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MULTIPLE RANGE COMPOUND ACTION HAND TOOL

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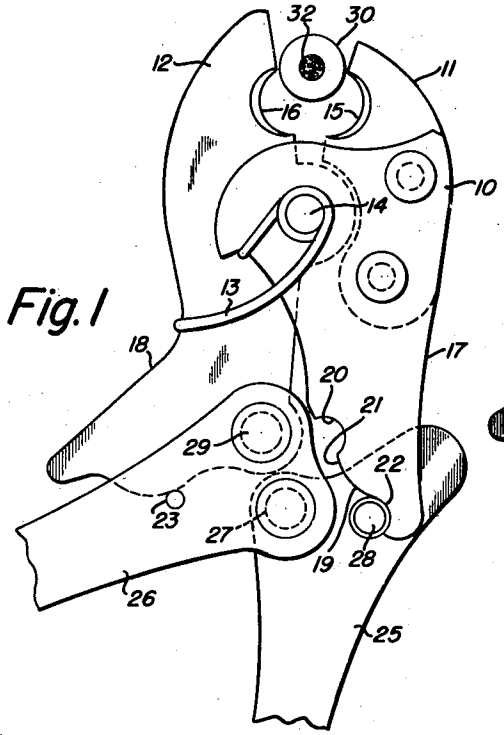


Fig. 1

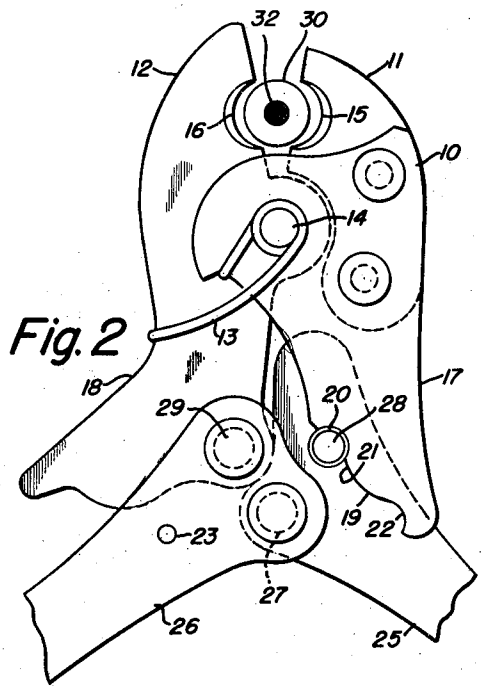


Fig. 2

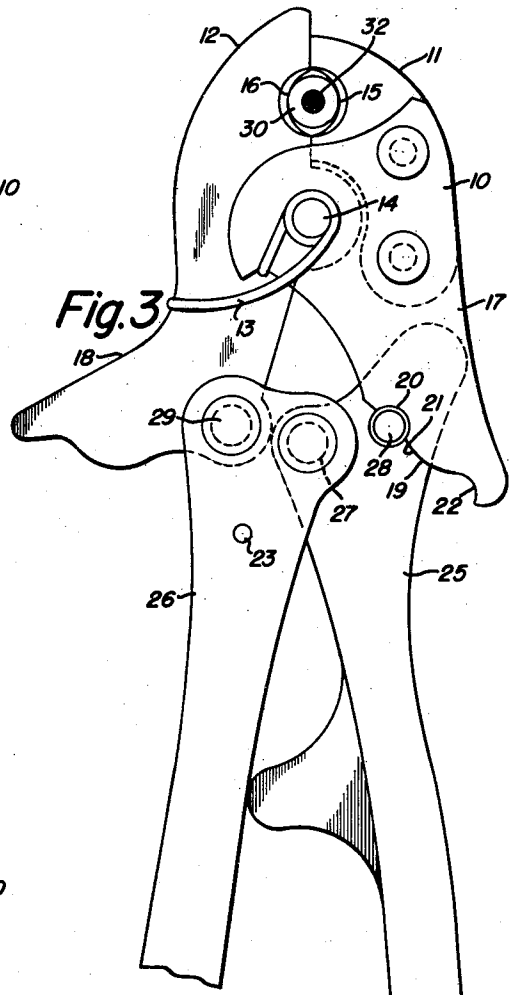


Fig. 3

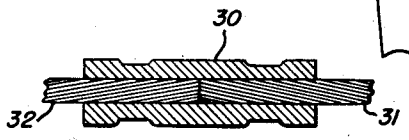


Fig. 4

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MULTIPLE RANGE COMPOUND ACTION HAND TOOL

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4 Claims. (Cl. 81—15)

This invention relates to pivoted jaw work performing tools in general, and relates more specifically to a simplified construction for producing a two-range work action movement with a single action high leverage drive device.

An object of this invention is to provide a work performing head member having drive receiving levers, and to drive the levers through a high pressure cycle with a pivoted linkage, but the linkage being detachable for operation of the levers through a larger range producing substantially no work action.

And another object of this invention is to provide a pivoted jaw device for clamping upon a workpiece with great pressure through a small closing movement, and having a faster and larger movement of low operative force for opening wide to receive a workpiece.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawing, in which:

Figure 1 is a side view of the preferred manual embodiment of the principles of the invention, the tool being in the widest open position for receiving a workpiece into the work area of the jaws;

Figure 2 is the same side view with the jaws closed through the fast movement work cycle portion and the leverage drive device engaged to begin the high pressure closing portion of the work cycle;

Figure 3 is the same side view with the tool fully closed upon the workpiece at the position of greatest force; and

Figure 4 is a section through a cable union produced by the illustrated tool.

The drawing illustrates a particular adaptation of the principles of this invention. This particular embodiment has a head member **10** composed of two jaws **11** and **12** pivotally interconnected by pivot **14** and urged to an open jaw position by a spring **13** as illustrated. The jaws **11** and **12** are provided with internal recesses **15** and **16** which function as die members.

This invention is provided for the purpose of enabling a workpiece head member to open wide for accepting a workpiece; to close rapidly upon the workpiece; to thereafter act upon the workpiece with extreme pressure. Uniting of cables such as power cables with sleeve connectors such as connector **30** of Figure 4, illustrates one problem which may be solved by the present type of invention. Sleeve connection of power cables is an old and well accepted expedient. However, the tools employed to compress the sleeve upon the cable have quite generally been heavy and elaborate. The present invention makes possible the full utilization of a manually operable high pressure producing linkage. Such linkage will produce extreme forces but with relatively small physical movement. Accordingly, if the jaws **11** and **12** are actuated only through the pressure producing work cycle, then the sleeve can only be introduced endwise into the tool. Such end introduction is satisfactory to put the workpiece into the tool but in the event of connecting long cables the workpiece cannot be taken out of the tool. Accordingly, the present invention provides for disengagement of the leverage actuation means from the head member in order to allow a rapid and large swing of the jaws **11** and **12** for admitting the workpiece and engagement of the actuation means only after the workpiece is positioned between the jaws and the jaws closed down in position to begin the high pressure work cycle.

The means for providing the engagement of the manually driven high pressure actuation system is illustrated in the drawings. Levers **17** and **18** in the head member **10** extend on the opposite side of pivot **14** from the jaws **11** and **12**. Manifestly, the levers **17** and **18** will produce a movement of the jaws **11** and **12** corresponding to the movement of these levers. Handles **25** and **26** are employed in the present embodiment of the invention as the prime movers and source of power. These handles **25** and **26** are joined together by a central pivot **27**. A pivot **29** is permanently joined to lever **18** for convenience. Pivot **28** is disengageably connected to the lever **17**. The pivots **27**, **28** and **29** may be actuated between an acute angular position as illustrated in Figure 2 and an obtuse angular position as illustrated in Figure 3. Actuation of these pivots will act in the well-known manner to produce a relatively fast movement at the first portion of the work cycle as the handles **25** and **26** are closed with increasing power and decreasing speed of movement as the obtuse angular position is approached. It is not the mechanical function of the three pivot devices that constitute the improved concept of the present invention, but rather the novel method of its use and the two-stage operation of a mechanical device by such linkage means is the improved concept.

The mechanical movement which can be imposed upon the levers **17** and **18** by the handles **25** and **26** through the described pivot leverage system is limited and, therefore, will not permit the convenient entry and exit of large workpieces to and from the jaws **11** and **12**. This condition was outlined more fully above. Thus, in this invention, it has been provided for the disengagement of at least one of the pivots **28** or **29** from its cooperating lever. In the illustrated embodiment, the one pivot **28** is disengageable and the pivot **29** is permanently attached to the lever **18** for convenience.

The illustrated embodiment of the disengageable pivot **28** to the lever **17** is also believed to be a novel arrangement. Lever **17** has an inside surface located adjacent the linkage system. A recess notch **20** in that inside surface **19** is shaped to accept the pivot **28**. The forces exerted by the pivot and the leverage system are such that the pivot **28** will force its way into the recess **20** without any danger of slipping out of the recess.

The lever **17** is relieved beyond the recess **20**. Such relieved surface is indicated by the reference character **21**. The relieved surface may be proportioned to allow the end of lever **17** to move over the pivot **28** completely, if desired, but it has been found that by relieving the surface down to a second notch **22** there are other advantages obtainable. The notch **22** serves as a convenient temporary engagement of the lever **17** with the pivot **28** and provides a suitable limit of closing movement of the

levers 17 and 18 at a position sufficient close to open the jaws 11 and 12 as far as needed. Therefore, the surface 21 between notches 20 and 22 will serve as a convenient guide surface to guide the lever 17 and the pivot 28 with respect to one another and place the pivot 28 into the recess notch 20. The surface 21 also is a cam surface in this respect and causes the levers 17 and 18 to close through a rapid work cycle to the position wherein the jaws 11 and 12 are then properly located to begin the high pressure work cycle.

The work piece is illustrated as the electrical junction sleeve 30 previously referred to and two power cables 31 and 32 are to be joined. The finished junction is illustrated in the Figure 4.

In operation the pivot 28 is dropped into the notch 22 simply by manually moving the head member and the handle members into the position shown in Figure 1. A stop 23 aids in properly locating the head member in conjunction with the location of notch 22. The workpiece is then dropped through the side split opening between the jaws 11 and 12. Thereafter, the head member is shifted from the position of Fig. 1 to that illustrated in Figure 2. Such shifting causes the pivot 28 to ride over the relieved surface 21 as a cam and partially close the jaws 11 and 12. After the parts are in the relief position shown in Figure 2, the handles are closed to the position shown in Figure 3 to produce the indentation and compression of the sleeve 30 upon the wire. The workpiece is removed from the tool by reversing the steps from Figure 3 to Figure 2 and then to that shown in Figure 1.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. A compound action tool, comprising, a work performing head member having first and second drive receiving levers, said head having a first work range and a second work range, said drive receiving levers having a first range corresponding to said first work range of the head, a second range corresponding to said second range of the head, and mechanical linkage drive means to operate said drive receiving levers, said linkage drive means having first and second link members, central pivot means between said link members, first pivot means connecting said first link member with said first drive receiving lever, said second drive receiving lever having a series of jack step notches, surface means carried by said second link member, said surface means being selectively insertable into any one of said jack step notches, and drive means to operate said central pivot means and said first pivot means and said surface means between an acute angular relative position and an obtuse angular relative position, each of the notches being defined by a bearing surface having retaining and supporting portions thereof positioned to provide full bearing support to the surface means through said angular relationship movement and thereby prevent unintentional disengagement of said surface means, said linkage drive means with the surface means engaged with said second drive receiving lever limiting said drive receiving levers to operate only in said second range, said first range being obtainable by disengagement of at least said surface means from said second drive receiving lever.

2. A compound action pivoted jaw tool, comprising, a work-performing head member having first and second jaw members, a pivot interconnecting said jaw members, said jaw members having a work performing portion on one side of the pivot, first and second drive receiving levers on the other side of said pivot, said work performing head member having a first work range and a second work range, said first and second levers having a first work range and a second work range corresponding to the like ranges of said work performing portion, first and second pivoted actuation handles, pivot means interconnecting said pivoted actuation handles, said first handle having a secondary pivot laterally spaced from said pivot means and interconnecting said first handle and said first drive receiving lever, said second drive receiving lever having an inside surface with a notch facing said secondary pivot, said second handle having a pivot surface laterally spaced from said pivot means and releasably seatable in said notch, said actuation handles being pivotable through a work range, said work range producing movement of the drive receiving levers and jaw members through said first work range with said pivot surface of the second handle engaged in said notch, said second drive receiving lever being closable in said second work range by disengagement of said secondary pivot and notch and closing beyond the minimum position of the said work range.

3. A compound action pivoted jaw tool, comprising, a work performing head member having first and second jaw members, a pivot interconnecting said jaw members, said jaw members having a work performing portion on one side of the pivot, first and second drive receiving levers diverging outwardly on the other side of said pivot, said work performing head member having a first work range and a second work range, said first and second levers having a first work range and a second work range corresponding to the like ranges of said work performing portion, a power drive device to drive the first and second drive receiving levers apart through said first work range, said power drive device having a first pivotal connection to said first drive receiving lever, said second drive receiving lever having an inside surface facing said power drive device, said inside surface having a notched form to pivotally receive a pivot surface, said second lever ending at a position close to the beginning of the notched surface, said power device having a pivot surface laterally spaced from said first pivot connection and removably seatable in the notched form of said inside surface, said power drive device having power means to drive said first pivotal connection and said pivot surface laterally apart to a maximum position and closed to a minimum position in a first work range, movement of said power device producing movement of the drive receiving levers and jaw members in said first work range with said pivot surface engaging the notched form surface, said second drive receiving lever being closable in said second work range by disengagement of said pivot surface and notch and moving said end of the second lever toward the first lever past the pivot surface beyond said minimum closed position thereof.

4. A compound action pivoted jaw tool, comprising, a work performing head member having first and second jaw members, a pivot interconnecting said jaw members, said jaw members having a work performing portion on one side of the pivot, first and second drive receiving levers diverging outwardly on the other side of said pivot, said work performing head member having a first work range and a second work range, said first and second levers having a first work range and a second work range corresponding to the like ranges of said work performing portion, first and second pivoted actuation handles, said first handle having a secondary pivot laterally spaced from said pivot means interconnecting said first handle and said first drive receiving lever, said second drive receiving lever having an inside surface facing said secondary pivot, said inside surface having a notched form to pivotally receive a pivot surface, said second lever ending at a position close to the beginning of the notched surface, said second handle having a pivot surface laterally spaced from said pivot means and removably seatable in the notched form of said inside surface end, said actuation handles being pivotable through a work range, movement of said handles through said work range producing movement of the drive receiving levers and jaw members in said first first work range with said pivot

surface of the second handle engaging the notched form surface, said second drive receiving lever being closable in said second work range by disengagement of said pivot surface and notch and moving said end of the second lever toward the first lever past the pivot surface beyond said minimum closed position thereof.

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