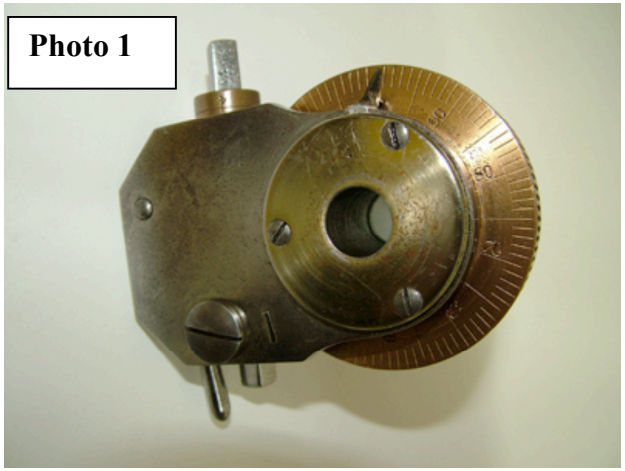
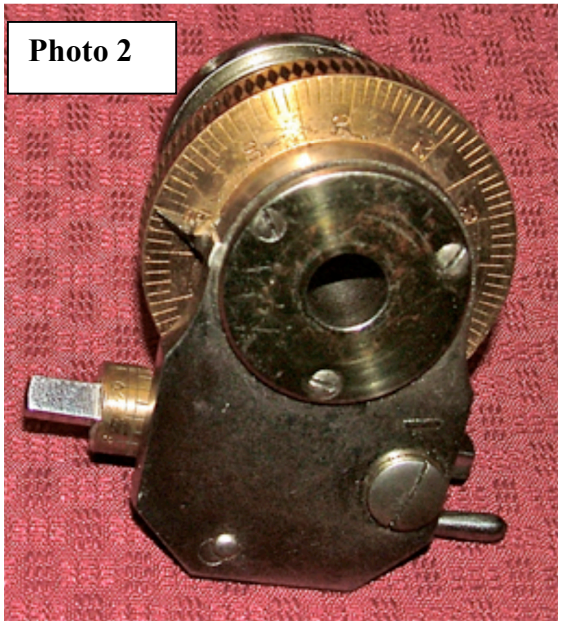
Q. - How can I make a dividing Chuck of Holtzapffel design?



A. - Probably the best Dividing Chuck designed by Holtzapffel was made in 1892 for Alfred Bevan, the first owner of lathe No.2410. This lathe was supplied with virtually every known accessory and Bevan specified all the parts that would normally be made of brass were to be made in bronze. The initial cost was £670 but Bevan kept coming back for more equipment.

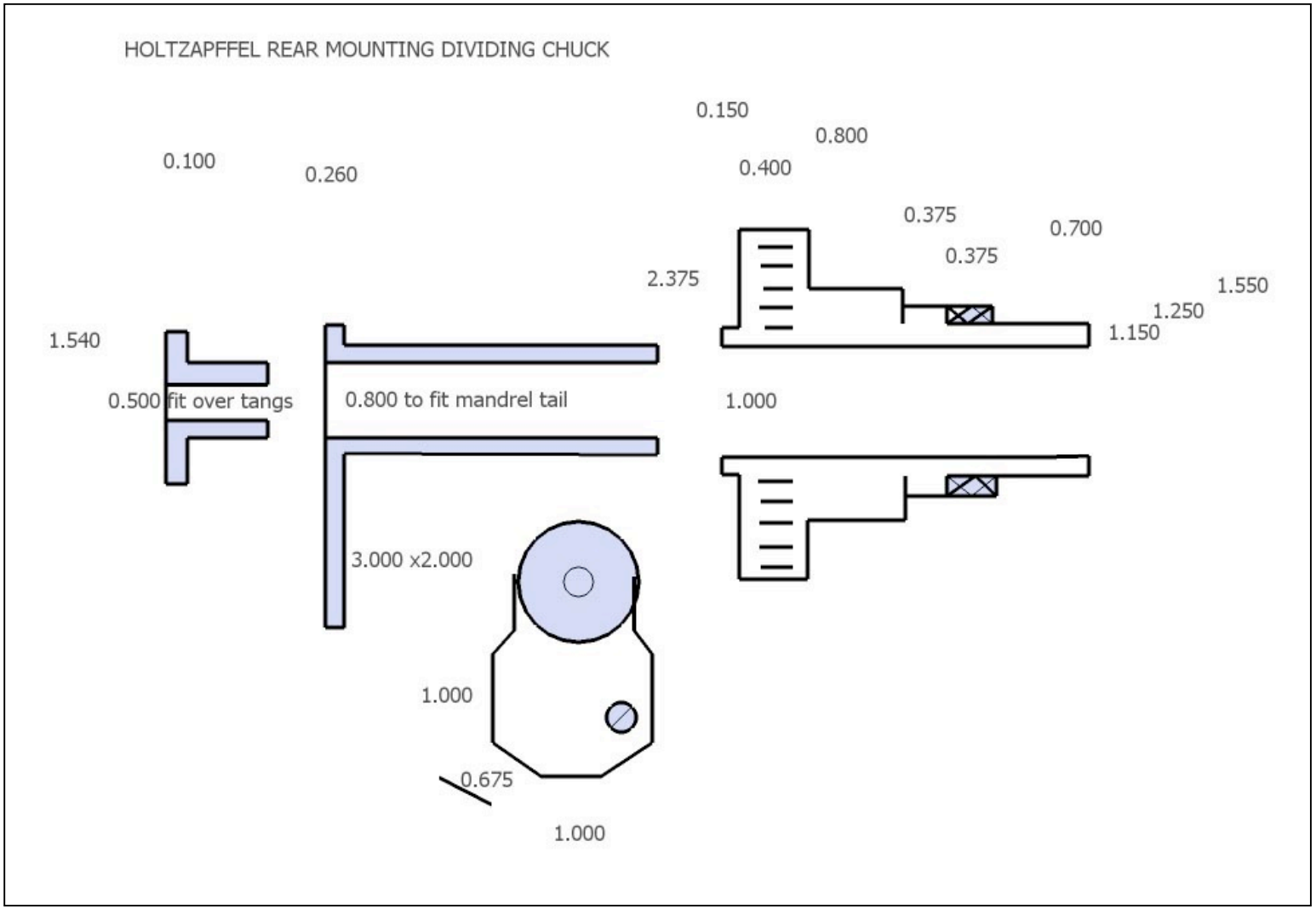
The Dividing Chuck has three main components:

1. a flanged inner tube of steel which fits over the tail end of the lathe mandrel;
2. an outer tube of bronze which slides on the inner tube with a worm-wheel section;
3. a steel worm-cage and worm joined to the flange which can lock the worm-wheel in any position.



The steel inner tube (shown on the left of the diagram) is in two parts; the smaller part, the insert, has a slot cut across its small end to locate onto the two pins of the mandrel tail; it is held to the larger part by 3 screws (photos 1 & 2); The insert is 1.540" large diameter x 0.100" thick with a 0.500" hole to allow the fixing bolt to go through into the mandrel tail; small diameter about 0.800" to fit the tail, length depends on the length of your mandrel tail; o/d shown as 0.800" also depends on the diameter of your mandrel tail.

You need to look at photos 1 & 2 to see the shape of the flange; the bottom edge is 1.00" long and the cut-off sides are about 0.675" long but the shoulders are curved, not straight as shown in the sketch.


HOLTZAPFFEL REAR MOUNTING DIVIDING CHUCK
0.150
0.800
0.100
0.260
0.400
0.375
0.700
0.375
2.375
1.550
1.250
1.150
1.540
0.500 fit over tangs
0.800 to fit mandrel tail
1.000
3.000 x2.000
1.000
0.675
1.000

The bronze outer tube (shown on the right of the diagram and in photo 3) is 2.375" largest diameter into which is cut 96-teeth to match the 13 t.p.i. worm (or maybe 13.10 t.p.i.). This is the only dividing chuck that I am aware of which has divisions of both 96 and 100 as, for this purpose, the worm-wheel is engraved on its face with 100 divisions and on its edge with every 6th division of 96. To divide by any part of 96 you just release the worm, move on and re-set the worm without turning it; to divide by any part of 100 you then tweak the worm until the indicator aligns with the chosen number on the 100 scale. Good old Bevan was quite a clever fellow!

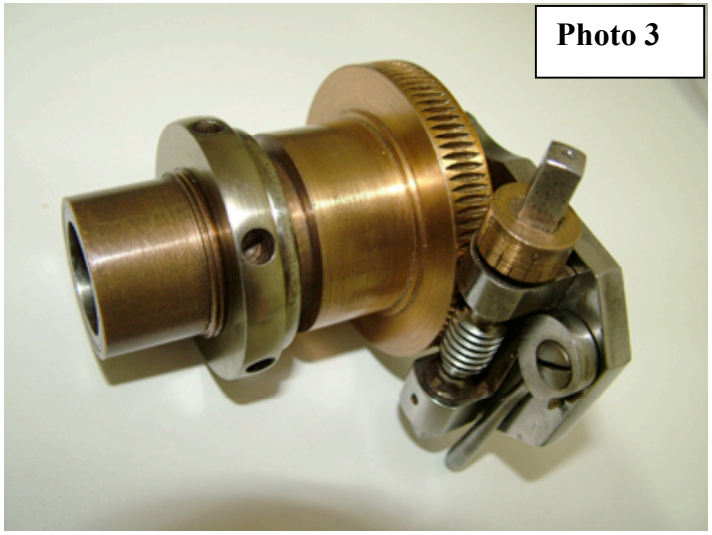


Photo 3


Photo 4

The shoulder is 0.800" long x 1.550" diameter, the step to hold a gear-wheel is 0.375" long x 1.250" diameter as is the threaded section (shown cross-hatched in the diagram); it is 20 t.p.i. (probably 19.89 t.p.i.). The end is 0.700" long x 1.150" diameter (this length, combined with that of the steel insert, will depend on the length of your mandrel tail).

Most Holtzapffel Dividing Chucks are adjusted by a ratchet-wheel and this has the disadvantage that it can only be set to exact divisions of 96. Evans chucks are adjusted with a worm and worm-wheel which allows for precise adjustment to any part of the circle and Holtzapffel seems to have been reluctant to copy this advantageous feature in the Dividing Chuck, despite the fact that they had adopted it for many years for their other ornamental chucks.

The wormwheel is 0.400" thick with a step 0.150" thick to allow for the thickness of the worm cage. The worm cage is not shown in the diagram but may be seen in photos 3 & 4. It is just like the Evans type except that it has a cam-lock instead of the more reliable screw-in-slot fixing mechanism. Overall length is 1.85", gap 1.079", width 0.575", height 0.65". The worm is made from 0.500" stock, reduced to about 0.420" o/d for the worm thread. The Micrometer is 0.300" thick x 0.600" diameter with a central square hole of 0.250" across flats; it is divided by 20 with numbers engraved at 0, 2, 4, 6 & 8. The cam may be copied from any Holtzapffel ornamental chuck; cam radius about 0.23" rising to 0.400"; however, unless you specifically require an authentic Holtzapffel design, I would recommend that you make instead the more reliable screw-in-slot mechanism designed by Evans and shown in photo 5.

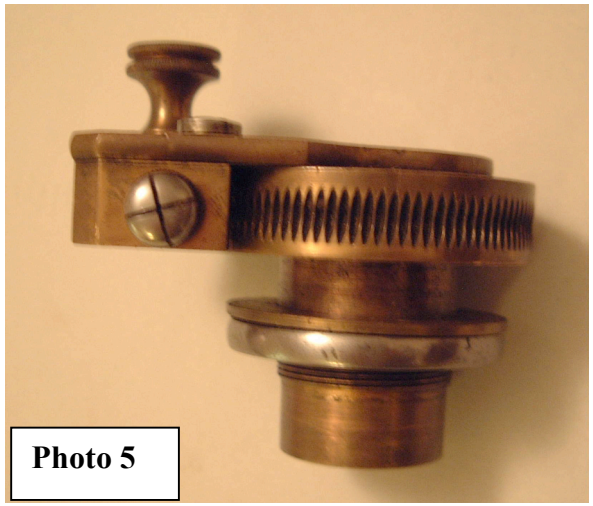


Photo 5