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(54) Title: TOOL UNIT CLAMPING APPARATUS HAVING A LOCKING MECHANISM WITH INCREASED GRIPPING FORCE

(57) Abstract

A clamping apparatus (35) for detachably connecting a tool unit (10) to a tool supporter (37) with increased holding force is provided. The clamping apparatus (35) includes a housing (41), a pair of opposing locking spheres (57a, b) within the housing (41), a cylindrical canister member (39) mounted within the housing (41) that is movable with an insert-supporting tool unit (10) and which has a pair of opposing apertures (55a, b) in its sidewalls for conducting the locking spheres (57a, b) from a locking to an unlocking position, and a lock rod (60) reciprocally movable within the interior of the canister member (39) along an axis (A) and having opposing cam portions (64a, b) for radially moving the locking spheres (57a, b) through the canister apertures (55a, b) into wedging engagement with opposing angled walls (30) of sphere receiving openings (20) in the tool unit (10). To increase the mechanical advantage of the wedging action between the locking spheres (57a, b) and the angled walls (30) of the tool unit (10), the aperture walls (56) of the canister member (39) are angled with respect to a line (R) extending radially from the lock rod axis (A) to reduce the angle between the aperture wall (56) and the tool unit wall (30). Such angling increases the force of wedging and locking engagement between the locking spheres (57a, b) and the angled walls (30) of the tool unit (10). In the preferred embodiment, the aperture walls (56) are angled 15° with respect to the aforementioned radial line (R), thereby increasing the holding force of the clamping mechanism (35) by 30 %.

