different ratios for screw-cutting. These again are doubled or trebled by altering the ratios of other gears connected therewith, so

that for each position of engagement of the stud wheel, two, or in some cases three, pitches can be cut. This avoids the waste of time involved in setting up fresh wheels on the swing-plate as often as a screw of different pitch has to be cut.

Another step in the direction of economy depends on the removal of all screw-cutting, except those screws which are of several feet in length, from the ordinary lathe to the special chasing and screwing machines. The screw-cutting arrangement of an engineer’s lathe is a cumbrous apparatus to fit up and set in motion for the cutting of screws of small dimensions. When there was no other method available except that of common dies operated by hand or carried in a screwing machine, there was good reason why a true cutting tool should be operated in the lathe through change wheels. But the

reason no longer exists, since for the single cutting tool of the lathe the two or three cutters of the chasing and screwing machines (figs. 3 and 4) are substituted, and the hollow mandrel embodied in the latter permits of screws being cut and parted from the solid bars of several feet in length. Except for the cutting of long screws and screws of odd pitches, the ordinary lathe is now a wasteful machine.

The second method of cutting screws is that by means of hobs or leaders, and either comb or single-edged tools. That is, a short