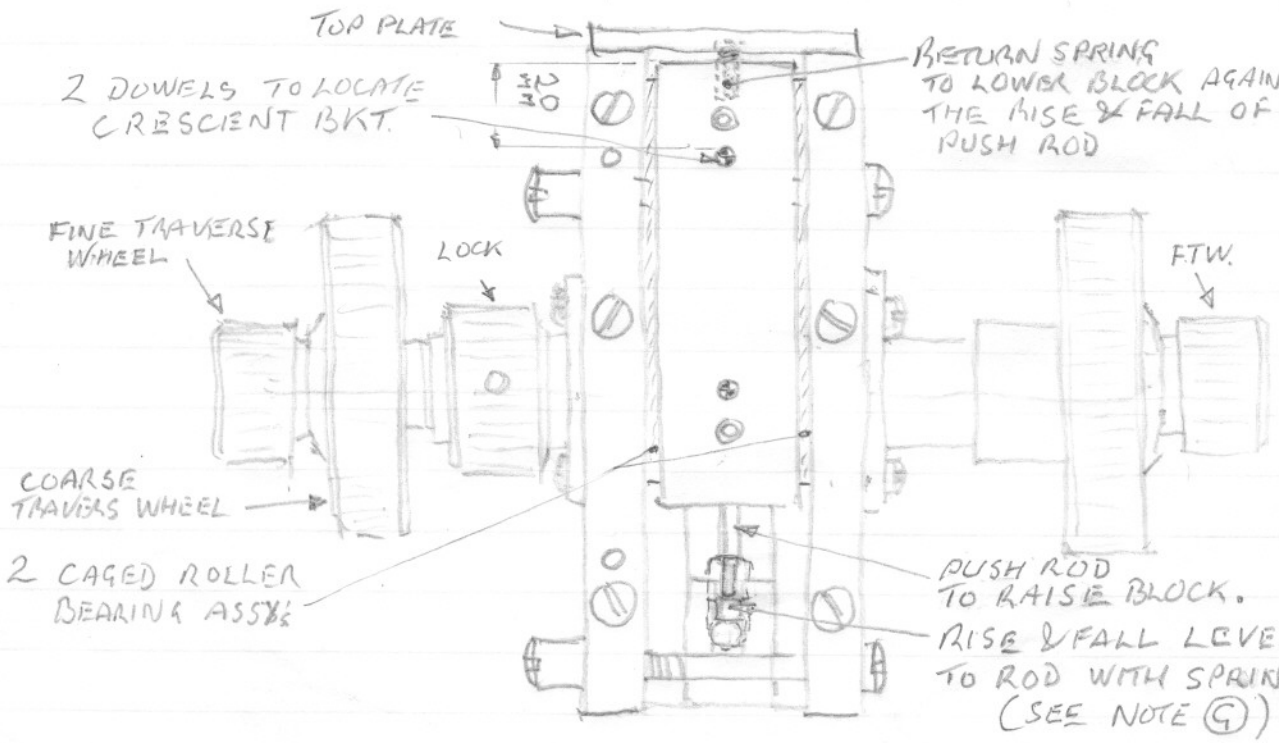
V/STANDARD

(D) THE STOP PLATE WAS REPLACED & THE FORWARD PLATE REMOVED EXPOSING THE END OF A COMPRESSION SPRING & A TWIN SET OF ROLLER BEARINGS SET BETWEEN A SET OF OPPOSED VEES. :-

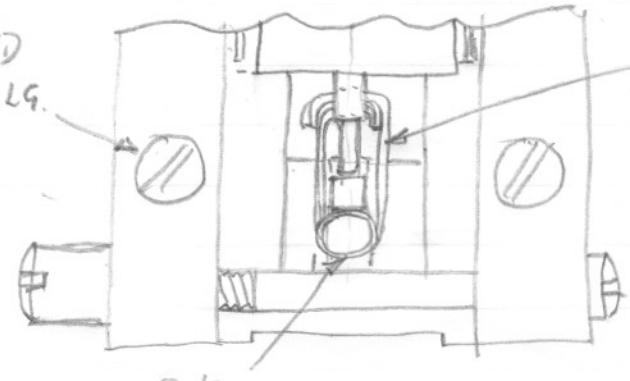


(E) CIRCULAR BRT. REMOVED, (SEE (C) SKETCH) MALE DOVETAIL. 2 — 4MM CHEESE HD-SCREWS ARE THEN REMOVED ALLOWING THE FEMALE D/TAIL TOGETHER WITH THE RACK PINION & CONTROL WHEEL TO BE REMOVED). SEE SKETCH (D)

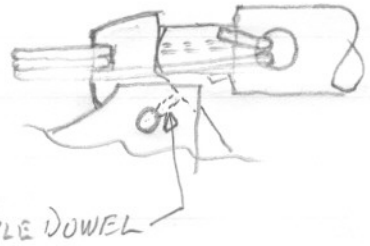
(F) 2 — 4MM SCREWS WERE THEN REMOVED ALLOWING THE CRESCENT BKT. TO BE WITHDRAWN FROM ITS 2 — 3MM DOWELS. THIS NOW EXPOSES THE CENTER BLOCK OF THE ROLLER BEARING ASSY:-

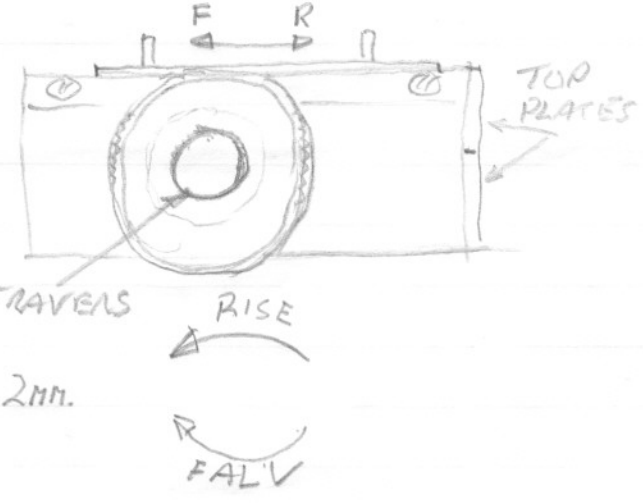


(G) DETAIL OF RISE & FALL LEVER AGAINST THE PUSH ROD, AND SPRING WIRE CONNECTING ASSEMBLY :—



SIDE VIEW OF SPRING COUPLING OF PUSH ROD TO RISE & FALL LEVER :—



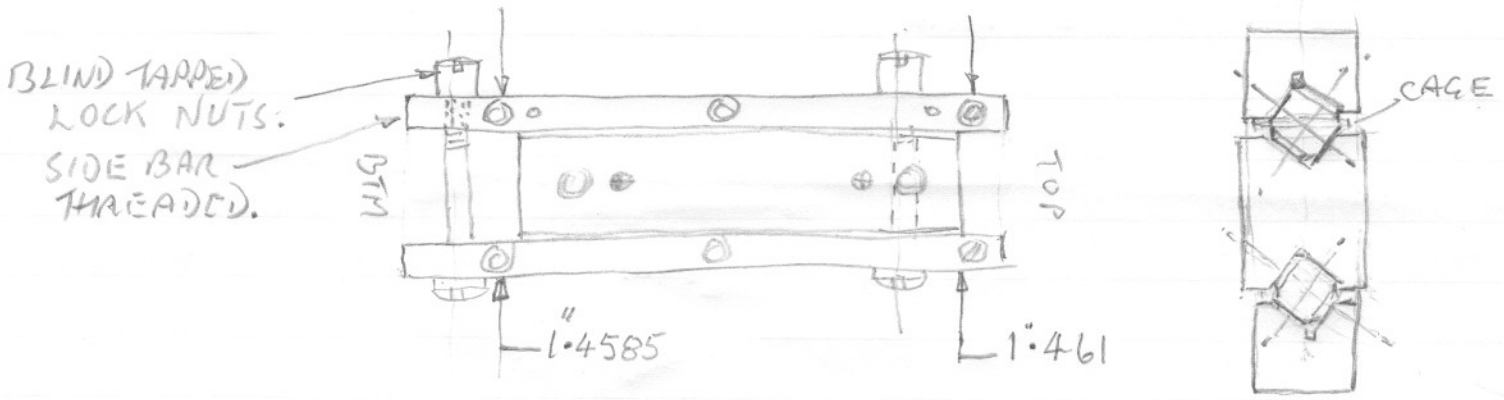


FINE TRAVERS RISE & FALL, APPROX 2MM.

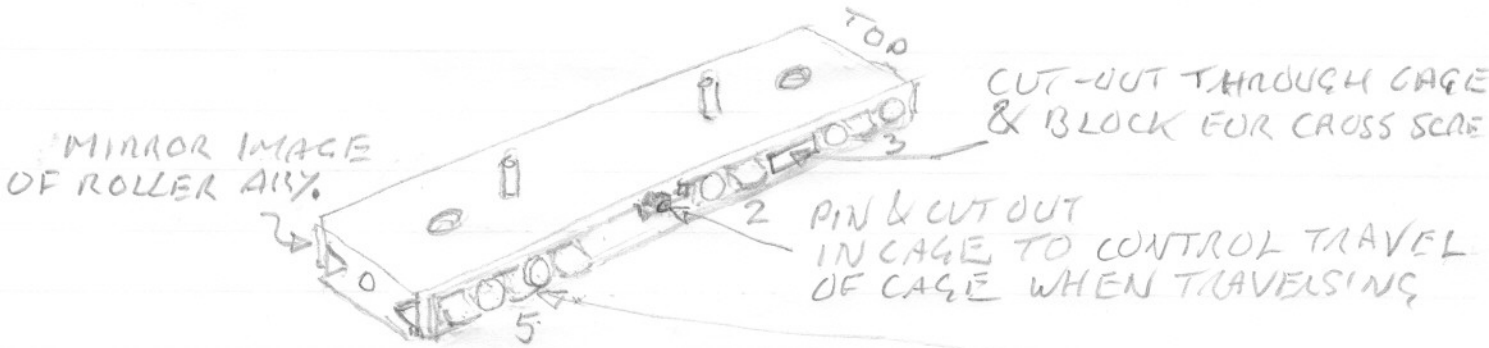
(H) THE COUPLING SPRING WAS RELEASED FROM THE RISE & FALL LEVER NOTCH & IT TOGETHER WITH THE PUSH ROD ASSY WAS REMOVED. THE 6 – 3,5 MM CH. HD. SCREWS WERE REMOVED & THE ROLLER SLIDE ASSY. LIFTED FROM ITS 2 – 3 MM DOWELS.

(I) THE 1 MM DIA GRUB SCREW WAS REMOVED FROM THE RISE & FALL LEVER, BUT DOWEL PIN WOULD NOT SLIDE OUT. FORCE WAS NOT APPLIED AT THIS STAGE. SEE NOTE (G) SKETCH. THIS ITEM LEFT & ATTENTION GIVEN TO THE ROLLER ASSY.

(J) THE ROLLER ASSY. TRAVERSE WAS NOT SMOOTH & WAS DISMANTLED.—



WIDTH DIMENSIONS TAKEN TO ASSIST RE-ASSEMBLY.



10-ROLLERS ASSEMBLED ON ALTERNATIVE AXIS.

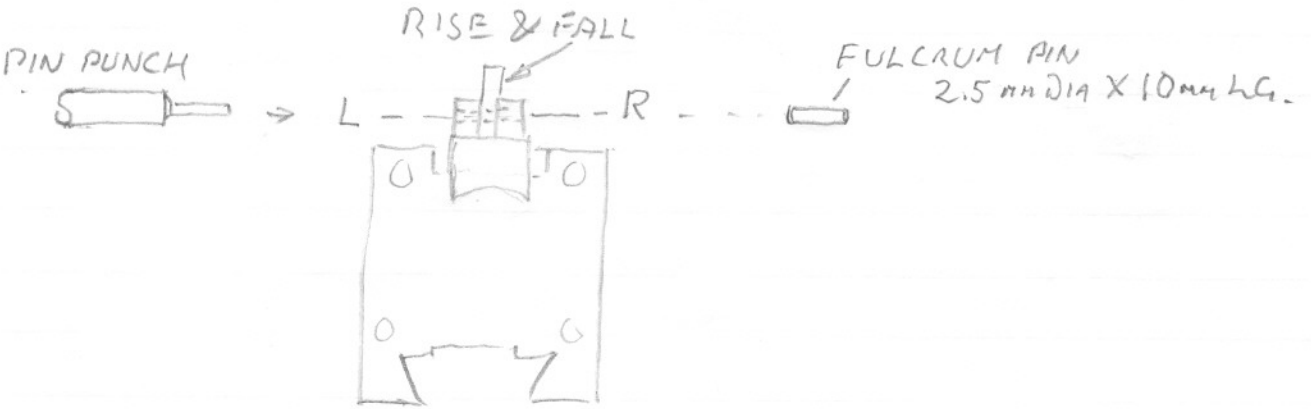
THE CONGEALED & HARDENED GREASE WAS DISSOLVED OFF IN ISOPROPYL ALCOHOL.
ROLLERS ARE 4·00 MM DIA X 3·98 MM LG. 20 OFF.

THE ROLLERS TOGETHER WITH THE CENTRE SECTION & SIDE MEMBERS WAS RE-ASSEMBLED. WHITE PETROLEUM JELLY B.P. WAS USED TO LUBRICATE.

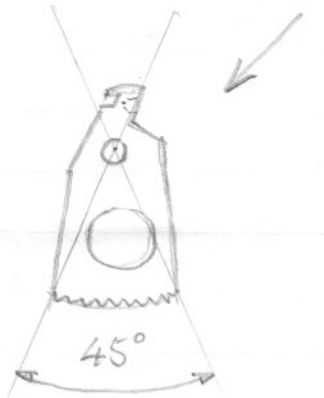
ON RE-ASSEMBLY THE AXIS OF THE ROLLERS WAS TURNED THROUGH 180° BRINGING THE CONTACT TO THE VEE SURFACE ON A NEW & UNUSED AREA. THIS HAS THE EFFECT OF ADDING APPROX. 0"·001 TO THE WIDTH OF THE ASSY. THROUGH OUT ITS LENGTH.

AS RESULT OF THE CLEANING A SMOOTH TRAVERSE HAS BEEN ACHIEVED.

(K) THE FULCRUM PIN FOR THE RISE & FALL LEVER WAS REMOVED (SOME FORCE WAS NEEDED) & THE LEVER LIFTED OUT.
THE REMOVAL OF THE PIN WAS LEFT TO RIGHT.

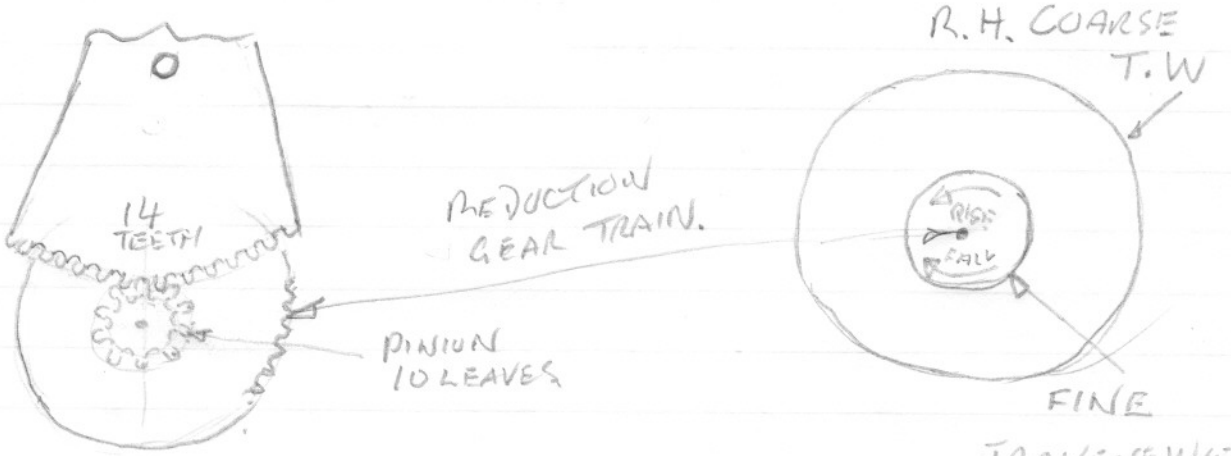


THE RISE & FALL LEVER.



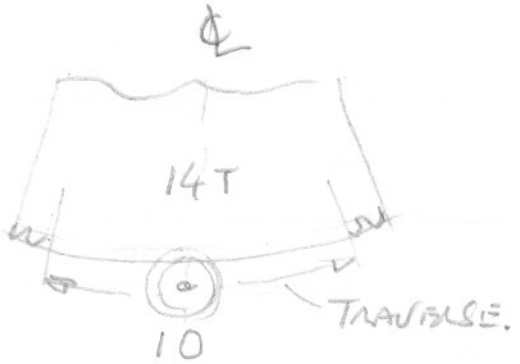
THE TEETH (14) ON THE LEVER WERE MUCH WORN & BURRED, BUT NOT STRIPPED AS TO PREVENT SOME ENGAGEMENT WITH THE PINION.

(L)



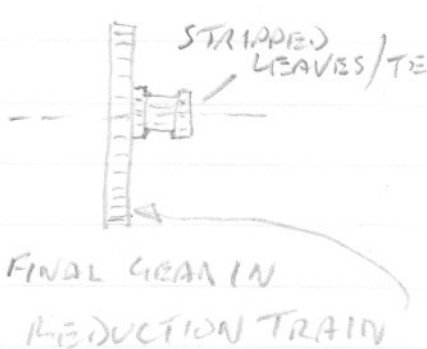
THE FINE TRAVERSE WHEEL REQUIRES 20 REVOLUTIONS BETWEEN STOPS. THE 10 LEAF PINION 1 REVOLUTION
ie 20 to 1 REDUCTION THROUGH GEAR TRAIN.

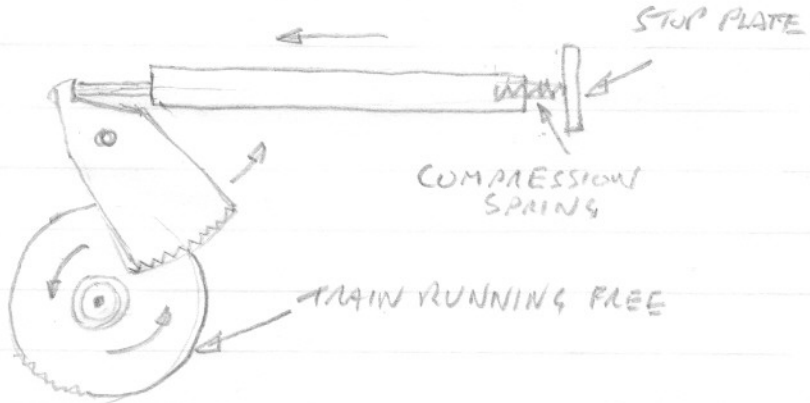
IF THE ASSEMBLY CAN BE ARRANGED ON THE CENTRE LINE OF THE PINION & LEVER. THERE WILL BE 2 UNENGAGED TEETH EACH END.



THIS WILL PREVENT RUN-OFF AT THE ENDS WHICH APPEARS TO HAVE BEEN ONE OF THE PROBLEMS. THIS HAD CAUSED DAMAGE TO THE END TEETH WHEN RE-ENGAGEING.

(M) FURTHER EXAMINATION OF THE REDUCTION TRAIN REVEALED THAT THE 10 LEAF/TOOTH PINION ENGAGEING WITH THE RISE & FALL LEVER WAS STRIPPED TO THE EXTENT THAT IT ONLY ENGAGED INTERMITANTLY AND THAT WITH THE RESISTANCE OF THE COMPRESSION SPRING DURING THE RISE SEQUENCE IT CAUSED THE LEVER TEETH TO PASS THROUGH & DISENGAGE. THE RISING BKT. ATTACHED TO THE ROLLER SLIDE ASSY. WOULD THEN DROP TO THE BOTTOM.

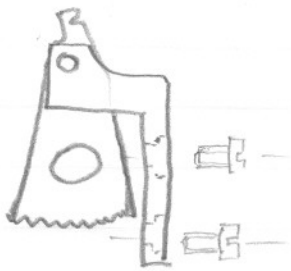




(N) THE ROOT OF THE PROBLEM HAS BEEN ESTABLISHED & IT IS NOT THE INTENTION TO RECOMMEND A SALVAGE SCHEME AT THIS STAGE. THEREFOR ALL DISMANTLED ITEMS WERE NOW RE-ASSEMBLED.

27-2-07 TO BE ABLE TO CONSIDER POSSIBLE SALVAGE SCHEMES, (SUCH AS CUTTING NEW PINION OR GEAR) THE ASSEMBLY WAS DISMANTLED AGAIN AS DETAILED IN NOTES A to N.

(1) TWO 2MOI CHEESE HD SCREWS WERE REMOVED FROM THE RISE & FALL BLOCK ASSY. & THE ASSY WITHDRAWN. SEE NOTE 'B' SHT 1.



(2) THE LOCKING SCREW TO THE RING NUT (NOTE 'B' SHT 1) WAS REMOVED & THE RING NUT TURNED ANTI CLOCKWISE ALLOWING THE GEAR TRAIN ASSY TO BE REMOVED. A SPECIAL KEY WAS MADE TO FIT THE INTERNAL CUT-OUTS OF THE RING NUT. CONSIDERABLE TORQUE WAS NECESSARY TO REMOVE THE RING NUT RESULTING IN BURRING OF THE CUT OUTS. DRIED OIL HAD POSSIBLY LOCKED THE NUT, ALSO THREAD DAMAGE CAUSED BY THE LOCKING GRUB SCREW.

(3) THE ANSWER TO THE PROBLEM IS THE REPLACEMENT OF THE GEAR & PINION ASSY. DUE TO THE STRIPPED PINION TEETH & THE REPLACEMENT OF THE RISE & FALL LEVER DUE TO THE DAMAGED RACK OF TEETH THAT ENGAGE WITH THE PINION.

(4) IN THE WORKSHOP WHERE THE DISMANTLING HAS TAKEN PLACE THERE IS NO FACILITY TO PRODUCE THE REQUIRED REPLACEMENT PARTS, IT WAS THEREFORE DECIDED TO REASSEMBLE COMPLETELY.

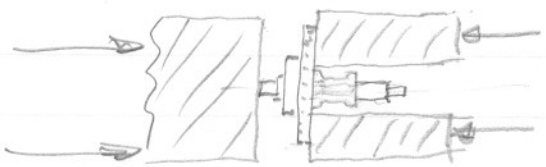
C.J MATTHEWS 3-3-07.

30-3-07

AFTER CONSIDERING THE MANUFACTURE PROBLEM AND THE FACT THAT A LATHE WAS AVAILABLE IN THE WORKSHOP, IT WAS DECIDED TO TRY AND PRODUCE A WORKABLE PINION REPLACEMENT.
THE MICROSCOPE WAS AGAIN DISMANTLED AND THE GEAR BOX REMOVED. THE DAMAGED LEVER RACK AND PINION REMOVED FROM THE BOX.

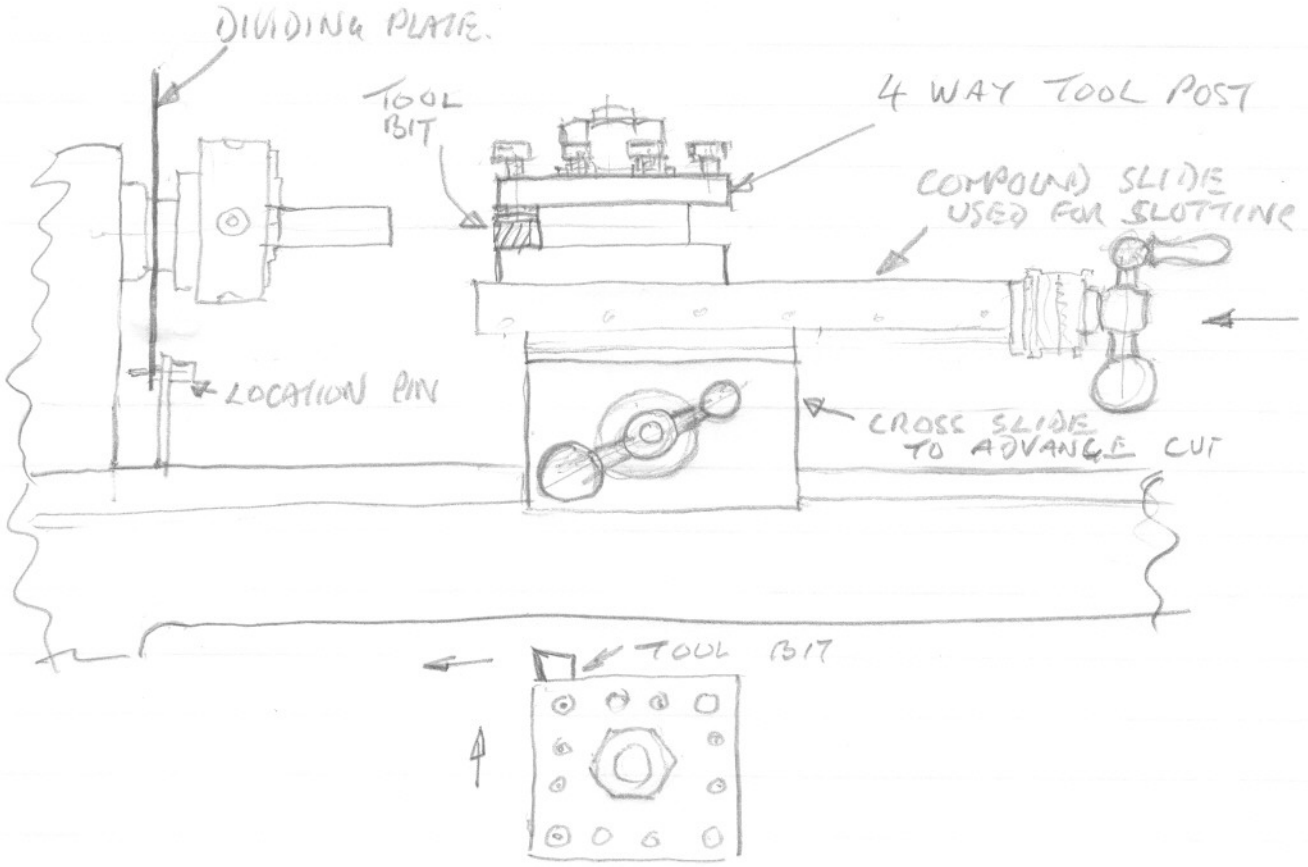
DAMAGED AND BURRED TEETH ON THE RACK WERE CLEANED OFF AND THE TOP OF THE TEETH ADJUSTED TO ESTABLISH A CONSTANT RADIUS FROM FULCRUM PIN.

TO ESTABLISH THE BLANK SIZE FOR THE PINION THE SHAFT WAS PRESSED OUT OF THE GEAR.



IT WAS ALSO IMPORTAINT TO KNOW THE INTERFERENCE FIT OF THE GEAR AND SHAFT PRIOR TO TURNING.

A DIVIDING PLATE FOR 10 TEETH WAS POSITIONED BEHIND THE LATHE CHUCK AND A 5/16" DIA STEEL ROD CHUCKED.

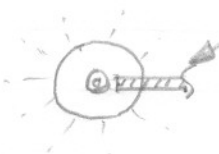


- THE TURNED PINION BLANK :—

DIA +·005 TO COMPENSATE FOR RACK REDUCTION. OTHER DIMENSION AS SAMPLE

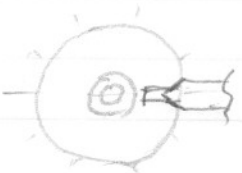
INTERFERENCE DIA. FIT FOR GEAR

- 1ST. SERIES OF 10 SLOTS :—



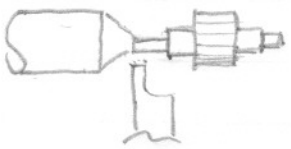
TOOL BIT 0·016 THICK (MADE FROM SWANN & MORTON SURGICAL BLADE)

- 2ND. SERIES OF 10 SLOTS. AS CHAMFERS :—

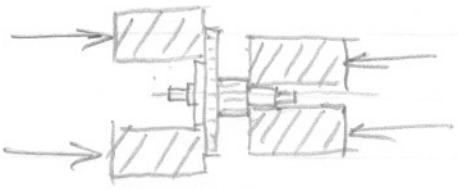


- CHUCK REMOVED WITH TURNING STILL IN PLACE AND TEETH SHAPED BY FILE TO APPROXIMATE FORM.

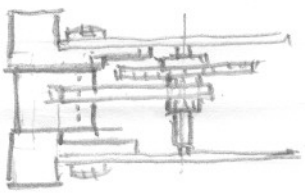
- CHUCK RETURNED TO LATHE TO COMPLETE AND PART-OFF

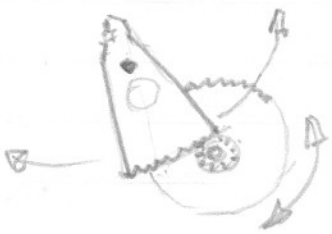


- PRESS FIT PINION TO GEAR :—

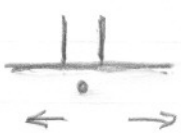


- Rack & GEAR ASSY. ASSEMBLED IN THE GEAR BOX AND MANUALLY ROTATED WITH A LAPPING MEDIUM TO ACHIEVE A SMOOTH ACTION.





- AFTER CLEANING AND COMPLETING THE ASSY. THE GEAR BOX WAS ASSEMBLED TO THE MAIN BODY OF THE MICROSCOPE WITH THE TOOTH ENGAGEMENT SUCH THAT THE FINE TRAVERSE OF APPROX. 2MM WAS PLACED EVENLY BETWEEN THE DOT & BAR MARKINGS :—



CONCLUSION

THE CAUSE OF THE FAILURE WAS DUE TO OIL AND GREASE DEGENERATION.

THE EXTRA PRESSURE APPLIED TO TRY AND OVERCOME THE LOCKING OF THE ROLLER SLIDE BROUGHT ABOUT THE STRIPPING OF THE PINION IN CONTACT WITH THE RACK.

C.J. MATTHEWS
2-4-07