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UNIVERSAL WAFER STEM CUTTER

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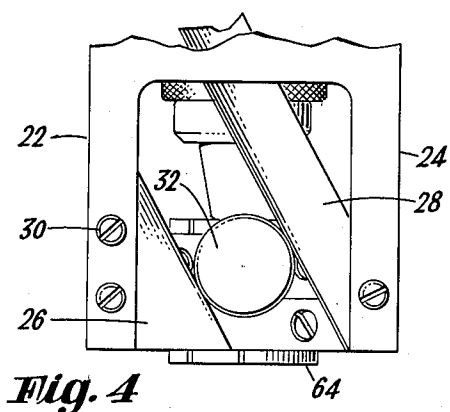


Fig. 4

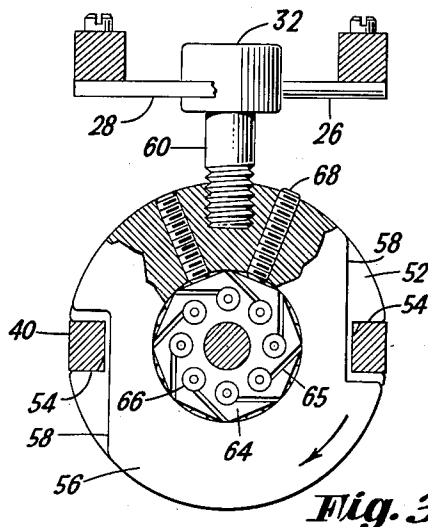


Fig. 3

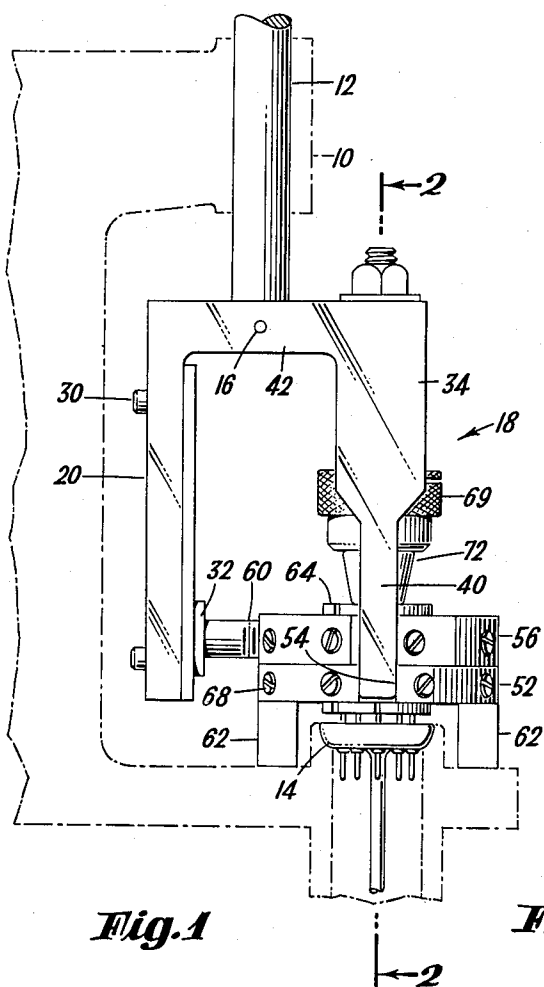


Fig. 1

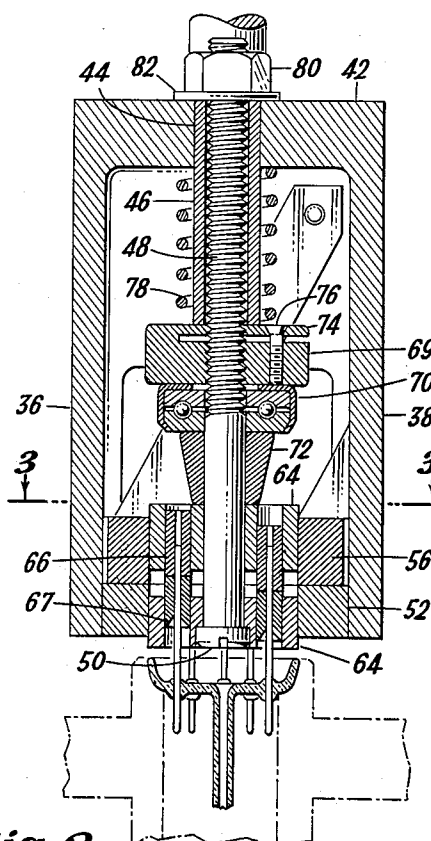


Fig. 2

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UNIVERSAL WAFER STEM CUTTER

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12 Claims. (Cl. 164—40)

This invention relates to wire cutters.

In particular it relates to a cutter for simultaneously shearing off at diverse lengths, a number of leads extending from a wafer or stem utilized in the manufacture of radio tubes.

The invention is particularly useful with turret type machines wherein the stem is progressed in an orbital path while successive operations are performed thereon in the manufacture of the radio tube. With this invention it is possible, at a single station, to cut off wires so that some wires will be at one height while others will be at another. It is even possible with this invention to simultaneously cut off the wires so that no two shall be of the same height.

It is an object of the invention to reduce the number of operations required to cut off several wires to different length.

It is a further object of the invention to provide simple means for rotating cutter dies with respect to one another.

These and other objects will appear after reading the following specification and claims in conjunction with the accompanying drawing in which—

Fig. 1 is a side elevation of my wire cutting dies and operating mechanism, the same being shown as applied to the wire leads of a wafer such as is used in the production of radio tubes.

Fig. 2 is a vertical section through the dies and die operating mechanism on the line 2—2 of Figure 1.

Fig. 3 is a horizontal section immediately above the level of the dies taken on the line 3—3 of Fig. 2, part of the upper die being broken away and

Fig. 4 is an elevational view of a portion of the die mechanism looking at Figure 1 from the left.

Now considering the figures more in detail, at 10 there is represented a support arm for the wire cutting mechanism through a bearing of which there is vertically reciprocable a rod 12. The arm 10 may be one of the arms of a turret type machine. The turret is provided with a number of seats one of which is illustrated at 14 supporting the so-called stem or the lead carrying portion and exhaust tubulation of a radio tube, this stem being carried around the machine during the various stages of tube manufacture. At the wire cutting stage suitable mechanism causes the rod 12 to be lowered and raised. The lower end of the rod is pinned as at 16 to a die supporting and die operating frame 18. The frame in side elevation is generally U-shaped, each leg of the U-shaped frame being forked. The inner portion 20 of the frame is formed to provide two tines 22, 24. Running diagonally of the tines is a pair of tracks 26 and 28 forming between them a diagonal cam trackway. These tracks are suitably secured to the inner portion by screws 30 or the like. A cam track follower in the form of a roller 32 operates in this track.

The outer portion 34 of the frame is provided with the two tine portions 36 and 38, the tine portions at a point substantially halfway down their length being narrowed to form parallel edged slender guide fingers 40.

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The top web 42 of the outer portion of the frame is provided with a hole 44 in which is arranged a slidable bushing 46. Within the bushing is a bolt 48 with its head 50 at the lower end. Supported on the head of the bolt is the lower shearing die block 52. This die block is provided with a pair of ways 54, each way embracing a respective finger 40 for guided slidable movement of the block with respect to the fingers. Forced against this lower die block is the upper shearing die block 56, this block having angular recessed portions 58 adjacent to fingers 40 to permit rotation of the upper die block on the lower block during rectilinear motion of the frame. To rotate the die block there is provided a radial stud 60, threaded into the upper die block and carrying at its outer end the cam follower 32 previously described. It is now evident that upon downward movement of the rod 12, the frame 18 will be displaced downwardly until the lower die block 52 is restrained against further movement, as by striking abutment blocks 62 on the bed of the machine. Further downward movement of the frame will effect relative vertical displacement between the frame and the die blocks, resulting in rotation of the upper block on the lower one.

Each of the blocks is in the form of a torus or ring with a cutter insert 64 retained therein. Each of the blocks together with the insert therein may be regarded as a cutter die holder. Both inserts slidably engage the bolt 48. In addition the upper insert rotatably engages the bolt. Each insert has a number of chordal slots 65 extending from the periphery of the insert to a vertical cylindrical opening within the insert. In each or in less than all of these openings there are inserted cutters 66 in the form of hollow cylinders and these may be placed at any height desired with respect to the contacting surfaces of the die blocks. The lower cutters 66 may be of a height less than the upper cutters and may have cup shaped depressions 67 at their lower ends to facilitate entrance of the wires into the cutters. By suitably positioning the pair of inserts 64 with reference to the level of the contacting faces of the die blocks so as to form a space therebetween and by suitably positioning the cutters within the inserts, the mating cutting edges of the upper and lower cutters of a pair can be adjusted to any level between the lower face of the upper insert and the upper face of the lower insert, without regard to the level of the mating cutting edges of any other cutter pair, thereby permitting simultaneous cutting of wires threaded through the cutters, at desired different levels. To secure the inserts and cutters in position within the die blocks, there is provided a number of screws 68, one for each cutter. These screws are threaded into the blocks and bear against portions of the inserts opposite the slots 65. The pinching effect thereby locks the inserts and cutters in place. The elements comprising the torus, insert and cutters may be regarded as a subassembly which may be set up prior to assembling these parts with the bolt 48 and its associated elements.

To maintain the die blocks in tight rotative engagement there is provided a clamping arrangement comprising a knurled nut 69 threaded on the bolt 48 with an end thrust ball bearing 70 and conical spacer 72 interposed between the nut and the top insert 64. To prevent undesired loosening of parts, the top of the nut is slit to provide a leaf 74 and a clamping screw 76 is provided to force the portions of the nut together to clamp the same on the bolt. The fixed arrangement of bearing 70 and spacer 72 has been found more satisfactory than the use of a spring interposed between the nut and the insert.

To insure return of the frame to original position with respect to the die blocks upon raising of rod 12, there is interposed a coil spring 78 between the under-

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neath surface of the web 42 and the top of the split nut, the spring surrounding the sleeve or bushing 46. A nut 80 threaded on the bolt 48 and a washer 82 prevent separation of frame and cutter die assembly. The nut is threaded down tight against the sleeve 46.

Having thus described my invention, what I claim as new is:

1. A wire shearing mechanism comprising a frame, a non-rotatable shearing die block slidably mounted in the frame, a cooperative shearing die block slidable with said first die block and rotatable with respect thereto, means cooperative with the frame and said rotatable die block to rotate the same upon relative slidable movement between the two and dies in said blocks, registering in one position of adjustment of said blocks, for receiving the stock to be cut.

2. A wire shearing mechanism comprising a frame, a non-rotatable shearing die block slidably mounted in the frame, a cooperating shearing die block slidable with said first block and rotatable with respect thereto, a cam track on the frame, a cam follower on the rotatable block cooperative with the cam track, whereby relative slidable movement between the frame and the die blocks will effect rotation of the rotatable block and dies in said blocks, registering in one position of adjustment of said blocks, for receiving the stock to be cut.

3. A wire shearing mechanism comprising a frame, a non-rotatable shearing die block slidably mounted in the frame, a second cooperating shearing die block slidable with said first block and rotatable with respect thereto, and means for rotating said second block comprising an arm extending radially of the second die block, a roller at the end of the arm, inclined ways on the frame on opposite sides of the roller, whereby slidable movement of the frame relative to the die blocks will rotate the second die block and dies in said blocks, registering in one position of adjustment of said blocks, for receiving the stock to be cut.

4. A shearing mechanism comprising a frame, a die assembly comprising a non-rotatable shearing die block slidably mounted in the frame, a second shearing die block slidable with said first die block and rotatable with respect thereto, means for rotating said die block to and from said shearing position upon its relative sliding movement to and fro, respectively, of the frame, means for effecting said relative sliding motion in one direction, resilient means, interposed between the frame and the die assembly, to effect reverse sliding movement of the frame with respect to the blocks with consequent rotation of the second block and dies in said blocks, registering in one position of adjustment of said blocks, for receiving the stock to be cut.

5. A shearing mechanism comprising a frame, a die assembly mounted in the frame, said assembly comprising a lower non-rotatable die block sub-assembly slidable in the frame, a second cooperating die block sub-assembly in contact with said first sub-assembly slidable therewith and rotatable thereon, means cooperating with the frame and the rotatable sub-assembly to rotate the second sub-assembly upon relative sliding motion between frame and second sub-assembly, a bolt having its head reacting against the lower face of the lower sub-assembly and passing upwardly through both sub-assemblies, a nut threaded on the bolt, means interposed between the nut and the upper face of the upper sub-assembly to rotatably clamp the sub-assemblies together, the upper portion of said bolt passing through the frame, stop means on the upper portion of the bolt to prevent withdrawal of the bolt from the frame, a spring interposed between the nut and frame to urge the die assembly to a normal position with the stop means engaging the frame and dies in said sub-assemblies, registering in one position of adjustment of said sub-assemblies, for receiving the stock to be cut.

6. A shearing mechanism comprising a frame, a die

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assembly mounted in the frame, said assembly comprising a lower non-rotatable die block sub-assembly slidable in the frame, a second cooperating die block sub-assembly in contact with said first sub-assembly slidable therewith and rotatable thereon, means cooperating with the frame and the rotatable sub-assembly to rotate the second sub-assembly upon relative sliding motion between frame and second sub-assembly, a bolt having its head reacting against the lower face of the lower sub-assembly and passing upwardly through both sub-assemblies, a nut threaded on the bolt, means interposed between the nut and the upper face of the upper sub-assembly to rotatably clamp the sub-assemblies together, a ball bearing included in said means, the upper portion of said bolt passing through the frame, stop means on the upper portion of the bolt to prevent withdrawal of the bolt from the frame, a coil spring surrounding the bolt interposed between the nut and frame to urge the die assembly to a normal position with the stop means engaging the frame and dies in said sub-assemblies, registering in one position of adjustment of said sub-assemblies, for receiving the stock to be cut.

7. A die sub-assembly comprising a cutter die holder having a plane surface for cooperation with the plane surface of a second cutter die holder, said first holder having a wall offset from the plane surface and presenting a hollow interior to the surface of the second holder, a cutter die having a shearing edge parallel to said surfaces, with the die traversing said hollow interior, and means for clamping said cutter die to said first holder with the shearing edge at varied levels with respect to the plane surfaces.

8. A die sub-assembly comprising a die block having a surface for cooperation with a second die block, a cutting die holding insert having a plurality of die receiving openings mounted in said die block, spaced with a surface of said insert offset from the said surface of the die block and lying within the die block, cutting dies arranged in said insert normal to the surface of the block, and means for clamping the block, insert, and cutting dies together.

9. A die sub-assembly comprising a die block having a surface for cooperating with a second die block, a cutting die retaining insert in said die block, said insert having chordal slits from the peripheral surface thereof and extending part way through the insert and terminating in passageways in a direction perpendicular to the surface, cutting dies inserted in said passageways, and threaded means extending into the die block and engaging the insert opposite the slit portions to clamp the insert and cutting dies in place within the block.

10. A die sub-assembly comprising a toroidal member with a lower surface adapted to engage a die block, a cylindrical insert having a plurality of die receiving openings positioned in the toroidal member with its lower surface above the lower surface of the toroidal member, cutting dies having shearing edges positioned in said insert with the shearing edges at desired varied heights with respect to the lower surface of the toroidal member, and means for retaining the insert and cutting dies in place within the toroidal member.

11. A die sub-assembly comprising a hollow cylindrical block, a cylindrical insert snugly fitting coaxially the block with the base of the insert recessed within the block, said insert having a circular row of bores normal to the base, chordal slits extending from the bores to the peripheral wall of the cylindrical insert, cutting dies, having shearing edges, snugly fitting in the bores with the shearing edges at desired varied levels with respect to the base of the insert, and radial means threaded into the block and engaging the insert opposite the slit portions clamping the insert and cutting dies to the block.

12. A die sub-assembly comprising a ring member with a surface adapted to engage a die block, an insert having a plurality of dye receiving openings positioned

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in the ring member with a surface in a plane within the confines of the ring member and displaced from the said surface, cutting dies having shearing edges positioned in said insert with the shearing edges at desired varied heights with respect to the said surface of the ring member, and means for retaining the insert and cutting dies in place within the ring member.

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