

[54] **HAND OPERABLE LONG REACH TOOL**

[76] Inventor: **Paul Burian**, 17 Chester Ave.,  
Elmsford, N.Y. 10523

[22] Filed: **Oct. 16, 1972**

[21] Appl. No.: **297,705**

[52] U.S. Cl. .... **294/19 R**, 294/104

[51] Int. Cl. .... **A47f 13/06**

[58] Field of Search..... 294/16, 19 R, 20, 50.9,  
294/103, 104, 115; 30/248, 249; 81/3.42,  
3.44; 128/2, 321; 306/12, 23

[56] **References Cited**

**UNITED STATES PATENTS**

|           |        |              |           |
|-----------|--------|--------------|-----------|
| 2,288,957 | 7/1942 | Sand .....   | 294/50.9  |
| 2,518,994 | 8/1950 | Miller ..... | 294/104 X |

|           |        |               |           |
|-----------|--------|---------------|-----------|
| 2,759,758 | 8/1956 | Yancey .....  | 294/104   |
| 2,790,437 | 4/1957 | Moore .....   | 294/104 X |
| 2,931,680 | 4/1960 | Kaspaul ..... | 294/100   |

**FOREIGN PATENTS OR APPLICATIONS**

|         |        |                     |        |
|---------|--------|---------------------|--------|
| 293,818 | 7/1928 | Great Britain ..... | 306/23 |
|---------|--------|---------------------|--------|

*Primary Examiner*—Richard A. Schacher

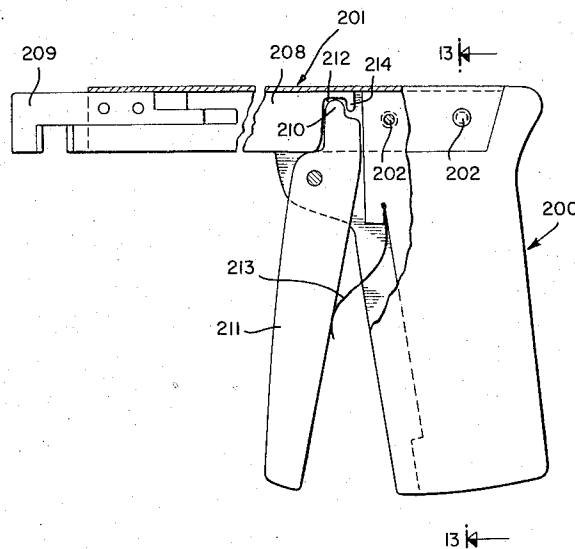
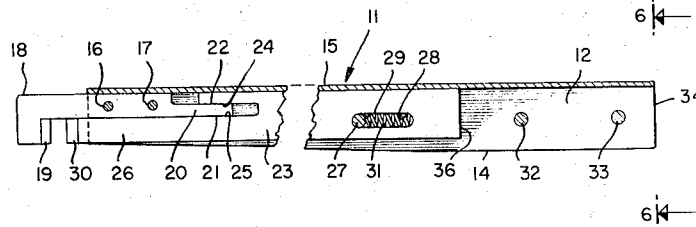
*Assistant Examiner*—Johnny D. Cherry

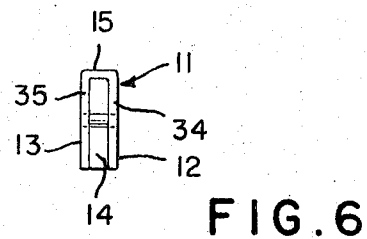
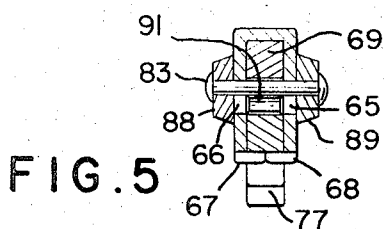
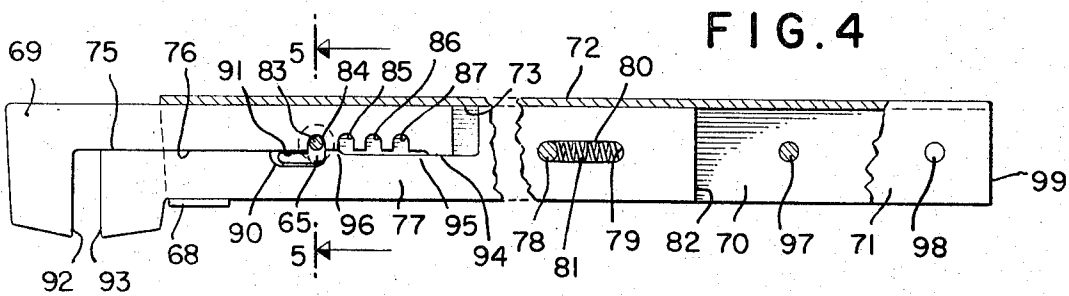
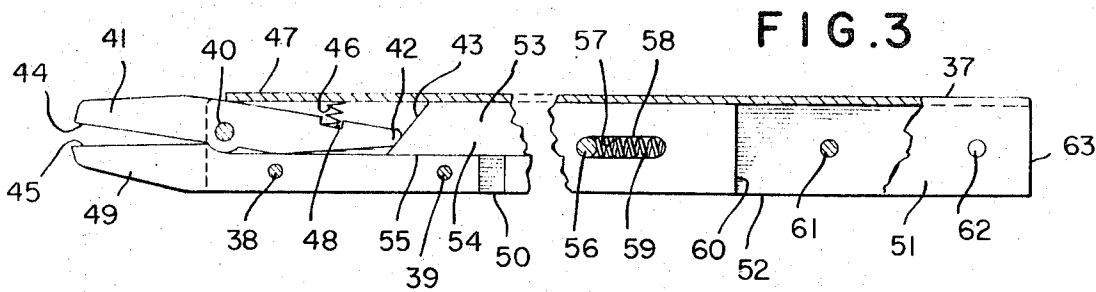
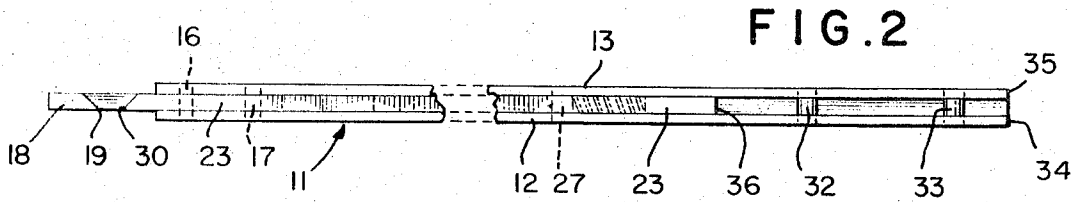
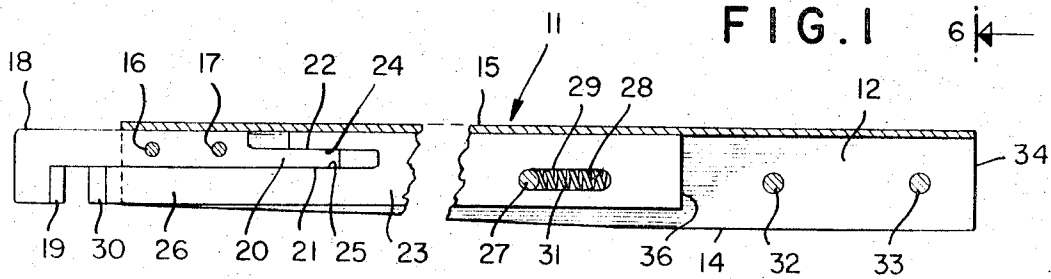
[57]

**ABSTRACT**

The invention concerns a long reach hand-operable tool useable for diverse purposes. The hand tool is comprised of an elongate member having at its terminal end portion work performing member actuatable by a hand grip member to which the elongate member is either removably or integrally connected.

**16 Claims, 13 Drawing Figures**





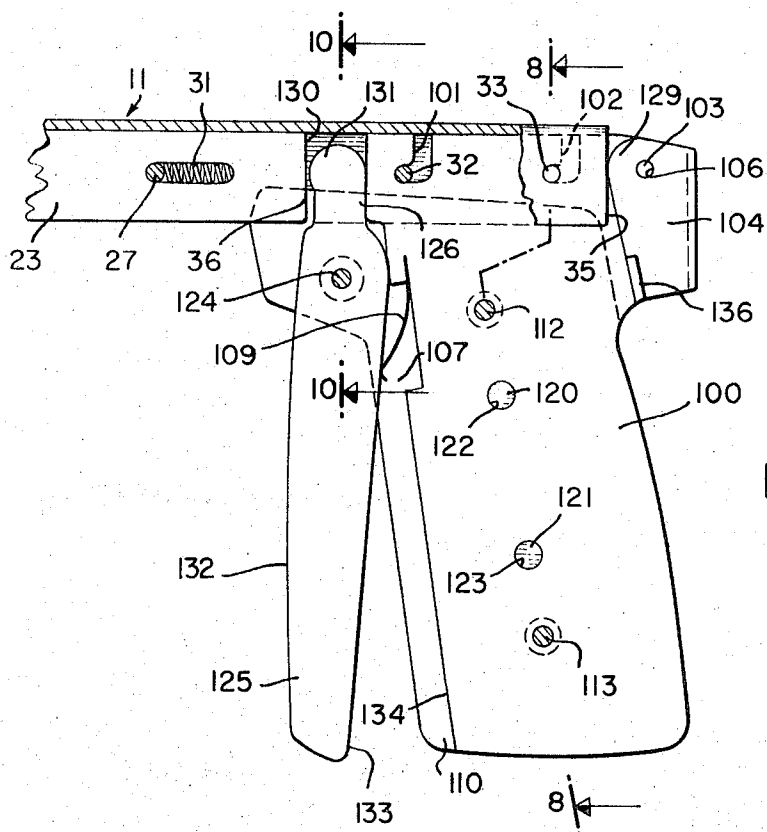


FIG. 7

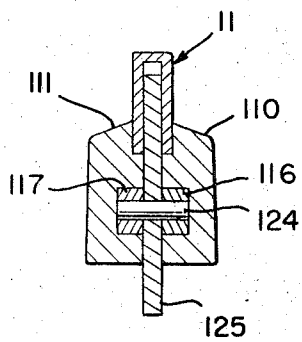


FIG. 10

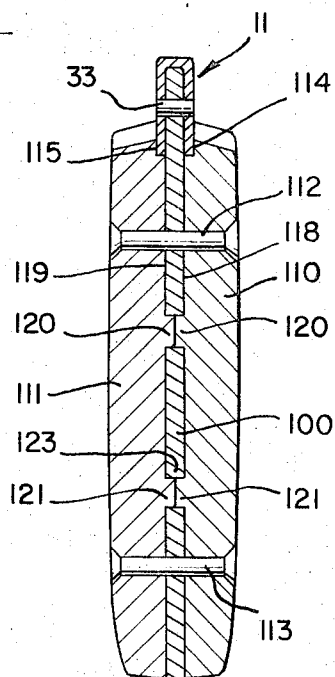


FIG. 8

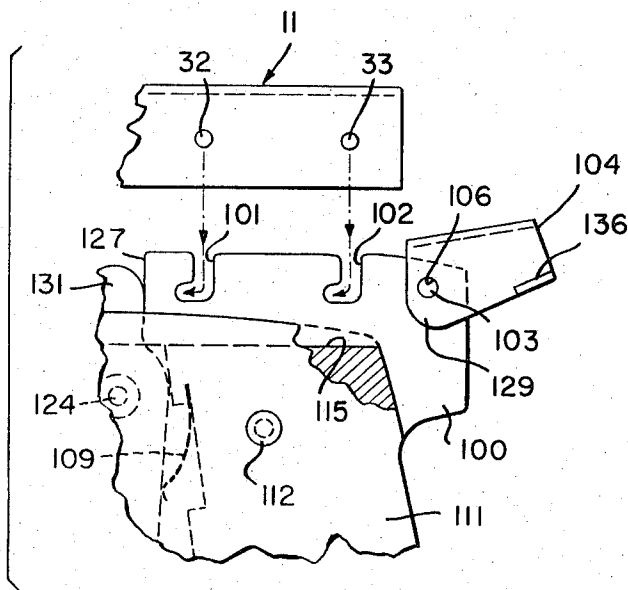


FIG. 9

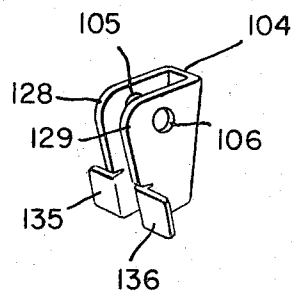


FIG. 11

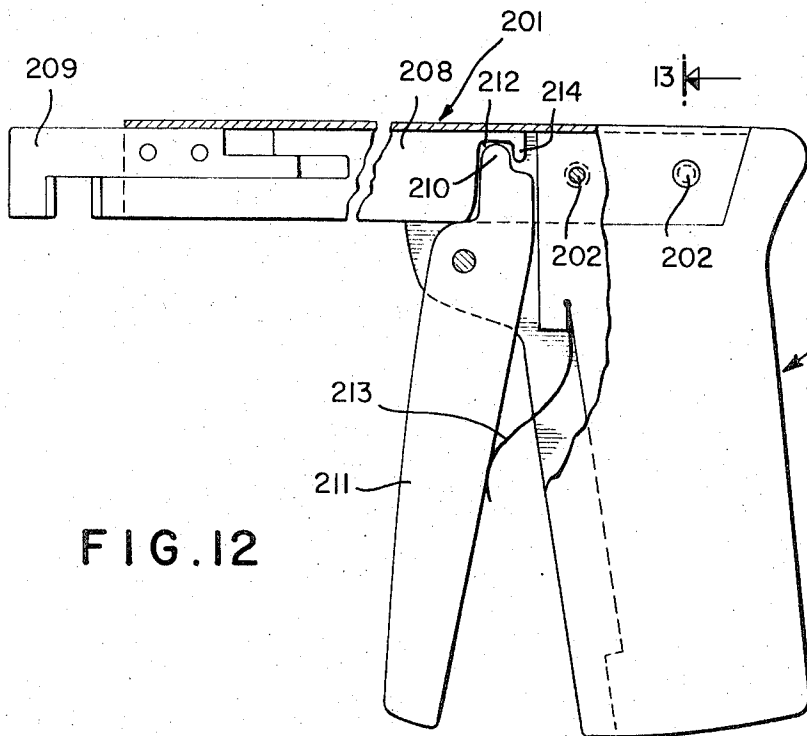


FIG. 12

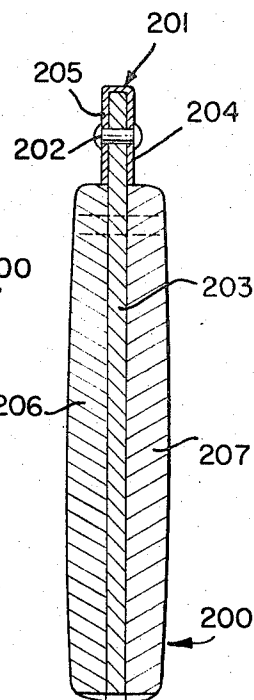


FIG. 13

**HAND OPERABLE LONG REACH TOOL**

This invention generally relates to long reach hand tools and in particular to versatile hand tools which may be provided in kit form to permit the user to select one of a plurality of attachments determined by the operation to be performed. By way of example and not by limitation the tool can be used as pliers, cutters, wrenches, twisting or torque applying implements, etc.

Tools currently available are designed for use in readily accessible spaces. There are many instances however where a specific operation, i.e., wire cutting, tightening of a nut, etc., is hindered by limited access to the member to be worked upon.

It is accordingly an object of the invention to provide a simple and efficient tool, which may be held and operated with one hand, for performing a predetermined function in relatively inaccessible locations and at distances beyond normal reach with conventional tools.

A more specific object of the invention is to provide a simple and efficient tool which may be held and operated with one hand, for grasping, pulling, pushing, twisting, bending or otherwise manipulating, positioning or removing an object within relatively inaccessible locations and at distances beyond reach with conventional pliers, tweezers, parallel jaw-action devices such as wrenches and similar devices.

Another object of the invention is to provide a simple and efficient tool, which may be held and operated with one hand without sacrificing efficiency in its work performing operation notwithstanding the substantial distance of the work-performing elements of the tool from its actuating zone.

Another object of the invention is to provide a simple and efficient tool, which may be held and operated with one hand, in inaccessible regions while ensuring that the action and force exerted at the working end of the tool is multiplied or increased relative to the action or force exerted for operating the tool.

With the above objects in view, I provide, in accordance with the invention a hand-operable tool comprising a hand-grip member, an elongate member adapted to be removably mounted at one end portion on said hand-grip member and having at its opposite end portion a plurality of work-performing elements, at least one of which is movable, means for removably mounting said elongate member on said hand-grip member, means for locking said elongate member in mounted position on said hand-grip member, and manually operable means associated with said hand-grip member for actuating the movable work-performing element of said elongate member when the latter is in its mounted position.

The invention also provides a hand-operable long-reach tool comprising a laminated hand-grip member constituted of a core plate and a pair of sandwiching grip covers, said core plate having a portion projecting beyond said grip covers, an elongate U-shaped channel member adapted at one end portion for removable mounting on said core plate projecting portion with its longitudinal axis substantially perpendicular to the longitudinal axis of said hand-grip member, the longitudinal extent of said channel member being substantially greater than that of said hand-grip member, means for removable mounting said one end portion of said channel member on said core-plate projecting portion,

means for locking said channel member in mounted position on said core-plate projecting portion, a plurality of work-performing elements arranged at the opposite end portion of said channel member, one of said work-performing elements being disposed in relatively fixed relation to said channel member and another of said work-performing elements being adapted to be moved into and out of engagement with said relatively fixed work-performing element, an elongate bar positioned in said channel member and longitudinally movable therein, said bar being adapted to effect movement of said movable work-performing element, a manually operable lever associated with said hand-grip member for actuating said bar to effect engagement of said work-performing elements, and resilient means associated with said bar and acting on said lever to normally maintain said work-performing elements out of engagement.

An advantage of the tool of the invention is that it may be held and operated with one hand so that the action or force exerted at the working end is, in effect, a direct extension of the hand operating the tool thereby minimizing physical fatigue due to abnormal or unnatural manipulative wrist or finger action. This advantage is further enhanced by providing a hand grip or handle and actuating lever so proportioned and positioned as to comfortably and advantageously conform to the normal and natural configuration of the operator's hand, fingers and wrist.

A further advantage of the invention is that the working elements of the tool can be interchangeably attached to and locked onto a common handle thereby providing a multi-purpose tool essentially comprising a common handle and a number of removable and interchangeably replaceable, long-reach working elements or tips of various configurations providing a variety of cutting and clamping actions.

As will appear from the description to follow, certain repetitive operations such as occur on assembly or production lines or service functions may dictate the use of a single-purpose tool. In this case, the appropriate working elements or tips and the associated channel member may be permanently attached to a handle grip. Thus, one or more single-purpose, self-contained tools may be provided each in compliance with the spirit and intent of the invention, i.e., the performance of a cutting, clamping or other work action at a distance or reach from the operator's hand far in excess of such distance or reach normally attainable with conventional tools.

More specifically, when the tool of the invention constitutes a single purpose tool, the channel member and its associated parts will be permanently fixed to the hand-grip of the tool. In this case, the tool of the invention comprises a hand-operable long reach tool comprising a hand-grip member, an elongate U-shaped channel member mounted at one end portion on said hand-grip member with its longitudinal axis substantially perpendicular to the longitudinal axis of said hand-grip member, the longitudinal extent of said channel member being substantially greater than that of said hand-grip member, a plurality of work-performing elements arranged at the opposite end portion of said channel member, one of said work-performing elements being disposed in fixed relation to said channel member and another of said work-performing elements being adapted to be moved into

and out of engagement with said fixed work-performing element, a bar positioned in said channel member and longitudinally movable therein, said bar being adapted to effect movement of said movable work-performing element, a manually operable lever associated with said hand-grip member for actuating said bar to effect engagement of said work-performing elements, and resilient means associated with said bar and arranged to normally maintain said work-performing elements out of engagement.

The above-mentioned objectives of the invention as well as others and the advantages thereof, will become more fully apparent from the following disclosure taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a view in longitudinal side elevation section of a channel member carrying the work-performing elements capable of acting as a cutter;

FIG. 2 is a view in longitudinal bottom plan of the FIG. 1 showing;

FIG. 3 is a view in longitudinal side elevation section of a channel member carrying different work-performing elements capable of acting as a plier;

FIG. 4 is a view in longitudinal side elevation of a channel member carrying work-performing elements capable of operating as a wrench;

FIG. 5 is an enlarged detail in transverse section taken on line 5—5 of FIG. 4;

FIG. 6 is a view in rear elevation of the channel members taken on line 6—6 of FIG. 1;

FIG. 7 is a view partly in side elevation section of the handle and its operating lever with the channel member of any one of FIGS. 1, 3 or 4 attached thereto;

FIG. 8 is a view in rear elevation section taken on line 8—8 of FIG. 7;

FIG. 9 is a partial view in side elevation showing the position of the tool parts preparatory to assembly;

FIG. 10 is a sectional view taken on line 10—10 of FIG. 7;

FIG. 11 is a perspective view of a channel latch embodied in the tool as shown in FIGS. 7 and 9;

FIG. 12 is a side elevation partly in section of a single purpose tool; and

FIG. 13 is a view taken on line 13—13 of FIG. 12.

Referring to the drawings, the tool of the invention includes an elongated U-shaped channel member 11, preferably formed of sheet metal to define two parallel side legs 12 and 13, an open bottom 14 and a narrow base closure 15 between the side legs, all extending the entire length of channel member 11 as shown, for example, in FIGS. 1, 2 and 5.

Between and to one end of legs 12, 13 is fixedly attached, by means of rivets 16 and 17, a fixed cutter bar 18 which projects outwardly from channel member 11. The projecting cutter bar is formed at one end with a work-performing member which is sharpened along a surface to provide a fixed cutting edge 19. The opposite end portion of the fixed cutter bar is partially relieved as shown in FIG. 1 to form a longitudinally extending tongue 20 located within channel member 11 and providing bearing surfaces 21 and 22. An elongated movable cutter bar 23 is positioned within channel member 11 for longitudinal movement between legs 12 and 13. The movable cutter bar 23 is provided at its forward end portion with a cut-out defining bearing surfaces 24, 25 and tongue 26 and being supported for guided longitudinal movement at its forward end by engagement of

the bearing surfaces 21, 22 of the fixed cutter bar 18 with the bearing surfaces 24, 25 of the movable cutter bar 23. The movable cutter bar may also be movably supported at its rear end portion by, for example, a pin 27 as shown in FIGS. 1 to 4, or by a cam surface formation on an actuating lever underlying a recessed rear end portion of the movable cutter bar for receiving cam surface formation for support and actuation thereby. In the embodiment, for example, illustrated in FIG. 1, the pin 27 is suitably fixed to legs 12 and 13 and passes through slot 28 in the movable cutter bar 23 to permit guided movement thereof on bearing surface 29 defined by slot 28. As illustrated in FIG. 1, the forward end of longitudinally movable cutter bar 23 is sharpened to produce a cutting edge 30 which is parallel and in line with the opposing cutting edge 19 of the fixed cutter bar 18.

A coiled compression spring 31 is positioned in slot 28 so as to be in compression between pin 27 and the rear side of slot 28 in consequence of which the movable cutter bar is forced rearwardly under action of the spring 31 until pin 27 engages the front end of slot 29 thereby limiting rearward motion of the movable cutting bar and thus maintaining a fixed distance between cutting edges 19 and 30.

With continued reference to FIGS. 1 and 2, where a demountable versatile and interchangeable tool is the objective, pins 32 and 33 are provided and suitably fixed to side legs 12 and 13 of channel member 11 at a given distance forward of bearing surfaces 34 and 35 at the rear end of channel member 11. If an integral single purpose tool is the objective, then elements 32 and 33 could constitute instead a pair of rivets for permanently mounting the channel member 11 to a cooperating hand-operated device as will be hereinafter described. Suffice it to say that the channel member, with its fixed and movable cutter bars, forms a sub-assembly adapted for a work-performing operation upon application of a longitudinally applied displacement force, in the FIG. 1 embodiment, upon the rear end bearing surface 36. This is effected by a hand-grip member upon mounting the sub-assembly of FIG. 1 thereto as will hereinafter more fully be described. Since, however, the further embodiments of FIGS. 3 and 4 may similarly be mounted to the hand-grip member for operation thereby, these further embodiments will now be described.

Referring to FIG. 3, which shows a flat nose plier construction, since channel member 37 is substantially identical in construction to channel member 11 of FIGS. 1 and 2, a detailed description of channel member 37 is not deemed necessary. In contrast to the embodiment of FIG. 1, however, where a cutting operation was effected with direct, forward, longitudinal displacement of the movable cutter bar in relation to the fixed cutter bar, in the FIG. 3 embodiment, the movable bar is pivotally mounted for arcuate movement of its working edge in a vertical plane upon longitudinal displacement of a movable member by the hand-grip member as hereinafter described. In any event, in FIG. 3, pin 40 serves as a pivot about which rotatable jaw 41 is free to turn within the angular limits imposed on the one hand by contact of surface 42, when in clock-wise rotation, with inclined plane surface 43 and, on the other hand, by contact of surface 44, when in counter-clockwise rotation, with surface 45. A coiled compression spring 46 is interposed between the underside of

base 47 of the U-shaped channel member 37 and a recess 48 in rotatable jaw 41 and normally urges rotatable jaw 41 with its surface 42 into contact with inclined surface 43. Fixed jaw 49 is located at the front end of channel member 37 and is held in rigid position between depending legs 50 and 51 of channel member 37 by rivets 38 and 39 so as to project outwardly part of its length from the channel member, the transverse extent of the fixed jaw 49 being such as to terminate substantially flush with the open end 52 of channel member 37.

For moving rotatable jaw 41 counterclockwise against the action of spring 46, an elongated movable wedge member 53 is located between legs 50 and 51 and is longitudinally movable and slidably supported for such movement at its forward end and adjacent its rear end. For this purpose the forward end portion of wedge member 53, providing at its forwardmost edge the aforementioned inclined surface 43, is undercut to provide a surface 54 which engages the upper surface 55 of fixed jaw 49 for guided movement therealong. Adjacent the rear end of wedge member 53, a pin 56 is provided, suitably fixed to legs 50, 51, which is received in elongate slot 57 formed in the wedge member to permit the latter, when longitudinally displaced, to be moved relative to pin 56 with bearing surfaces 58, defined by the slot 57, in engagement with pin 56. A coiled compression spring 59 is positioned in slot 58 so as to be in compression between the pin 56 and the rear side of slot 57 thereby normally urging wedge member 53 rearward until the forward edge of slot 57 contacts the pin 56. Wedge member 53 is provided with a forward bearing surface 60 and pins 61 and 62, the functions of which are similar to forward bearing surface 36 and pins 32 and 33, respectively, of the described FIG. 1 embodiment.

It will be apparent that the structure illustrated in FIG. 3 could also be used as a cutting plier providing the surfaces 44 and 45 are sharpened to define opposed cutting edges.

Referring now to FIGS. 4 and 5, which shows a wrench sub-assembly, channel 64 is essentially identical to channel members 11 and 37 of FIGS. 1 and 3 respectively, except for purpose and location of slots 65 and 66 and lips 67 and 68 (see FIG. 5) to be more fully hereinafter described.

Adjustable jaw 69 of the wrench sub-assembly is positioned between legs 70 and 71 of channel member 64 so as to be freely longitudinally movable parallel to base closure 72 of the U-shaped channel member 64. The adjustable jaw is of a length sufficient for its forward end to project outwardly of channel member 64 as shown in the drawing. The adjustable jaw 69 is restrained to longitudinal adjustment within channel members 64 by the engaging action of the upper surface 73 of jaw 69 with the under surface of base 72 and also by engagement of the under surface 75 of the adjustable jaw with an upper surface 76 of a movable jaw 77. As shown in FIG. 4, the movable jaw 77 is located between legs 70 and 71 and is movably and slidably supported for longitudinal movement of its forward end by the lips 67 and 68 and further slidably supported at a point near its rearward end by pin 78 suitably fixed to legs 70 and 71. The pin 78 is received in elongate slot 79 formed in the movable jaw to permit the latter when longitudinally displaced, to be moved relative to pin 78, with bearing surfaces 80 defined by slot 79 in

engagement with pin 78. Coil compression spring 81 is positioned in slot 80 to act in a manner identical to that described for coil compression springs 31 and 59.

FIGS. 4 and 5 further illustrate a construction which permits adjustment of adjustable jaw 69 in relation to movable jaw 77 and when so adjusted remains in relatively fixed relation to the movable jaw 77. For this purpose, a rivet 83 is transversely disposed through vertical slots 65 and 66 in the legs of channel member 64, the extending ends of the rivet carrying buttons 88, 89 for finger manipulation. Thus, rivet 83 is vertically displaceable within the confines of slots 65 and 66. As shown in FIG. 4, movable jaw 77 is provided with a longitudinal recess 90 disposed so that its rearward end is in communication and in alignment with the lower ends of vertical slots 65 and 66. A U-shaped leaf spring 91 is nested in recess 90 and serves to normally urge rivet 83 upward towards the upper ends of slots 65 and 66.

In order to permit "fixed" adjustment of adjustable jaw 69 in relation to movable jaw 77, the adjustable jaw is provided at its lower surface with a series of discrete longitudinally spaced apart recesses, in the described embodiment, comprising recesses 84, 85, 86 and 87. In FIG. 4, the adjustable jaw 69 is shown positioned with recess 84 receiving rivet 83 which serves to prevent both transverse and longitudinal movement of the adjustable jaw when the rivet is so positioned. To readjust adjustable jaw 69, it is merely necessary to press down on buttons 88, 89 until the pin clears the confines of recess 84 and is urged against the action of spring 91 into recess 90 until the desired recess 85, 86 or 87 is brought into alignment with rivet 83 whereafter, upon release of buttons 88, 89, the rivet will again be urged upwardly by spring 91 for reception in one of the selected recesses in movable jaw 77.

It should be noted that recesses 84 to 87 are so dimensioned that rivet 83 is fully engageable into any one of the recesses without protruding below the under surface 75 of the adjustable jaw. When so engaged, rivet 88 presents no obstruction to the longitudinal movement of movable jaw 77.

To prevent complete withdrawal of adjustable jaw 69 from channel member 64 a projection 94 is provided on adjustable jaw 69 which is slidably movable in a shallow recess 95 and limits forward motion of jaw 69 when the projection 94 comes into contact with projection 96 at the forward end of recess 95 formed in the movable jaw 77.

It will be noted that the movable jaw 77 has a bearing surface 82 and pins 97, 98 which serve the same purpose as bearing surface 36 and pins 32, 33 of FIG. 1 and bearing surface 60 and pins 61, 62 of FIG. 3.

For longitudinal movement of the movable members 23, 53 and 77 of the FIGS. 1, 3 and 4 embodiments, by applying a resultant longitudinally directed force adjacent the respective bearing surfaces 36, 60 or 82, there is provided a hand-grip assembly to which the respective subassemblies of FIGS. 1, 3 and 4 are adapted to be connected as will now be described.

Although FIG. 6 is related to FIG. 1 in that it is a view in rear elevation of the channel members taken on line 6-6 of FIG. 1, it is to be understood that the view in rear elevation of the FIG. 3 and FIG. 4 embodiments will be the same.

As shown in FIGS. 7 to 11, the hand-grip assembly is provided with a latch plate 100, preferably of steel and

of a thickness substantially equal to the space between the legs of the channel members 11, 37 and 64 of FIGS. 1, 3 and 4 to provide a "slip fit" when the latch plate is selectively inserted into the space between the legs of channel members 11, 37 or 64. The upper portion of latch plate 100 is provided with two key slots 101 and 102, best shown in FIG. 9, shaped so that the slots extend in part vertically below the upper horizontal edge of latch plate 100 a predetermined distance therebelow and are then directed forwardly on a line slightly angled below a horizontal. It is to be noted that imaginary centerlines respectively bisecting said key slots 101 and 102 are separated a distance equal to the imaginary centerlines respectively locating pins 32, 33; pins 61, 62 and pins 97, 98 of FIGS. 1, 3 and 4 respectively.

Pivot pin 103, transversely secured to latch plate 100 in predetermined relationship to key slots 101 and 102, passes through bearing holes 105 and 106 of channel latch 104 (see FIG. 11) allowing said channel latch 104 to rotate from its substantially horizontal, "open" position best shown in FIG. 9 to its substantially vertical, "closed" position, best shown in FIG. 7.

The front edge 134 of latch plate 100 is provided with a recess 107 and a communicating slot 108 into which a leaf spring 109 is forced and secured by friction fit.

As shown partially in FIG. 7 and in cross-section in FIG. 8, latch plate 100 is sandwiched by a pair of grip covers 110, 111 and connected therewith by rivets 112, 113. The grip covers 110 and 111 may be molded of plastic material to provide a comfortably contoured hand-grip similar to the commonly familiar pistol grip and are provided at their upper edges with recesses defining steps 114, 115 best seen in FIG. 8 and in partial section in FIG. 9. Additionally, each grip cover 110 and 111 is formed as shown in FIG. 10 with a recess in which cylindrical tubular metal inserts 116 and 117 are received. The recesses and inserts are disposed in precise relationship with rivets 112 and 113 and locating bosses 120 and 121, formed on grip covers 110 and 111 and received in locating holes 122, 123, to permit ready assembly of the parts described. The inserts 116, 117 serve as bearings for pivot pin 124 about which operating lever 125 is free to rotate. As will be noted in FIG. 7, pivot pin 124 acts as a fulcrum about which lever 125 is angularly moved adjacent its upper end to provide the desired "mechanical advantage" required for a tool work performing operation. The upper end of operating lever 125 mounted as described, is received in a space between the forward bearing surface, exemplified as 130, of the movable member 23 and the rear surface 126 of latch plate 100, with the rear surface 127 of lever 125 in normal engagement with surface 126 occasioned by leaf spring 109 which normally maintains operating lever 125 spaced from edge 134 of the pistol grip. It will be seen that the forward surface 131 of the lever is at all times in engagement with the bearing surface 130.

From the foregoing, it will be seen that the tool of the invention has two basic assemblies, a first constituted by a pistol grip type handle incorporating the latch plate 100, grip covers 110 and 111, channel latch 104 and the operating lever 125, and the second constituted by the previously described interchangeable long-reach work performing elements and cooperating channel members 11, 37 or 64, fixed or "adjustably" fixed

parts, e.g. 18, 49 or 69; and movable parts 23, 41 or 77.

To assemble the two sub-assemblies, as will readily be apparent from FIGS. 7 and 9, it is only necessary to position channel member 11 (referred to for illustrative purposes only since obviously the same applies to channel members 37 or 64) above latch plate 100 with channel latch 104 in the horizontal or open position, lower said channel member 11 (as shown by the directional arrows in FIG. 9) until pins 32 and 33 engage and bottom in the vertical portion of key slots 101 and 102, then urge said channel member 11 forwardly until the pins 32 and 33 are fully engaged in the horizontally extending portion of key slots 101 and 102. Channel latch 104 is then rotated clockwise to bring cam action surfaces 128 and 129 into frictional engagement with surfaces 34 and 35 thereby preventing channel member 11 from being removed from the hand grip assembly. Key slots 101 and 102 are located with respect to pivot pin 103 so that, in consequence of the eccentricity of surfaces 128, 129 with respect to pivot pin 103, a strong locking force will be exerted by channel latch 104 against channel member 11 so that said channel member will be intimately connected with latch plate 100. (FIG. 7).

To operate the assembled tool, the hand grip consisting essentially of latch plate 100, channel latch 104, grip covers 110 and 111 and operating lever 125 is grasped in the crotch of one's hand so that said hand grip assembly can be encircled by one's thumb on one grip cover, the palm of the hand on the other grip cover and the fingers completing encirclement around the forward edge 132 of operating lever 125. The operating lever 125, with the tool thus grasped, is squeezed in a counterclockwise direction against the action of leaf spring 109 and compression spring 31, acting indirectly upon the lever through movable cutter bar 23, until the lever strikes edge 134 of latch plate 100. The squeezing pressure thus exerted on operating lever 125 will cause the relevant movable cutter bar (in FIG. 7 being that illustrated in FIG. 1) to be urged longitudinally forwardly thereby causing the work performing elements, e.g., cutting edges 19 and 30 to mate and any wire or other material transversely disposed between said cutting edges 19 and 30 to be cut.

Release of finger pressure on operating lever 125 causes it to return to its normal position (shown in FIG. 7) and will permit the movable work-performing element to retract under the action of spring 31, to separate the work performing element, and simultaneously urge lever 125 to its normal position in cooperation with leaf spring 109.

Assuming that channel member 37 of FIG. 3 and its associated parts are locked onto latch plate 100, squeezing pressure exerted on operating lever 125, as described above will cause wedge member 53 to move longitudinally forwardly thereby causing surface 42 to ride up on the inclined surface 43. This movement is translated into rotational movement of movable jaw 41 about pivot 40 thereby causing the jaw 41 to close upon fixed jaw 45. Any object disposed between the jaws in these circumstances can be securely grasped and manipulated as required until pressure on operating lever 125 is released whereupon movable jaw 41 with retraction of wedge member 53 under influence of spring 59 returns to its normal position (see FIG. 3) thus releasing the previously held object.

In like manner, the movable jaw 77 of FIG. 4 can be made to longitudinally converge on adjustable jaw 69. However, since adjustable jaw 69 may longitudinally be adjusted for retention in any one of recesses 84 to 87 and since longitudinal travel of movable jaw 77 is limited to the extent of longitudinal displacement occasioned by operating lever 125, it will be apparent that jaws 69 and 77 cannot completely be closed except when pin 83 is received in the first recess 84.

To remove any one of the channel members described from the hand-grip assembly, it is only necessary to hold the tool in one hand and with the thumb and forefinger of the other hand grasp the channel latch 104 at the fingertabs 135, 136 for rotation counterclockwise about pivot pin 103 in order that cam surfaces 128, 129 be disengaged from the end bearing surfaces of the selected channel member thereby to permit separation of the channel member therefrom by urging the same rearward and upward causing pins 32 and 33 on the channel member to disengage from key slots 101 and 102 on the pistol grip thereby freeing the channel member and its associated parts from latch plate 100.

Any one of the channel members 11, 37 or 64 can be attached to or removed from the assembled grip referred to above. The pins 27, 56 or 78; slots 28, 57 or 79; pins 32, 33; 61, 62; 97, 98 all provided as part of the channel member assembly are predeterminedly oriented with respect to slots 101, 102, bearing surfaces 105, 106, pin 103 as well as inserts 116, 117 and locating bosses 122, 123 all provided as part of the hand-grip assembly to ensure interchangeability with the hand grip of the selected channel member assembly and to provide thereby a multi-purpose tool, capable, by virtue of its functional design and operational concept, of performing a variety of cutting, grasping or clamping actions at considerable distance from the operator's hand.

The tool thus far described was concerned with a versatile multi-purpose tool, a selected sub-assembly of which could be connected for use with a hand-grip sub-assembly, in dependence on the use to which the tool was to be applied.

As hereinbefore disclosed, the basic concept herein disclosed is applicable to a single purpose tool, an embodiment of which is shown in FIGS. 12 and 13.

Referring to FIGS. 12 and 13, it will be seen that the single purpose tool comprises a hand-grip portion 200 and an elongate channel portion 201 which, for illustrative purposes may contain a channel member identical to member 11 of FIG. 1 except that the channel member is fixedly attached to the hand grip by, for example, rivets 202. Since the channel member is fixedly attached to the hand grip, the latch plate 203 need not be provided with the slots 101, 102. In the embodiment of FIG. 12, the bottom open spaced-apart legs 204, 205 of the channel member 201 rest on the upper surface of left and right hand side grip sections 206, 207.

In the FIG. 12 embodiment the rear guide pin (for example 27 in FIG. 1) and the slot (for example 28 in FIG. 1) otherwise provided for the embodiments of FIGS. 1, 3 and 4 are eliminated and the movable member 208 is supported for longitudinal movement by the upper surface of fixed member 209 and by the upper cam surface 210 of lever 211 which is received in a recessed end portion 212 of the movable member which is supported thereat by the lever in its normal position

and in its actuated position in which the cam surface 210 of lever bears against the end surface of movable member 208 to urge the same forwardly toward the fixed member 209. As in the other embodiments the lever is urged to its normal position by leaf spring 213 after finger pressure is released from the lever. Obviously the spring should be sufficiently strong to urge the movable member 208 rearwardly to its normal position when the camming surface 210 bears against the lip 214 formed on the movable member, as shown in FIG. 12.

The above description is intended to be illustrative and not limiting of the invention. Accordingly, various changes, modifications or adaptations of the embodiments set forth may occur to those skilled in the art and these may be made without departing from the spirit and scope of the invention defined in the appended claims.

What is claimed is:

1. A hand-operable long reach tool comprising a hand-grip member, a first elongate member formed with an axially extending channel having a height substantially greater than its width, said first member being mounted at one end portion thereof on said hand-grip member with its longitudinal axis substantially perpendicular to the longitudinal axis of the hand-grip member, the longitudinal extent of said channel member being substantially greater than that of said hand-grip member, a second elongate member of a shape substantially corresponding at least in part to that of said channel for longitudinal and guided movement therein and wholly within the confines thereof, a plurality of work-performing elements at the opposite end portion of said first member and having work-performing surfaces extending longitudinally beyond the opposite end of said first member, one of said work-performing elements being supported by said first member and another of said work-performing elements being movable into and out of engagement with said one work-performing element as a function of longitudinal reciprocation of said second member within said channel, a manually operable lever carried by said hand-grip and having a part integrally formed therewith which in a normal position of the lever engages the second member for longitudinal displacement thereof from a normal position toward said fixed work-performing element upon actuating said lever from said normal to an operative position thereof, and first and second resilient means for respectively returning said lever and said second member to their normal positions in which position said other work-performing element is out of engagement with said one work-performing element, said first resilient means being disposed between a portion of the hand-grip and the lever and the second resilient means being operative within a slot in said second member.

2. A tool according to claim 1, wherein said first member comprises a U-shaped channel member and said second member comprises an elongate rectangular bar having a dimension for at least a part of its length, closest to the hand-grip member, substantially equal to that of the channel so as to be snugly received in said channel.

3. A tool according to claim 2, wherein said work-engaging elements are replaceable.

4. A tool according to claim 1, wherein said first member is removably mounted at said one-end portion

thereof on said hand-grip member, and latch means for latching said first member in assembled relation to said hand-grip member.

5 5. A hand-operable long reach tool comprising a laminated hand-grip member constituted of a core plate and a pair of sandwiching grip covers, said core plate having a portion projecting beyond said grip covers, an elongate U-shaped channel member adapted at one end portion for removable mounting on said core plate projecting portion with its longitudinal axis substantially perpendicular to the longitudinal axis of said hand-grip member, the longitudinal extent of said channel member being substantially greater than that of said hand-grip member, means for removably mounting said one end portion of said channel member on said core-plate projecting portion, means for locking said channel member in mounted position on said core-plate projecting portion, a plurality of work-performing elements arranged at the opposite end portion of said channel member, one of said work-performing elements being disposed in relatively fixed relation to said channel member and another of said work-performing elements being adapted to be moved into and out of engagement with said relatively fixed work-performing element, an elongate bar positioned in said channel member and longitudinally movable therein, said bar being adapted to effect movement of said movable work-performing element, a manually operable lever associated with said hand-grip member for actuating said bar to effect engagement of said work-performing elements, and resilient means associated with said bar and acting on said lever to normally maintain said work-performing elements out of engagement, said core plate having a second projecting portion, said locking means comprising a U-shaped latch pivotally mounted on said second core-plate projecting portion and provided with cam-action surfaces which, upon rotation of said latch, bear against corresponding surfaces on the one end portion of said channel member when the latter is in its mounted position and thereby lock said channel member in such mounted position.

6. A hand-operable tool comprising a hand-grip member, an elongate member adapted to be removably mounted at one end portion on said hand-grip member and having at its opposite end portion a plurality of work-performing elements, at least one of which is movable, means for removably mounting said elongate member on said hand-grip member, means for locking said elongate member in mounted position on said hand-grip member, and manually operable means associated with said hand-grip member for actuating the movable work-performing element of said elongate member when the latter is in its mounted position, said plurality of work-performing elements including a work-performing element which is adjustably mounted for a predetermined fixed relationship with respect to the movable work-performing element, said elongate member being a U-shaped member formed with vertical slots in the depending legs thereof, locking means being provided normally resiliently urged to one limit of said slots, said adjustable work-performing element being provided with a series of recesses spaced along the longitudinal axis thereof, each recess being adapted for alignment with said slots to receive said locking means when urged to said one limit of said slots.

7. A hand-operable long reach tool comprising a hand-grip member, a first elongate member formed

with an axially extending channel having a height substantially greater than its width, said first member being mounted at one end portion thereof on said hand-grip member with its longitudinal axis substantially perpendicular to the longitudinal axis of the hand-grip member, the longitudinal extent of said channel member being substantially greater than that of said hand-grip member, a second elongate member of a shape substantially corresponding at least in part to that of said channel for longitudinal and guided movement therein, a plurality of work-performing elements at the opposite end portion of said first member and having work-performing surfaces extending longitudinally beyond the opposite end of said first member, one of said work-performing elements being supported by said first member and another of said work-performing elements being movable into and out of engagement with said one work-performing element as a function of longitudinal reciprocation of said second member within said channel, a manually operable lever carried by said hand-grip and having a part which in a normal position of the lever engages the second member for longitudinal displacement thereof from a normal position toward said one work-performing element upon actuating said lever from said normal to an operative position thereof, and resilient means for returning said lever and said second member to their normal positions in which position said other work-performing element is out of engagement with said one work-performing element, said first member comprising a U-shaped channel member and said second member comprising an elongate rectangular bar having a dimension for at least a part of its length, closest to the hand-grip member, substantially equal to that of the channel so as to be snugly received in said channel, said one of said work-performing elements being fixedly attached to the U-shaped member and being provided with a linearly arranged supporting surface, said rectangular bar proximate to said other work-engaging element being provided with a linearly arranged bearing surface that cooperatively engages said supporting surface.

8. A hand-operable long reach tool comprising a hand-grip member, a first elongate member formed with an axially extending channel having a height substantially greater than its width, said first member being mounted at one end portion thereof on said hand-grip member with its longitudinal axis substantially perpendicular to the longitudinal axis of the hand-grip member, the longitudinal extent of said channel member being substantially greater than that of said hand-grip member, a second elongate member of a shape substantially corresponding at least in part to that of said channel for longitudinal and guided movement therein, a plurality of work-performing elements at the opposite end portion of said first member and having work-performing surfaces extending longitudinally beyond the opposite end of said first member, one of said work-performing elements being supported by said first member and another of said work-performing elements being movable into and out of engagement with said one work-performing element as a function of longitudinal reciprocation of said second member within said channel, a manually operable lever carried by said hand-grip and having a part which in a normal position of the lever engages the second member for longitudinal displacement thereof from a normal position toward said one work-performing element upon actuat-

ing said lever from said normal to an operative position thereof, and resilient means for returning said lever and said second member to their normal positions in which position said other work-performing element is out of engagement with said one work-performing element, the hand-grip member comprising a laminated member constituted of a core plate and a pair of sandwiching grip covers, said core plate having a portion projecting beyond said grip covers, said elongate first member being removably mounted on said core plate projecting portion.

9. A tool according to claim 8, wherein latch means is provided comprising a U-shaped latch pivotally mounted on said core-plate projecting portion and having cam-action surfaces adapted, upon rotation of said latch means, to bear against surfaces of said channel member when the latter is in its mounted position and thereby lock the channel member in said mounted position.

10. A tool according to claim 8, in which said channel member comprises spaced-apart transverse pins, correspondingly spaced-apart key slots being provided in said core-plate projecting portion for respectively receiving said transverse pins.

11. A tool according to claim 8 in which each grip cover is recessed at its upper end adjacent to the core-plate projecting portion for receiving the longitudinal edges of the channel member when the latter is mounted on said hand-grip member.

12. A tool according to claim 8, in which said grip covers extend beyond said core plate, and in which said manually operable lever is pivotally mounted between such grip-cover extensions.

13. A tool according to claim 12, in which an upper end of said manually operable lever is dimensioned for reception in the channel member between an end of said second member and an adjoining end of said core plate projection portion.

14. A hand-operable long reach tool comprising a hand-grip member, a first elongate member formed with an axially extending channel having a height substantially greater than its width, said first member being mounted at one end portion thereof on said hand-grip member with its longitudinal axis substantially perpendicular to the longitudinal axis of the hand-grip member, the longitudinal extent of said channel member being substantially greater than that of said hand-grip member, a second elongate member of a shape substantially corresponding at least in part to that of said channel for longitudinal and guided movement therein, a plurality of work-performing elements at the opposite end portion of said first member and having work-performing surfaces extending longitudinally beyond the opposite end of said first member, one of said work-performing elements being supported by said first member and another of said work-performing elements being movable into and out of engagement with said one work-performing element as a function of longitudinal reciprocation of said second member within said channel, a manually operable lever carried by said hand-grip and having a part which in a normal position of the lever engages the second member for longitudinal displacement thereof from a normal position toward said one work-performing element upon actuating said lever from said normal to an operative position thereof, and resilient means for returning said lever and said second member to their normal positions in which

position said other work-performing element is out of engagement with said one work-performing element, said first member comprising a U-shaped channel member and said second member comprising and elongate rectangular bar having a dimension for at least a part of its length, closest to the hand-grip member, substantially equal to that of the channel so as to be snugly received in said channel, said one of said work-performing elements being a fixed element comprising a first work member that is fixedly attached to the channel member and provided with a longitudinally directed supporting surface, said other movable work-performing element comprising a second work member integrally formed with said rectangular bar and having at one end portion means cooperating with complementary means on the first work member to perform a work function and adjacent said one portion a longitudinally extending bearing surface which engages said supporting surface for movement therealong.

15. A hand-operable long reach tool comprising a hand-grip member, a first elongate member formed with an axially extending channel having a height substantially greater than its width, said first member being mounted at one end portion thereof on said hand-grip member with its longitudinal axis substantially perpendicular to the longitudinal axis of the hand-grip member, the longitudinal extent of said channel member being substantially greater than that of said hand-grip member, a second elongate member of a shape substantially corresponding at least in part to that of said channel for longitudinal and guided movement therein, a plurality of work-performing elements at the opposite end portion of said first member, one of said work-performing elements being supported by said first member and another of said work-performing elements being movable into and out of engagement with said one work-performing element as a function of longitudinal reciprocation of said second member within said channel, a manually operable lever carried by said hand-grip and having a part which in a normal position of the lever engages the second member for longitudinal displacement thereof from a normal position toward said fixed work-performing element upon actuating said lever from said normal to an operative position thereof, and resilient means for returning said lever and said second member to their normal positions in which position said other work-performing element is out of engagement with said one work-performing element, said first member comprising a U-shaped channel member and said second member comprising an elongate rectangular bar having a dimension for at least a part of its length, closest to the hand-grip member, substantially equal to that of the channel so as to be snugly received in said channel, said one of said work-performing elements being fixedly attached to the U-shaped member and being provided with a linearly arranged supporting surface, said rectangular bar proximate to said other work-engaging element being provided with a linearly arranged bearing surface that cooperatively engages said supporting surface, said second member being supported at its one end portion on the manually operable lever, said one work-performing element and said manually operable lever constituting the sole support for said second member.

16. A hand operable long reach tool comprising a hand-grip member, a first elongate member formed with an axially extending channel and being mounted

15

at one end portion thereof on said hand-grip member with its longitudinal axis substantially perpendicular to the longitudinal axis of the hand-grip member, a second elongate integral member of a shape substantially corresponding at least in part to that of said channel for longitudinal and guided movement therein and wholly within the confines thereof, a plurality of work-performing elements at the opposite end portion of said first member, one of said work-performing elements being fixed and another being movable into and out of engagement with said fixed work-performing element as a function of longitudinal reciprocation of said second member within said channel, a manually operable lever carried by said hand-grip member and having a part integrally formed therewith which in a normal po-

16

sition of the lever engages the second member within the confines of said channel for longitudinal displacement thereof from a normal position toward said fixed work-performing element upon actuating said lever from said normal to an operative position thereof, and first and second resilient means for respectively returning said lever and said second member to their normal positions in which position said other work-performing element is out of engagement with said fixed work-performing element, said first resilient means being disposed between a portion of the hand-grip and the lever and the second resilient means being operative within a slot in said second member.

\* \* \* \* \*

20

25

30

35

40

45

50

55

60

65