Feb. 7, 1961 C. L. MILLER ET AL 2,970,731

WIRE BREAK-OFF MECHANISM

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Fig. 1.

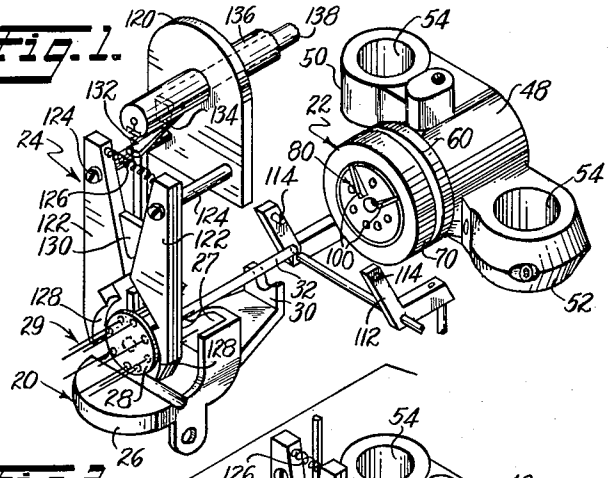
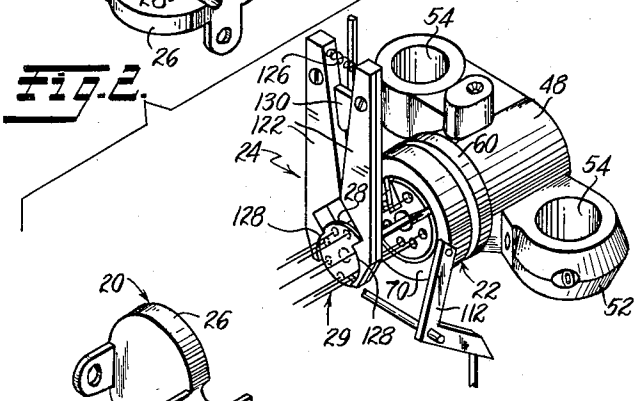


Fig. 2.



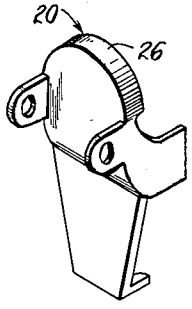
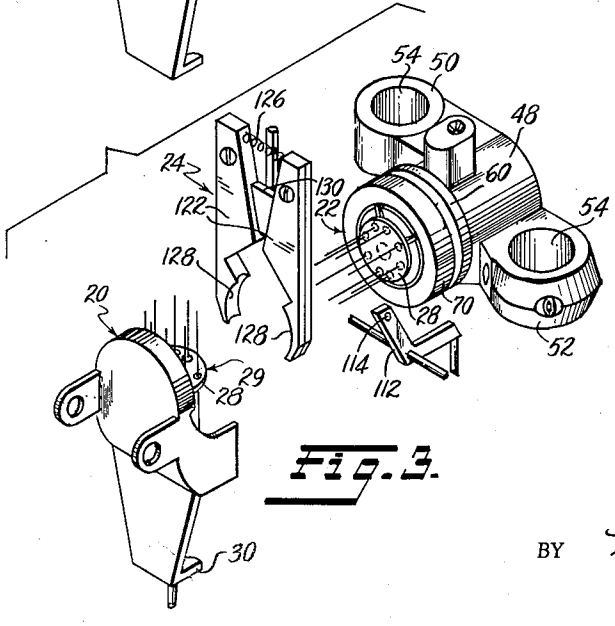


Fig. 3.



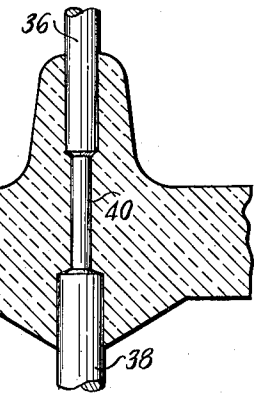


Fig. 8.

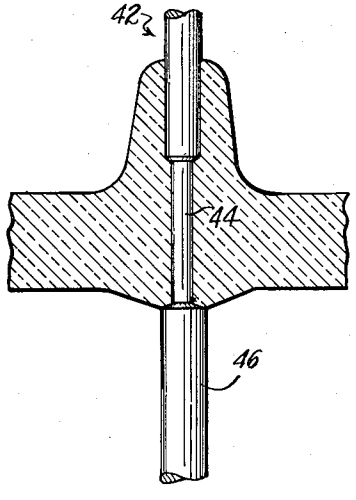


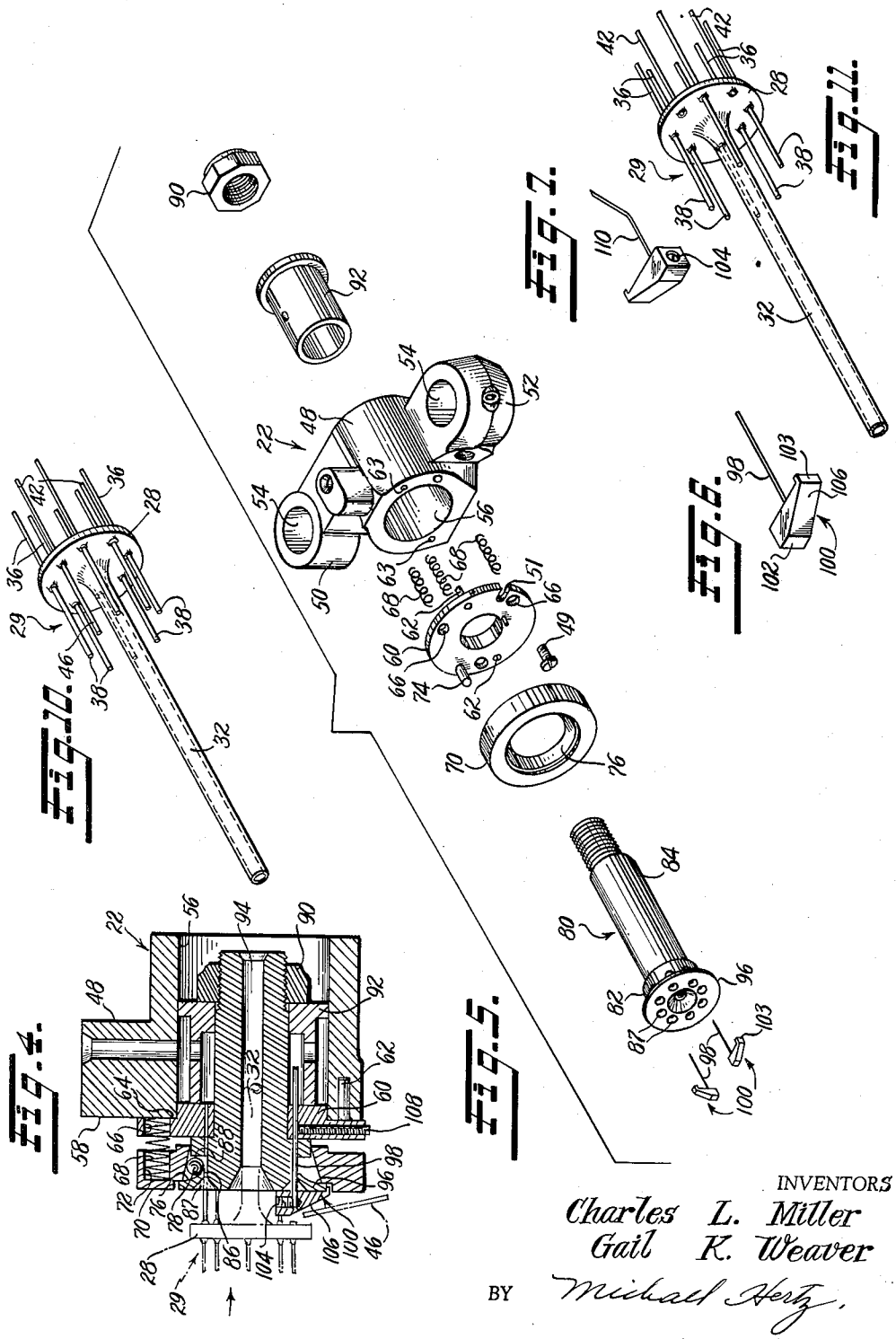
Fig. 9.

INVENTORS
Charles L. Miller
Gail K. Weaver
BY Michael Hertz
ATTORNEY

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WIRE BREAK-OFF MECHANISM

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INVENTORS
Charles L. Miller
Gail K. Weaver
BY Michael Hertz,
ATTORNEY

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WIRE BREAK-OFF MECHANISM

Charles L. Miller, Clinton, and Gail K. Weaver, Rebersburg, Pa., assignors to Sylvania Electric Products Inc., a corporation of Delaware

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9 Claims. (Cl. 225—93)

This invention relates to wire break-off mechanism.

In the manufacture of some types of electron tubes, it is necessary to provide a stem to form part of the tube and comprised of a disc-like glass tube base traversed by a number of lead-in wires, these wires, in the completed tube, being connected to electrodes within the tube and extending exteriorly of the tube to form exterior electrodes to be plugged into a socket. Where the number of such lead-in wires is small and therefore the wires afford insufficient support for parts within the tube, it has been customary to embed within the stem additional wires or so called dummy leads to support the parts and these leads in the completed tube do not extend exteriorly of the tube.

In one form of dummy lead, disclosed in the Cresswell and Schneiring Patent 2,892,008 dated June 23, 1959, the wire is of such form and of such length that initially it extends from both faces of the base but prior to the tube being completed, the part of each dummy lead which would otherwise extend exteriorly of the tube is snapped off flush with the base. Prior to this invention, the snapping off operation of the dummy lead was performed by hand. With this invention these wires or dummy leads are snapped off automatically as the stems are fed from a stem forming machine to a machine which cuts and bends the portions of the lead-in wires which are to be electrode connected.

It is an object of this invention to provide a device easily fitted within an existing stem processing machine to automatically snap off the undesired wire portion of a lead-in wire as the stem is fed to said machine.

It is a further object of the invention to provide a mechanism which will automatically snap off the excess wire of a dummy lead-in wire as a stem provided with such dummy lead-in wire is fed into the stem processing machine.

These and other objects will become apparent after reading the following specification when taken in conjunction with the accompanying drawing in which:

Fig. 1 is a fragmentary view of a stem inserting mechanism illustrating a stem with its tubulation ready to be grasped for transfer from a cradle on a conveyor to a chuck of the stem processing machine.

Fig. 2 is a similar view but with the tubulation of the stem partially inserted into the chuck and the lead-in wires close to the chuck.

Fig. 3 is a similar view showing the stem fully inserted in the chuck with two wires or dummy leads snapped off.

Fig. 4 is a diametrical cross section through the chuck.

Fig. 5 is an exploded view of the chuck.

Fig. 6 shows a form of wire breaker to be inserted in the chuck.

Fig. 7 shows a modified form of the breaker.

Fig. 8 is a fragmentary section through a stem showing a through lead-in wire embedded in the stem.

Fig. 9 is a similar section showing a dummy lead traversing the base of the stem prior to snapping off of the portion of the lead below the glass base.

Fig. 10 is a view of a stem prior to completion of dummy leads and

Fig. 11 is a similar view after the dummy leads have been completed.

Now referring to the drawings in greater detail, at **20** is shown a cradle for supporting a stem, the cradle being one of a number on a chain conveyor which receives stems from a stem forming machine. At **22** is shown a chuck for receiving the stem, this chuck being mounted on a conveyor to carry the stems to lead-in cutting and bending mechanism, while at **24** is shown in diagrammatic form a transfer device for transferring the stem from a cradle, which, as shown in Fig. 1, has been tilted to horizontal position, to the chuck.

The mechanism so far described is for the purpose of affording a background for applicants' invention, and, in and of itself, forms no part of the invention. Only so much of the structure indicated generically as **20**, **22** and **24** will be described as will be necessary to understand the invention. In the prior art, the conveyors supporting the equally spaced cradles and correspondingly spaced chucks are moved intermittently so that as a cradle reaches a position opposite a chuck, the transfer device **24** will grasp the stem and transfer it to the chuck.

The cradle **20** comprises a head **26** having an arcuate platform **27**, Fig. 1, for supporting the ends of lead-in wires of the base or disc **28** of the stem **29** and a saddle **30** spaced from the head for supporting the tubulation **32** on the stem, this tubulation being utilized in the later manufacture of the tube as a means to enable evacuation of the tube prior to the tubulation being sealed close to the base of the tube and tipped off thereat. The stem also includes two types of wires, known as Dumet wires, one type of wire having two thick portions **36** and **38** partially within the glass base and connected by a copper clad thinner portion **40** wholly embedded in the glass base. The other or dummy type of wire **42** is of similar construction but the joint between the copper clad section **44** and the thicker portion **46** is at the surface of the glass base so that a lateral thrust on the portion **46** will break the wire at the surface, all as explained at greater length in the patent above referred to. The cradle is brought to its horizontal position by a tilt mechanism, not shown, as the conveyor carrying the cradle indexes to the transfer position.

Each chuck **22** comprises a body **48** with upper and lower arms **50** and **52**, with the arm **50** of one chuck articulated to the arm **52** of an adjoining chuck and both overlapping arms articulated to the chain conveyor supporting the bodies by pins passing through vertical apertures **54** in the arms. The body has a cylindrical horizontal opening **56** with a plane surface **58** at the left of Fig. 4 against which rests a collar **60**. The collar **60** has fixed thereto diametrical locating pins **62** seated in holes **63** in the body **48** and is held to the body by a screw **49** passing through a notch **51** in the collar and threaded into the body. The collar also has a flange **64** overlying the vertical front face of the body and in this flange are three apertures **66** for seating three coiled compression springs **68** which thrust against a chuck ring **70**, the outer ends of the springs being located in recesses **72** in the ring. The collar has a second pin **74** on the side of the collar opposite to the side carrying the pins **62**, the pin **74** slidably snugly engaged within an aperture in the chuck ring to guide the ring in its to be described movement toward and from the collar **60**. The ring has an internal bevelled wall **76** to form a wedge surface for a number of balls **78** located between the wall and the chuck stem indicated generally as **80**, the chuck stem being comprised of a head **82** and a shank **84**. The stem has a number of perforations **86** with flared mouths **87**

through its head corresponding in position and number to the total number of lead-in wires in the glass base and for each perforation there is a communicating seat **88** for its ball **78**. The shank **84** is threaded and provided with a nut **90** which bears against a spacer flange cylinder **92** within the chuck body, the spacer cylinder being interposed between the nut and the collar **60**. The chuck stem **80** also has a central through opening **94** for accommodating the exhaust tubulation **32** of the glass stem when the lead-in wires are thrust into the chuck. The balls **78** normally occlude the perforations **86** by reason of the springs **68** pressing the inclined wall **76** of the chuck ring **70** against the balls, the outward motion of the ring being limited by the outer face of the ring engaging a flange **96** on the chuck stem. The head of the chuck stem on its under faces bears against the collar **60**. Thus the chuck stem is held against movement by reason of its being clamped against collar **60** by nut **90** and spacer cylinder **92**. When the chuck ring **70** is pressed toward the collar **60**, the balls **78** are free to move and stem lead-in wires are then easily insertible into the perforations **86**. When the ring is released to the action of its spring **68**, the lead-in wires are clamped in the perforations by reason of the thrust action of the balls **78**.

Those balls which would otherwise be in line with the dummy leads are removed, and inserted into the thus otherwise unobstructed perforations **86** are the rods **98** of breakers **100**. The breakers shown in detail in Fig. 6 each comprises the rigid rod **98** and a metallic block **102** with a positioning lip **103** engaging the outer edge of the flange **96** to prevent rotation of the breaker in the perforation. The rod is held within the block in any convenient fashion as by a set screw **104**. The block is generally a modified parallelepiped with the rod extending from an unmodified face of the block. The opposite face of the block is modified to have a hard surfaced bevelled face **106** adapted to be engaged by the end of a dummy lead wire so that as the wire is thrust toward the block in a direction parallel to the rod **98**, the end of the dummy lead wire will engage the bevelled face and it will be deflected and finally broken off at the juncture of the dummy lead wire with the surface of the base of the glass stem. The rod **98** of the breaker is held in the perforation in the chuck stem by a screw **108** threaded into the collar **60** and engaging the rod.

In the modification of Fig. 7, the rod **98** of Fig. 6 is replaced by a bent rod **110** whose resiliency is sufficient to maintain the block in the perforation in the chuck stem without the use of a screw. The screw to hold the block is preferred however since it affords better securement of the breaker within the chuck stem.

To shift the chuck ring **70**, any conventional means is employed, as a pivoted fork **112** whose pins **114** engage the face of the ring and move the ring concomitantly with the shifting of the transfer device to insert the glass stem lead-in wires and exhaust tubulation into the chuck. This fork is oscillated by any conventional means in timed relationship with conveyor indexing.

The transfer means is also conventional and comprises a transfer plate **120** on which is pivoted a pair of arms **122**, as by pivot pins **124**, the upper ends of the arms being shown spread apart by the action of a compression spring **126**. The lower ends of the arms are formed into arcuate jaws **128** adapted to grasp the circular base of the stem when the stem is tilted to horizontal position by swing of the cradle **20**. The jaws are separated by a wedge block **130** normally retracted to an up position by a spring **132** affixed thereto and cammed down by a spring retracted finger **134** pivotally mounted in a transfer bar **136**. The finger is operated by a thrust rod **138** slidable in the thrust bar **136**, the bar **138** having a cam at its end to engage the finger to depress it against the action of its spring. The transfer bar is operated in any suitable fashion, as by cam mechanism timed with conveyor indexing movement to reciprocate the plate **120** and jaws **128** between the two conveyors, and the thrust rod is also suitably operated by cam mechanism similarly coordinated with the indexing movement of the conveyors.

As the transfer device **24** brings the stem toward the chuck body **48**, the fork **112** will depress the chuck ring **70** to facilitate entrance of the leads into the perforations of the chuck. Just prior to the movement of the transfer device toward the breaker, the cradle will tilt downwardly. Then as the transfer device operates the dummy leads will strike the inclined surfaces **106** of the breakers, will be deflected and finally broken off. The fork **112** will now release the collar **60**, the transfer arm will then release the glass stem and move to pick up another glass stem, as a cradle supporting the next stem moves from a vertical to horizontal position. The chain supporting the chuck bodies indexes to present a new chuck body with breakers therein to the next oncoming stem transported by the transfer device **24**.

What is claimed is:

1. Wire break off mechanism for breaking away excess wire from a dummy wire traversing a stem, said stem being comprised of a base with lead-in wires passing through the base and perpendicular to a surface thereof and with at least one said dummy wire, said dummy wire being weakened at that surface, said mechanism including a chuck having a face with unobstructed apertures therethrough to receive said lead-in wires, said chuck carrying a breaker, said breaker having a face inclined to the face of the chuck occluding one of said apertures and in line with the on-coming dummy wire as the lead-in wires of the stem are fed into the apertures of the chuck, to bend and break off said dummy wire at said weakened portion.

2. Wire break off mechanism for breaking away excess wire from a dummy wire traversing a stem, said stem being comprised of a base with lead-in wires passing through the base and perpendicular to a surface thereof and with at least one said dummy wire, said dummy wire being weakened at that surface, said mechanism including a chuck having a face with unobstructed apertures therethrough to receive said lead-in wires, said chuck being further provided with a breaker, said breaker having a face inclined to the face of the chuck occluding one of the apertures in the face and a stem held within said occluded aperture of the chuck and in line with the on-coming dummy wire as the lead-in wires of the stem are fed into the apertures of the chuck, to bend and break off said dummy wire at said weakened portion.

3. Wire break off mechanism for breaking away excess wire from a dummy wire traversing a stem, said stem being comprised of a base with lead-in wires passing through the base and perpendicular to a surface thereof and with at least on said dummy wire, said dummy wire being weakened at that surface, said mechanism including a chuck having a face with unobstructed apertures therethrough to receive said lead-in wires, said chuck being further provided with a breaker, said breaker having a face inclined to the face of the chuck and occluding one of said apertures and a bent rod held within said occluded aperture of the chuck, said inclined face being in line with the on-coming dummy wire as the lead-in wires of the stem are fed into the apertures of the chuck, to bend and break off said dummy wire at said weakened portion.

4. Wire break off mechanism for breaking away excess wire from a dummy wire traversing a stem, said stem being comprised of a base with lead-in wires passing through the base and perpendicular to a surface thereof and with at least one said dummy wire, said dummy wire being weakened at that surface, said mechanism including a chuck having a face with unobstructed apertures therethrough to receive said lead-in wires, said chuck being further provided with a breaker, said breaker comprising a parallelpiped modified to have a bevelled face and a rod extending perpendicularly from the face opposed to the bevelled face, said rod extend-

ing in and held in said chuck and said bevelled face being in line with the on-coming dummy wire as the lead-in wires of the stem are fed into the apertures of the chuck, to bend and break off said dummy wire at said weakened portion.

5. Wire break off mechanism for breaking away excess wire from a dummy wire traversing a stem, said stem being comprised of a base with lead-in wires passing through the base and perpendicular to a surface thereof and with at least one said dummy wire, said dummy wire being weakened at that surface, said mechanism including a chuck having a face with unobstructed apertures therethrough spaced about the face near the periphery thereof to receive said lead-in wires, said chuck carrying a breaker, said breaker having a face occluding one of said apertures and another face inclined to the face of the breaker occluding said one of said apertures and in line with the on-coming dummy wire as the lead-in wires of the stem are fed into the apertures of the chuck, to bend and break off said dummy wire at said weakened portion.

6. Wire break off mechanism for breaking away excess wire from a dummy wire traversing a stem, said stem being comprised of a base with lead-in wires passing through the base and perpendicular to a surface thereof and with at least one said dummy wire, said dummy wire being weakened at that surface, said mechanism including a chuck having a face with unobstructed apertures therethrough adjacent the boundary of the face to receive said lead-in wires, said chuck being further provided with a breaker, said breaker having a face inclined to the face of the chuck occluding one of the apertures in said chuck face and a rod forming part of the breaker held within said occluded aperture of the chuck with the breaker in line with the on-coming dummy wire as the lead-in wires of the stem are fed into the apertures of the chuck, to bend and break off said dummy wire at said weakened portion.

7. Wire break off mechanism for breaking away excess wire from a dummy wire traversing a stem, said stem being comprised of a base with lead-in wires passing through the base and perpendicular to a surface thereof and with at least one said dummy wire, said dummy wire being weakened at that surface, said mechanism including a chuck having a face with unobstructed apertures therethrough to receive said lead-in-wires, said chuck carrying a breaker, said breaker having a face inclined to the face of the chuck and in line with the on-coming dummy wire as the lead-in wires of the stem are fed into the apertures of the chuck, to bend and break off said dummy wire at said weakened portion, said breaker being further provided with a lip engaging an edge portion of the chuck to prevent rotation of the breaker in the aperture.

8. A breaker for insertion into a chuck, said breaker comprising a metallic block of generally parallelpiped form modified to have one face bevelled, a rod attached to the face of the parallelepiped opposite to the bevelled face and perpendicular to said opposite face, and a lip on the breaker parallel to and spaced from the rod, said lip extending in the same direction as the rod.

9. In combination, a chuck having unobstructed apertures, a breaker held by said chuck, said breaker comprising a metallic block of generally parallelepiped form with one face modified to have its face bevelled, and a resilient rod attached to the face of the modified parallelepiped opposite to the bevelled face, said rod being bent intermediate its length so that the free portion of the rod forms an obtuse angle with the block attached portion of the rod, said rod being inserted in one of said apertures to resiliently engage the inside wall of the aperture to thereby hold the breaker to the chuck.

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