United States Patent [19]

Netta

[11] **3,840,987**

[45] **Oct. 15, 1974**

[54] **PROTECTIVE DEVICE FOR A POWER TOOL**

[75] Inventor: **Louis A. Netta,** North Brunswick, N.J.

[73] Assignee: **Thomas & Betts Corporation,** Elizabeth, N.J.

[22] Filed: **Nov. 28, 1973**

[21] Appl. No.: **419,794**

[52] **U.S. Cl.** **30/90.1,** 30/91.2, 30/92, 30/182, 30/241

[51] **Int. Cl.**... **B21f 11/00,** B26b 15/00, B26b 29/00

[58] **Field of Search** 30/241, 182, 228, 90.1, 30/91.2, 92

[56] **References Cited**

UNITED STATES PATENTS

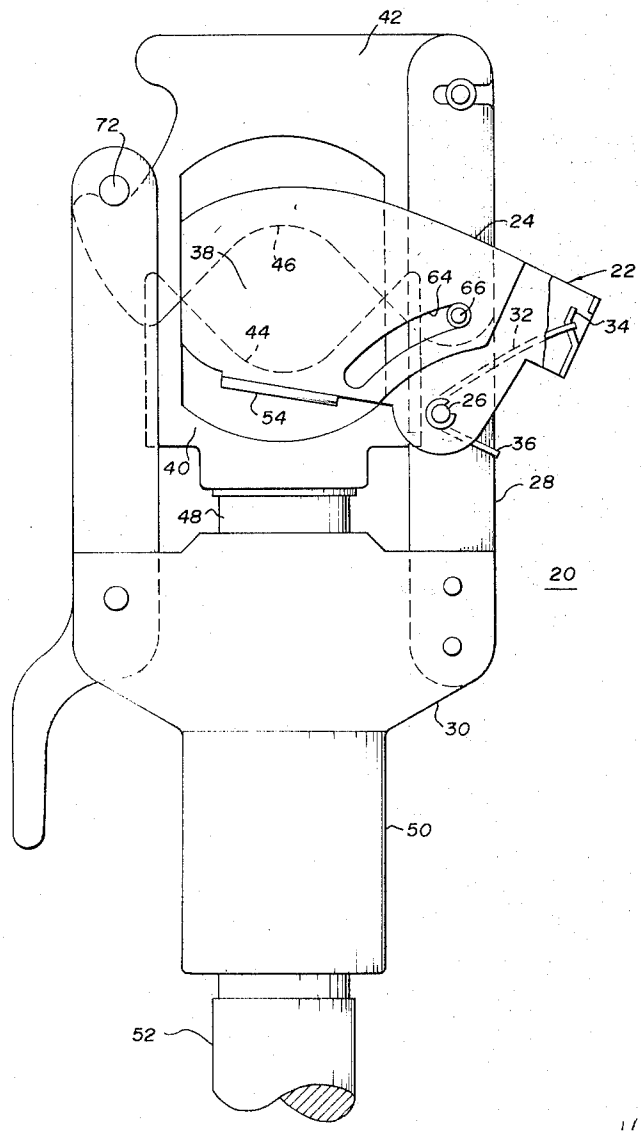
2,008,362	7/1935	Littlehale	30/182 X
2,237,870	4/1941	Smith	30/272
3,036,798	5/1962	Martin	30/90.1 X
3,142,219	7/1964	Martin	30/92 X

Primary Examiner—Al Lawrence Smith
Assistant Examiner—J. T. Zatarga
Attorney, Agent, or Firm—David Teschner; Jesse Woldman

[57] **ABSTRACT**

A selectively operable safety shield comprising a preferably U-shaped member coupled to the frame of a power tool is biased towards a first position straddling the normally exposed work zone of the tool to restrict inadvertent contact with the moving members thereof to prevent injury to an operator utilizing such tool. The shield may be manipulated away from its closed position to selectively expose the work zone by cooperative engagement with the workpiece. Further movement of the shield may be accomplished by attaching it to a preferably pivoting support coupled to the frame of the tool to permit the tool to be engaged mid-span of a length of the workpiece.

8 Claims, 10 Drawing Figures



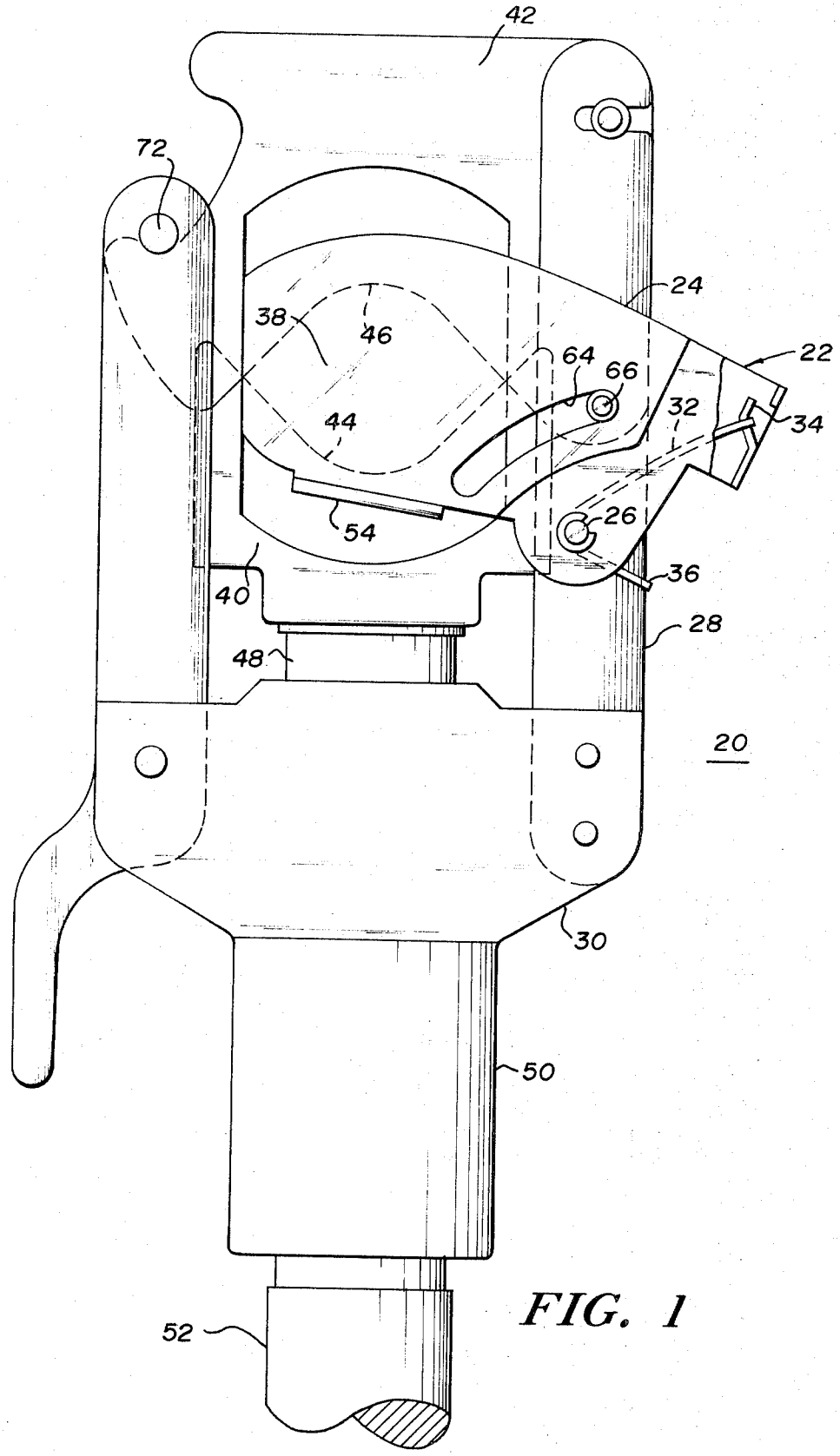


FIG. 1

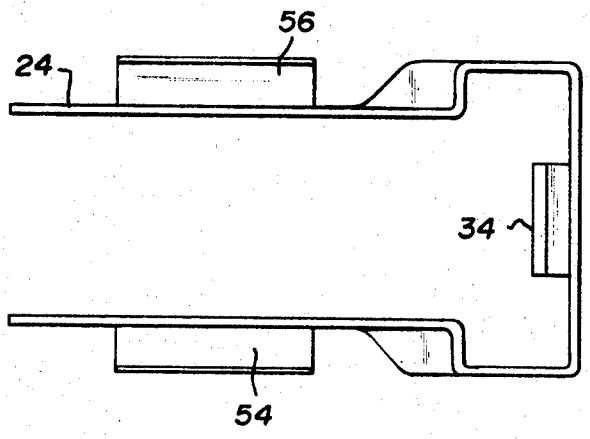


FIG. 2

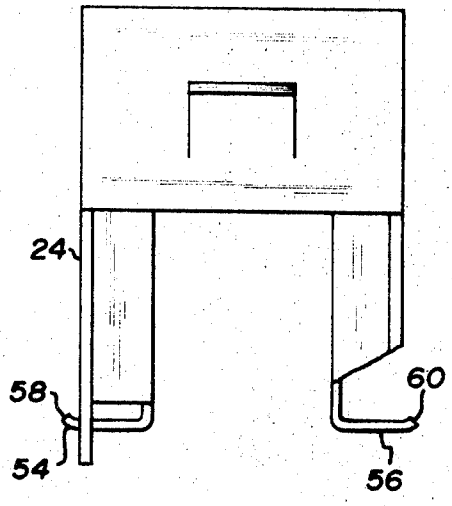


FIG. 3

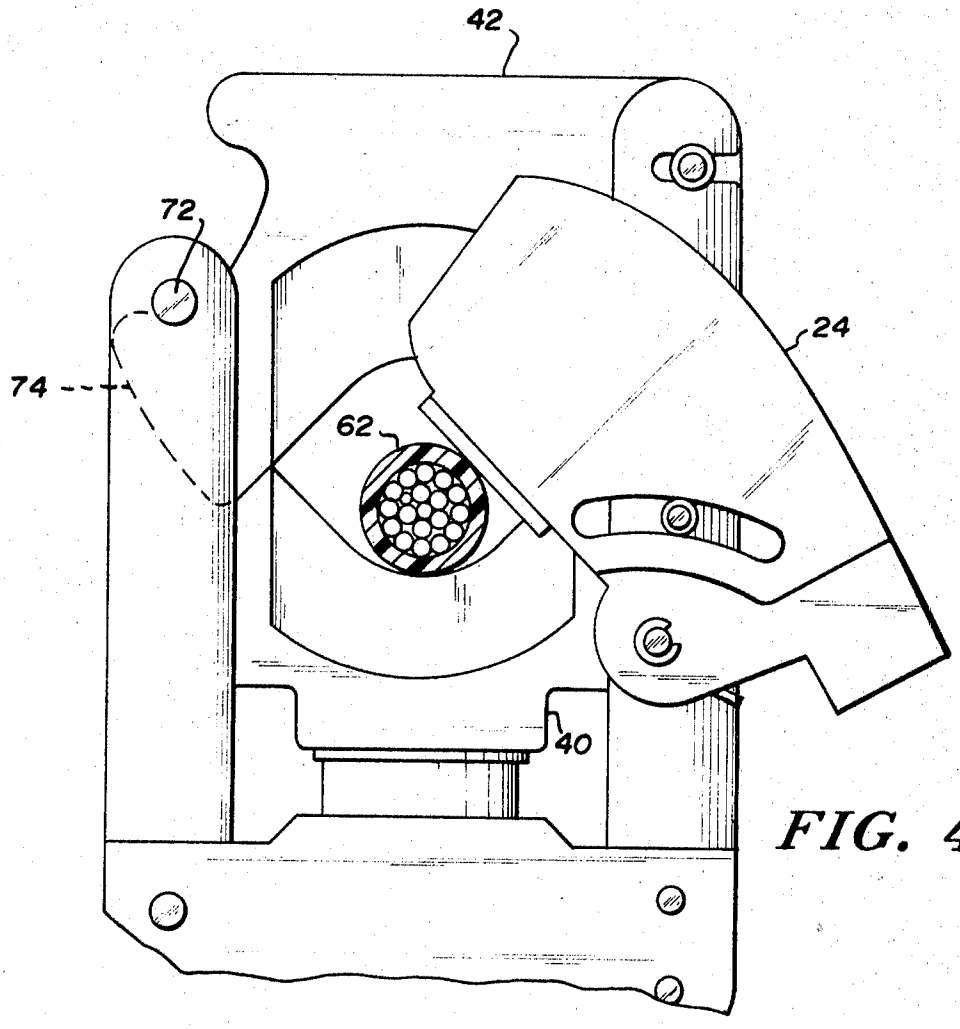


FIG. 4

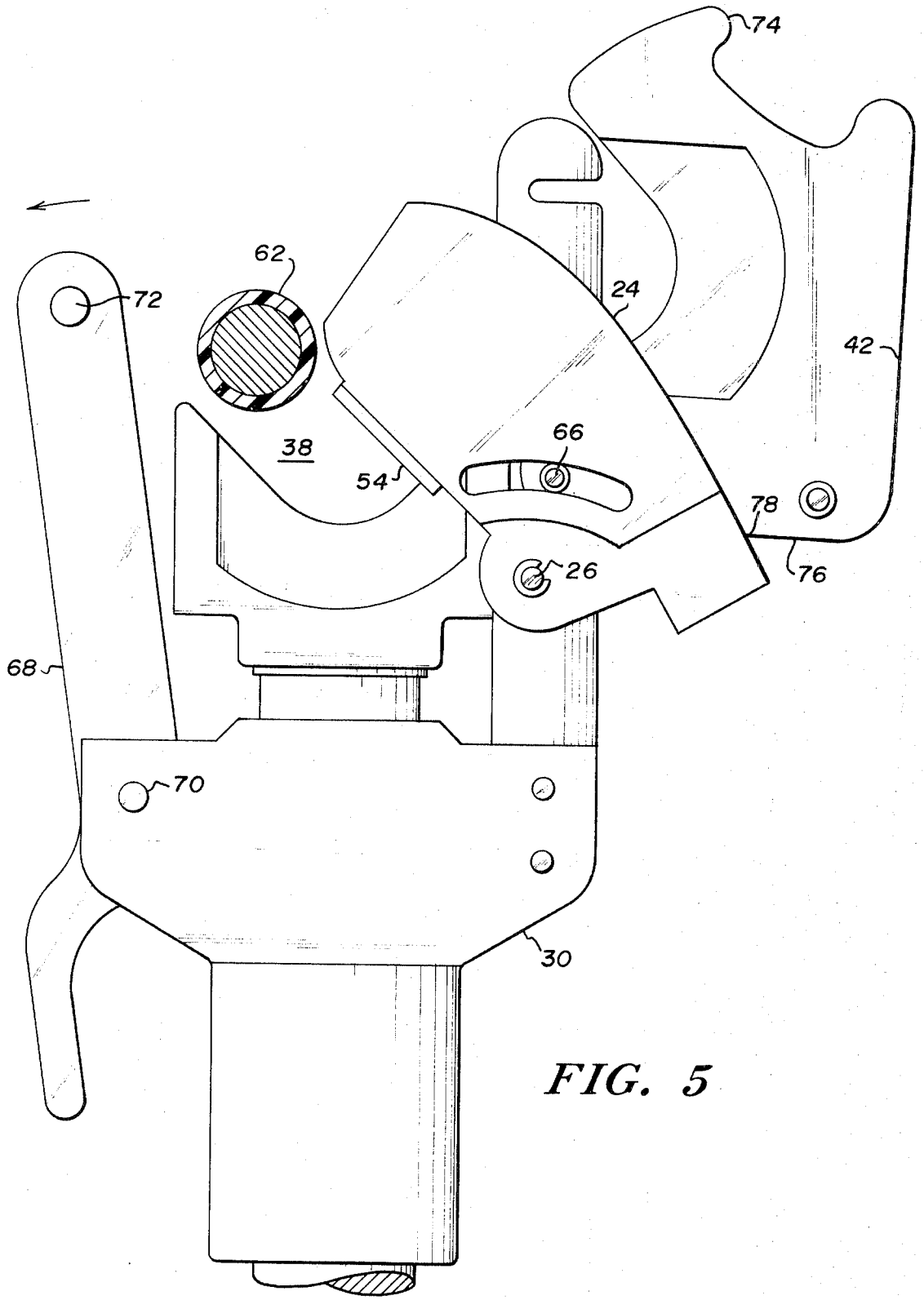


FIG. 5

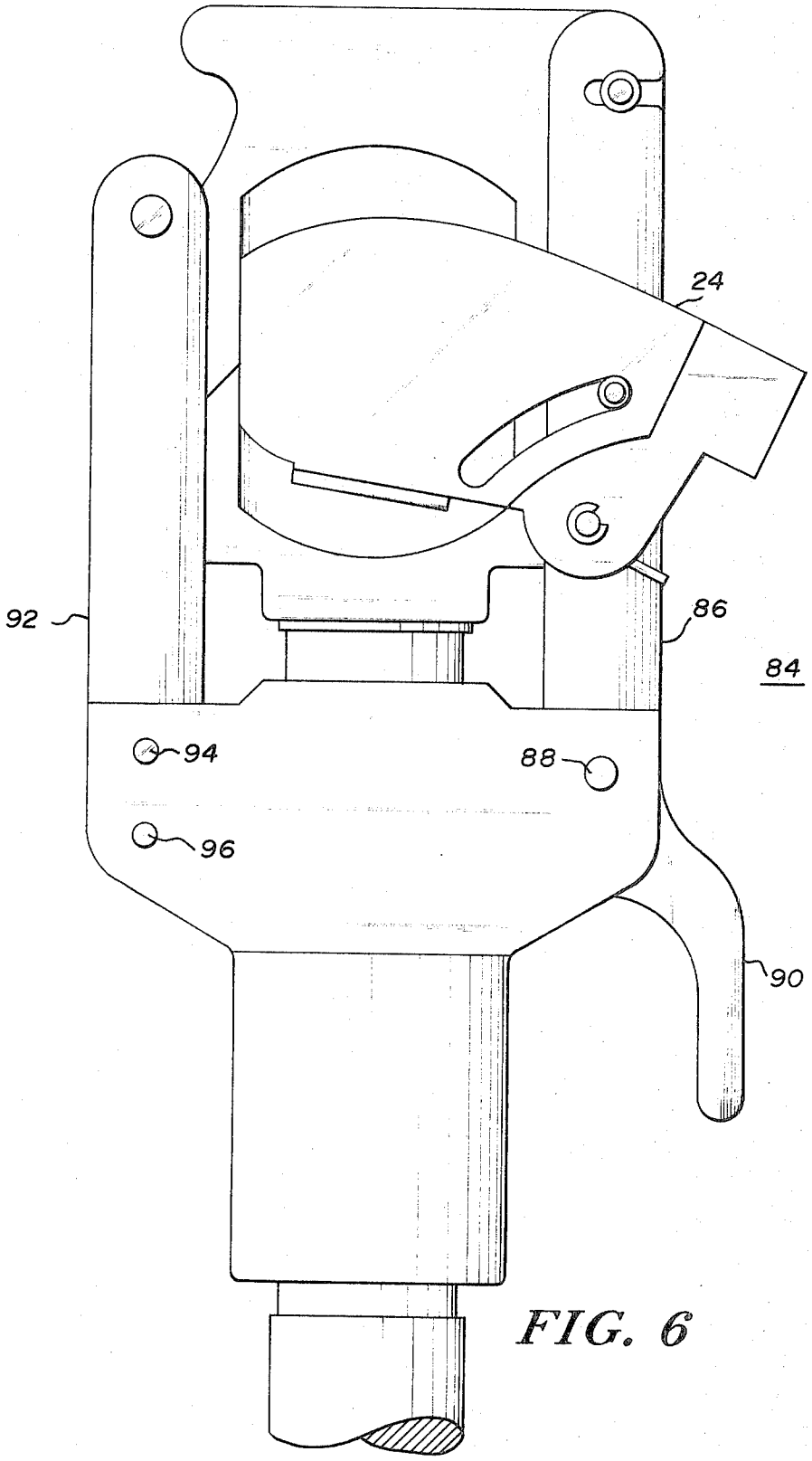


FIG. 6

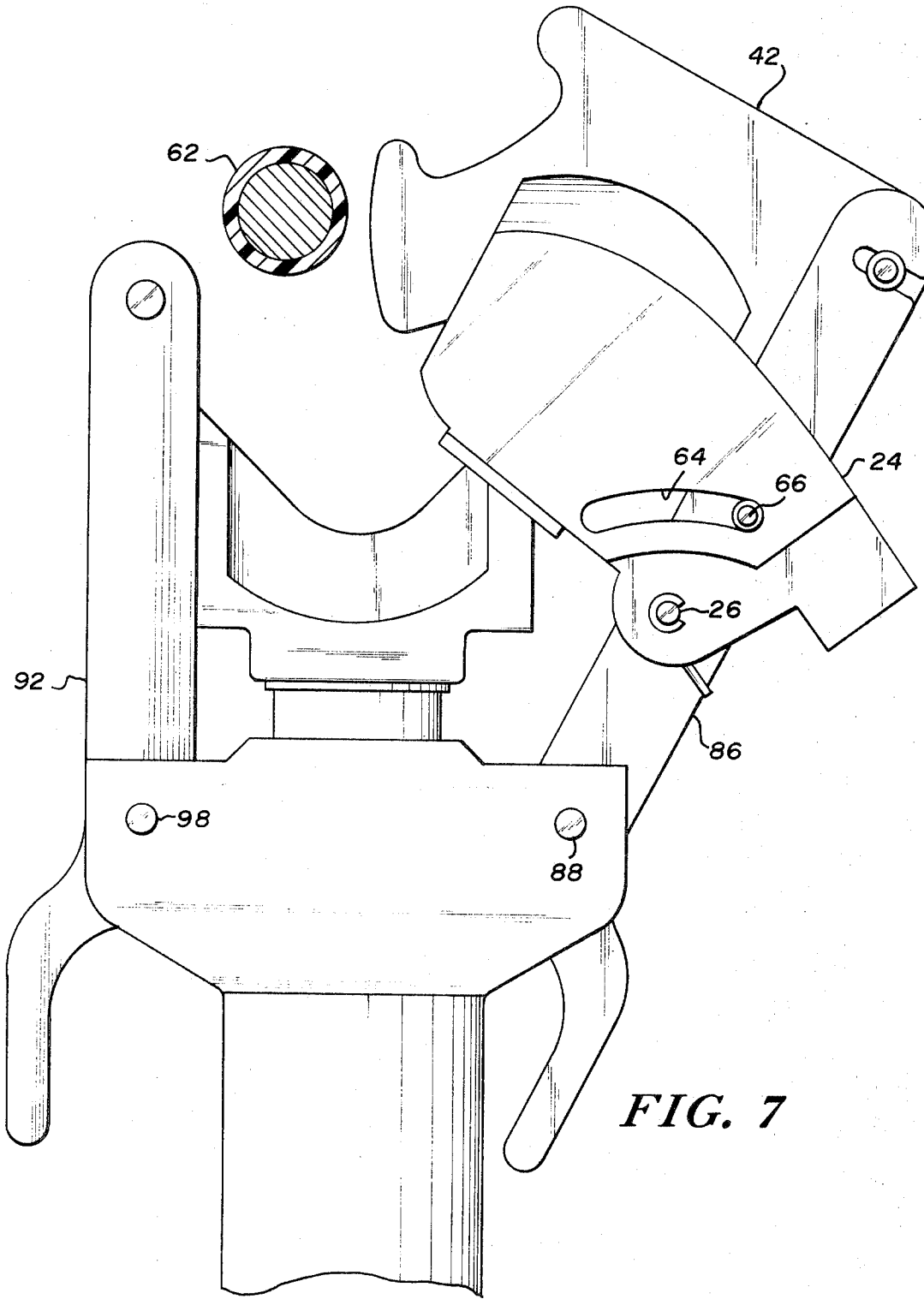


FIG. 7

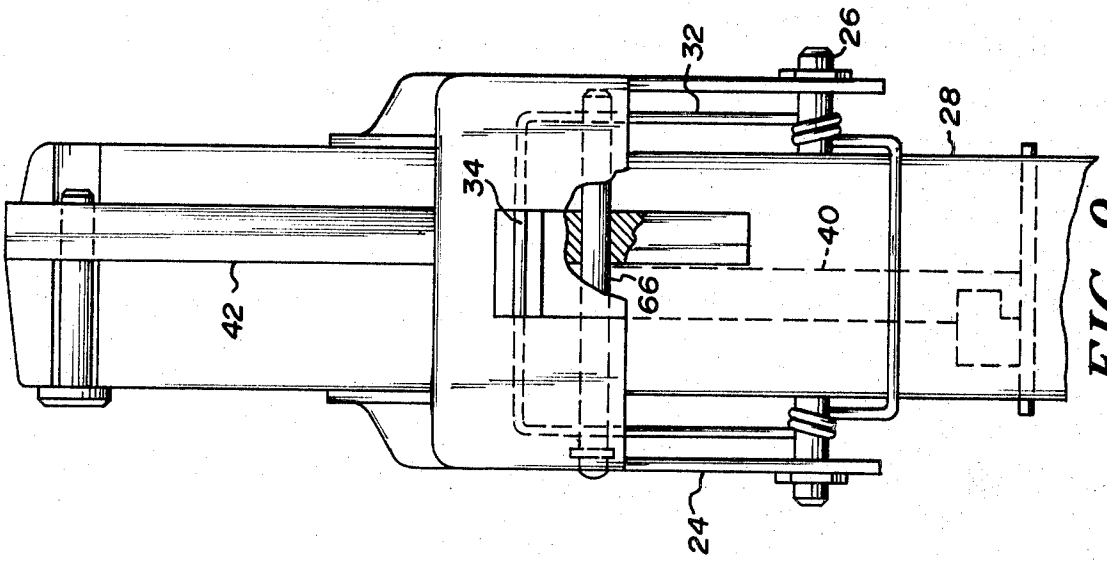


FIG. 9

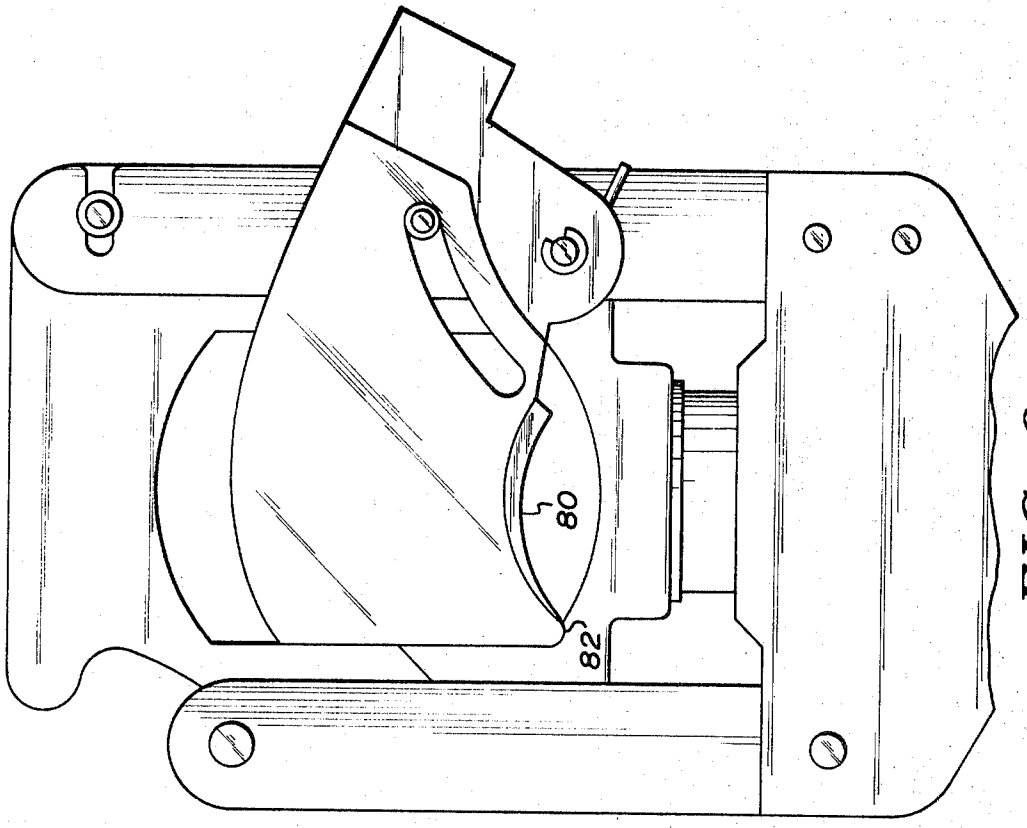


FIG. 8

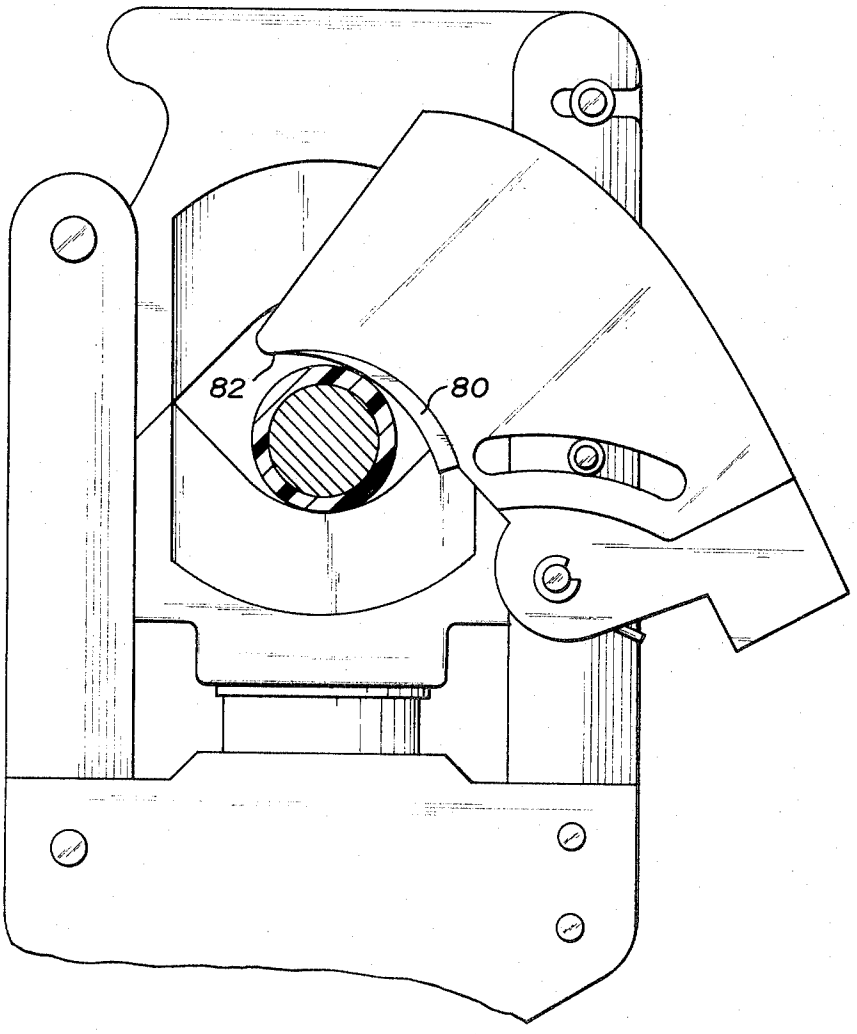


FIG. 10

PROTECTIVE DEVICE FOR A POWER TOOL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention is directed to the field of protective devices for tools having normally exposed work zones.

2. Description of the Prior Art

Prior art tools which may be both manually and power operated and which may include cutting and crimping devices in which the die portions thereof are urged towards one another under relatively high pressure generally comprise a suitably formed aperture defining the work zone and are designed to unobstructively receive the workpiece preparatory to the performance of the specified operation thereon. The resulting exposed work zone generally presents an extremely hazardous condition for an operator who may inadvertently insert one or more fingers between the die members of the tool while the power stroke is initiated. In view of the increasing emphasis upon safety in the field of power tools and equipment, it has become necessary to insure that such tools are suitably protected so as to avoid injury to the operator under substantially all conditions of operation. This increased concern for safety has engendered an immediate need for a form of protective device or guard means which is simple, convenient, relatively tool-proof and easy to operate to ensure the safe operation of the tool and protect the operator from injury in the use thereof. Pivoting latch arrangements which permit the tool to be placed over the mid-span of a conductor, or the like, wherein the latch must be advanced to the fully closed position before further operation can take place are disclosed in U.S. Pat. No. 2,722,859 issued Nov. 8, 1955 to H. C. Stoltz, and U.S. Pat. No. 2,772,715 issued Dec. 4, 1956 to K. L. Neijstrom et al. Neither of these devices, however, will prevent the inadvertent insertion of the operator's finger into the exposed work area or zone prior to or during the power stroke. Existing protective guards or shields which have been devised principally for use in conjunction with stationary machinery comprise, in most cases, a stationary shield at least partially surrounding the work area, requiring the operator to engage in rather inconvenient, cumbersome, and time-consuming manipulations to advance the work into the work area. The operator is thus tempted to defeat the safety feature of such guard or shield to increase his productive capacity, leading, in many cases, to a condition more hazardous than that which the guard or shield was designed to prevent.

SUMMARY OF THE INVENTION

The invention overcomes the problems and limitations noted above with respect to prior art devices by providing a protective device for power tools and the like, which is safer, more versatile, simpler, more convenient, and more economical than such prior art devices. The protective device comprises, in one embodiment, a preferably U-shaped shield movably coupled to a die support attached to the frame of a power tool and biased towards a first or closed position straddling the normally exposed work zone of the power tool to restrict inadvertent access thereto. The shield is provided with manipulating means which may take the form of a flanged shoulder arranged to abut the workpiece so that the shield is displaced and the workpiece inserted into the work zone in essentially one continuous operation. The shield is appropriately biased to remain in contact with the workpiece during operation of the tool so as to preclude the entry of any further material or a part of the operator's body into the work zone during the power stroke. In one embodiment, of a tool with which the shield may be employed, the stationary die member of a two part shearing die may be unlatched from its normal position and selectively pivoted away from the work zone while one edge of the die engages a portion of the shield so that the shield is also manipulated away from the work zone as the tool is opened, for example, for mid-span engagement about a conductor or the like. In a further embodiment, the support member to which the shield is coupled is pivotingly attached to the tool frame to permit the shield to be displaced to a further or third position with respect to the work zone. The operator may thus bring the tool to the workpiece and, in a single operation, employ the workpiece to reposition the shield permitting entry of the workpiece into the work zone in a safe, convenient, and simple procedure. It is therefore an object of this invention to provide a protective device for power tools and the like.

It is another object of this invention to provide means for restricting inadvertent access to the normally exposed work zone of a power tool and the like.

It is a further object of this invention to provide shield means for a power tool or the like which may be manipulated by the workpiece to provide access to the work zone.

It is still a further object of this invention to provide a movable shield straddling the normally exposed work zone of a power tool or the like and arranged to follow the contour of the workpiece to minimally expose the work zone during the power stroke.

It is yet another object of this invention to provide a protective device for a power tool or the like which may be manipulated from a closed to an open position by engagement with the workpiece.

Other objects and features will be pointed out in the following description and claims and illustrated in the accompanying drawings which disclose by way of example the principle of the invention and the best mode contemplated for carrying it out.

BRIEF DESCRIPTION OF THE DRAWINGS

In the Drawings

FIG. 1 is a fragmentary front elevational view, partly cut away and partly in section, of a protective device for a power tool constructed in accordance with the concepts of the invention.

FIG. 2 is a top plan view of the protective device illustrated in FIG. 1.

FIG. 3 is a rear elevational view, partly cut away, of the protective device illustrated in FIG. 1.

FIG. 4 is a fragmentary front elevational view, showing the device of FIG. 1 in a partially open state, with a conductor, in section, shown engaged therein.

FIG. 5 is a fragmentary front elevational view, of the device of FIG. 1 selectively pivoted to an open position to show the manner of mid-span engagement with a conductor, shown in section therein.

FIG. 6 is a fragmentary front elevational view, partly cut away and partly in section, of the device of FIG. 1 attached to a modified form of the power tool illustrated in FIG. 1.

FIG. 7 is a fragmentary front elevational view, of the device of FIG. 1 attached to a further modified form of the power tool illustrated in FIG. 1, and showing a conductor, in section, adjacent the work zone thereof.

FIG. 8 is a fragmentary front elevational view of another embodiment of a protective device constructed in accordance with the concepts of the invention.

FIG. 9 is a fragmentary rear elevational view, partly cut away and partly in section, of the assembly illustrated in FIG. 1.

FIG. 10 is a fragmentary front elevational view, of the device of FIG. 8 in a partially open state about an insulated conductor, shown in section, disposed within the work zone of a power tool.

Similar elements are given similar reference characters in each of the respective drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to FIGS. 1, 2, 3, 4 and 5 there is shown a power tool 20 having a protective device 22 constructed in accordance with the concepts of the invention. The protective device 22 comprises an essentially U-shaped shield 24 pivotingly coupled by means of a pin 26 to a first support means 28 affixed to the power tool frame 30. A torsion spring 32 engages a lanced portion 34 located at the bight of the U of the shield 24 and is brought around the coupling pin 26 and thereafter into engagement with the first support means 28 as at 36. The torsion spring 32 biases the shield 24 in a counterclockwise direction, as viewed in FIG. 1, to provide a shutter-like restriction about a work zone 38 defined by the edges of a first die member 40 and a second die member 42, which die members, for the purpose of illustration only and not as a limitation of the type of tool with which the shield 24 may be employed, comprise a pair of blades suitable, for example, for shearing electrical cable or the like. Each of the die members 40 and 42, respectively, thus comprise a relatively sharp, knife-like inner edge 44 and 46, respectively. The lower die member 40 is attached to a piston 48 fitted within a cylinder 50 to which may be applied a hydraulic fluid such as, for example, oil or air through a coupling 52 to drive the piston 48 and its associated die member 40 towards the stationary die member 42. The shield 24, in its first or closed position, thus serves to shroud the aperture formed by the work zone 38 to prevent inadvertent or accidental insertion of the operators finger between the die members 40, 42. To facilitate the manipulation of the shield 24 to a second or open position, there is provided a pair of flanged portions 54, 56 adjacent the lower edge of the shield 24, and extending generally perpendicularly outwardly from each of the leg portions of the shield 24, as shown in greater detail in FIG. 3. For convenience, each of the flanged portions 54, 56, is provided with an upturned portion 58, 60 respectively, adjacent the free edge thereof to facilitate engagement therewith by the workpiece which may include, for example, a conductor such as 62, (see FIG. 4) the end of which may be employed to raise the shield 24 sufficiently to provide access to the work zone 38 and permit the conductor 62 to the inserted therewithin. This procedure may be accomplished by placing the end of the conductor 62 beneath either one of the flanged portions 54, 56, and raising the conductor sufficiently to cause the shield 24 to rotate about its coupling pin 26 to expose the work zone 38 so that the conductor 62 may be advanced into the work zone 38 between the die members 40, 42. The shield 24, being biased towards the closed position by the torsion spring 32, will tend to maintain intimate contact with the outer surface of the conductor 62 so as to at least partially shroud the remaining exposed portion of the work zone 38 during the subsequent shearing operation. As the conductor is removed from the work zone 38 upon completion of the power stroke, the shield 24, being suitably biased, to cause to rotate back to its first or closed position as illustrated in FIG. 1, thereby re-establishing a guard about the work zone 38 preparatory to the next operation. To control the extent of travel of the shield 24 in its rotational movement, there is provided therein a slotted portion 64 suitably dimensioned to receive a pin 66 attached to the support member 28. Thus, the right side of the slotted portion 64, as viewed in FIG. 1, is arranged to abut the pin 66 to restrict the counterclockwise movement of the shield 24 in its first or closed position whereas the left side of the slotted portion 64 is arranged to provide a stop for the shield 24 in the open or second position. Although the shield 24 may be conveniently manipulated by means of either one of the flanged portions 54, 56, it may also be rotatably displaced from its first or closed position by cooperative engagement with the upper die member 42, as illustrated in greater detail in FIG. 5. As illustrated therein, a second support member 68 pivotingly coupled to the frame means 30 of the power tool 20 by means of a pin 70 comprises a retaining pin 72 adjacent its upper or free end. The pin 72 is arranged to engage the hook like end 74 of the upper die member 42 to releasably lock the die member 42 to the power tool frame 30. To install the power tool 20 midspan of a conductor such as 62 to effect the shearing thereof, the upper die member 42 is released from its locked position by subjecting it to a slight downward pressure to release its hook portion 74 from engagement with the retaining pin 72. The upper die member 42 may then be rotated about the pin 66 in a clockwise direction, as viewed in FIG. 5, to the position shown therein. A rear edge 76 of the upper die member 42 is thus caused to abut the shield 24 as at 78 causing the shield 24 to follow the rotational movement of the upper die member 42 so that the shield 24 is also rotated clockwise, as viewed in FIG. 5, away from the work zone 38. The power tool 20 is now opened sufficiently to permit its placement over the conductor 62 at any selected point along the length thereof. After the conductor 62 is seated within the work zone 38 the upper die member 42 may then be rotated counterclockwise so that its hook portion 74 re-engages pin 72 to lock the upper die member 42 in its closed position. The shield 24, being released from engagement with the upper die member 42, will tend to pivot back towards its first or closed position under the influence of the biasing spring 32 and will abut the outer surface of the conductor 62 substantially as shown in FIG. 4. As shown in greater detail in FIG. 9, the biasing spring 32 is arranged to straddle the first support member 28 and abut the outer surface thereof while slidably engaged about the pin 26 and supported at its other end about the lanced portion 34 of shield 24. The diameter of the spring 32 may, of course, be preselected to provide the desired biasing force for the shield 24 to insure that the shield 24 is properly maintained in its first or closed position irrespective of the position of the power tool 20

during operation. Although a torsion spring is illustrated as providing the biasing means for the shield **24,** other suitable arrangements may be provided, however, without departing from the spirit of the invention and within the concepts herein disclosed, such arrangement including, for example, compression or extension springs (not shown) coupled between the shield **24** and the support **28,** or suitably formed flat springs (not shown) bearing against the shield **24** to maintain it in its first or closed position. The flanged portion **54** of the shield **24,** although shown as an essentially planar element, may be arcuately formed as at **80** in FIGS. **8** and **10** to more closely conform to the outer contour of, for example a circular cross section cable or the like, or alternatively, may have a polygonal configuration (not shown) where necessary or desirable and within the concepts herein disclosed. Further, the free end of the shield **24** may be extended as at **82** (FIGS. **8** and **10**) to more fully encompass the workpiece and provide a further restriction of the work zone **38** during the operative cycle.

Referring now to FIG. **6** there is shown a power tool **84** similar in construction to the power tool **20** except that the method of coupling the first and second support members to the frame means of the power tool is essentially reversed. As illustrated therein, the power tool **84** comprises a first support member **86** which is pivotingly coupled to the power tool **84** by a pin **88** and further comprises a handle portion **90** for manipulating the support member **86** about the pin **88.** A second support member **92** is affixed to the frame of the power tool **84** by means of pins **94, 96,** so that the support member **86** may be selectively pivoted about the pin **88** while the support member **92** is maintained in a stationary position. This arrangement may be modified, however, as shown in FIG. **7** whereby the support member **92** is also movably coupled to the power tool by a pin **98** so that both support members may be selectively pivoted away from the work zone. Thus, in the arrangement illustrated in FIG. **7,** as the support member **86** is pivoted about the pin **88** in a clockwise direction, as viewed in FIG. **7,** the shield **24** and the die member **42** which are both coupled to the support member **86** are caused to follow the movement thereof and be displaced from the work zone simultaneously. Accordingly, the upper die member **42** and the shield **24** may thus be independently or simultaneously pivoted away from the work zone, as alternative arrangements, for either mid-span or end engagement with the workpiece. Upon the return of the support member **86** to its initial position, the leading edge of the shield **24** is caused to contact the outer surface of the workpiece **62** so that the shield **24** is pivoted backwardly against the force of the biasing spring **32** to assume a position substantially as shown in FIG. **4** during the subsequent operation of the tool. It will of course also be clear that the shield **24** may be provided with a further slotted portion (not shown) extending from the aperture therein through which the pin **26** is inserted generally parallel to the slotted portion **64** so that the shield **24** may be displaced both laterally and rotationally from its first or closed position to a predetermined second position substantially along the two axis to provide an additional degree of movement which may be found advantageous in certain applications.

Although there has been described in detail above the employment of a shield, such as **24** in conjunction with a power tool designed primarily for shearing, it will be clear to those skilled in the art that such arrangement may be readily employed with equal effectiveness in conjunction with existing compression and crimping tools having a normally exposed work zone so that the previously described hazardous condition resulting therefrom may be simply and conveniently avoided. By reversing the location of the flanged portions **54, 56** and suitably altering the location of the pins **26** and **66,** and the slotted portion **64** of shield **24,** the shield **24** may be manipulated from its closed position to an open position in a direction opposite to that described above, that is, as viewed in FIG. **1,** in a counterclockwise direction to provide an alternate mode of operation. Additionally, the shield **24** may be provided with flanged portions such as **54, 56** on both its upper and lower edges to permit both clockwise and counterclockwise manipulation of the shield, if necessary or desirable, and within the concepts herein disclosed.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A protective device for a power tool having a normally exposed work zone, comprising: frame means; shield means pivotably coupled to said frame means and selectively movable between a first position restricting access to said work zone, and a second position permitting access to said work zone; means for coupling said shield means to said frame-means so that said shield means is selectively displaceable between said first position and said second position; means cooperative with said shield means and said frame means for biasing said shield means in said first position; and means for selectively manipulating said shield means from said first position to said second position, said manipulating means being adapted to cooperatively engage a workpiece intended to be inserted in said work zone to provide access to said work zone, said shield means comprising a U-shaped member pivotably coupled to said frame means, said U-shaped member having a lanced portion adjacent the bight of said U-shaped member, said biasing means comprising a torsion spring engaging said lanced portion and said coupling means to bias said shield means towards said first position.

2. A protective device as defined in claim **1** wherein said manipulating means comprises a selectively formed flanged portion extending outwardly from said shield means generally adjacent one edge thereof.

3. A protective device as defined in claim **1** wherein said manipulating means comprises a flanged portion extending outwardly from each of the legs of said U-shaped member generally adjacent one edge thereof.

4. A protective device as defined in claim **1** wherein said frame means further comprises means for selectively limiting the extent of travel of said shield means.

5. A protective device as defined in claim **4** wherein said travel limiting means comprises pin means, and said shield means comprises a slotted portion slidably engaging said pin means.

6. A protective device as defined in claim **1** further comprising means for moving said shield means to a third position providing further access to said work zone.

7. A protective device as defined in claim **6** wherein said frame means comprises support means pivotable

towards and away from said work zone, said shield means being coupled to said support means so that upon selective manipulation of said support means, said shield means is moved from said first position to said third position.

8. A protective device as defined in claim **7** wherein said torsion spring is cooperative with said shield means and said support means.

* * * * *