Dec. 12, 1950 C. H. KLEIN 2,533,943

DIE HEAD DEVICE

Filed June 13, 1947 2 Sheets-Sheet 1

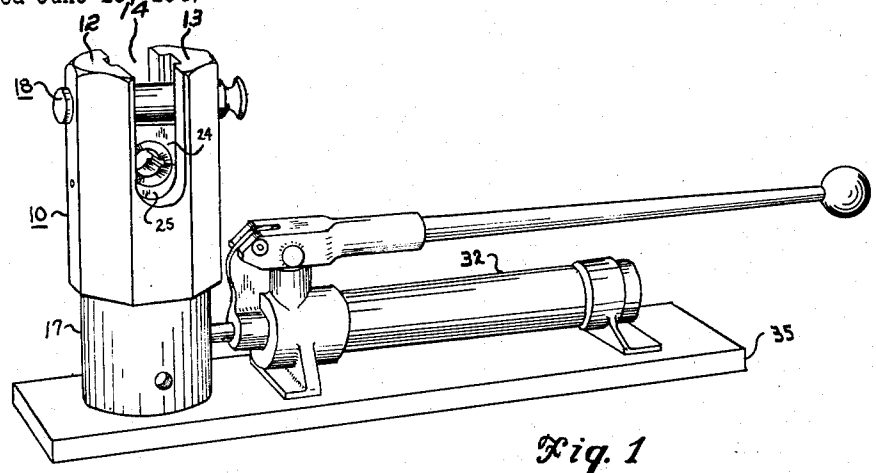


Fig. 1

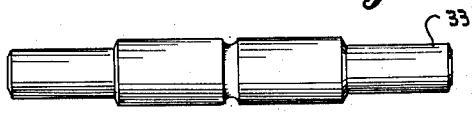


Fig. 2

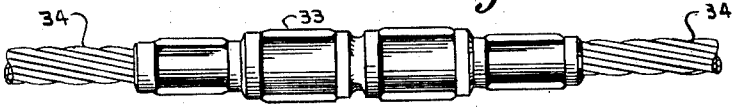


Fig. 3

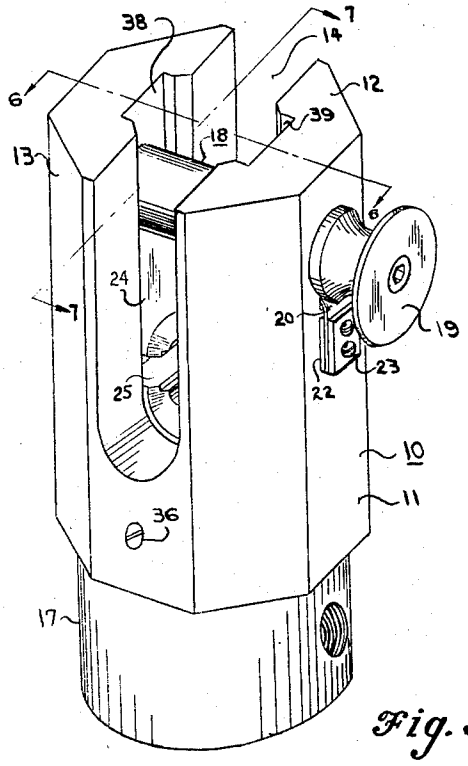


Fig. 5

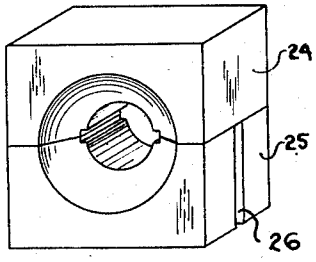


Fig. 4

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DIE HEAD DEVICE

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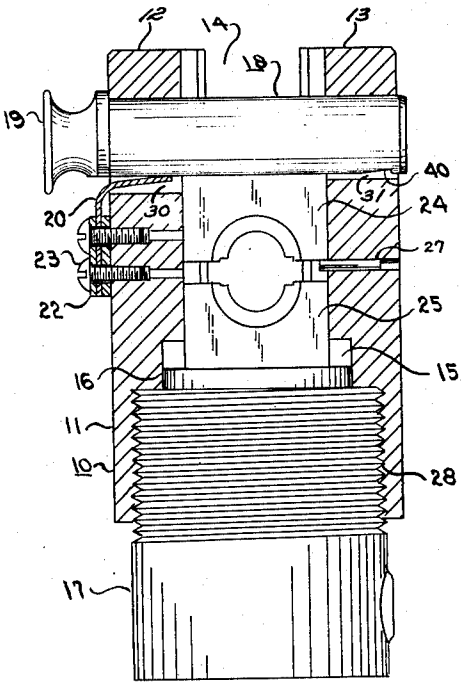


Fig. 6

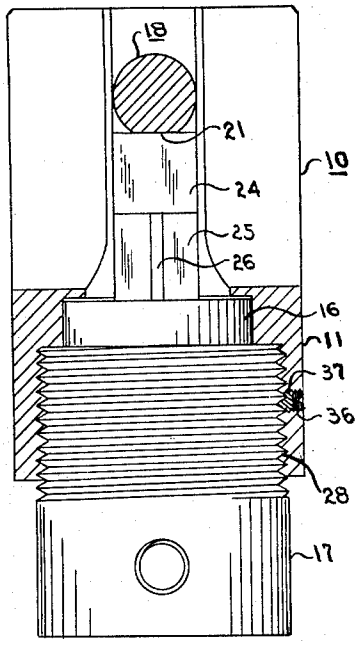


Fig. 7

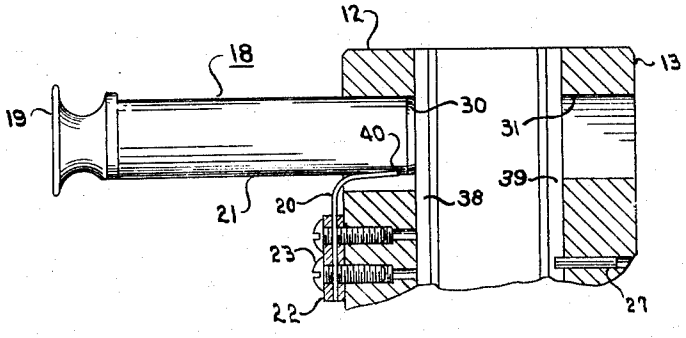


Fig. 8

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UNITED STATES PATENT OFFICE

2,533,943

DIE HEAD DEVICE

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Application June 13, 1947, Serial No. 754,558

4 Claims. (Cl. 153—1)

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My invention relates to compression tools adapted to compress sleeves on wires and more particularly to a die head compression device which is portable for use by linemen to compress sleeves on wires in the field.

In using a tubular sleeve to connect wires, the ends of the wires are inserted into the opposite ends of the sleeve and then the sleeve is compressed to secure the wires therein. In the use of such wire connecting sleeves, many devices have been employed to compress the sleeve about the ends of the wires. Because the act of connecting the wire to the sleeve is usually a field operation, and many times is done high in the air on wires suspended from poles, hand tools of various devices have been developed for compressing the sleeve about the wires. Actually, hand tools are limited in the amount of compressive force that can be applied to compress the sleeve. To compress sleeves of the larger sizes about wire, experience has shown that for many jobs a compression force of approximately thirty five tons is required to make a satisfactory safe connection. To make a device to provide a compression force of thirty five tons and yet be portable, is a task which has baffled engineers for a course of years. To use such a device in the field, it must be highly portable even to the extent that a man can operate the device in the air between supporting poles. Steel of course, has the required strength for a compression press, but is too heavy to be easily portable and operated.

It is therefore an object of the present invention to produce a lightweight aluminum die head compression device capable of withstanding sufficient compressive forces for compressing tubular sleeves on the ends of the wires.

Another object of my invention is to make a die head compression device of extruded or worked aluminum alloy.

Still another object of my invention is to provide a die head compression device having a channel shaped opening to receive a simple pair of dies, and having a steel cross pin to hold the dies in the channel shaped opening against the force of a power piston.

Yet another object of my invention is to provide a die head compression device adapted for easy insertion of a sleeve and wire ends, and easy removal of the extremely long continuous wire resulting from the joinder of two wires by the device.

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

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Figure 1 is a perspective view of my improved die head compression device assembled upon a baseboard with a suitable fluid pressure pump;

Figure 2 is a suitable sleeve blank used to join the ends of two wires;

Figure 3 is an illustration of two wires joined together by compressing the sleeve of Figure 2 upon the ends thereof with my improved die head device;

Figure 4 is a suitable set of dies for use with my improved die head compression device;

Figure 5 is a perspective view of my improved die head compression device;

Figure 6 is a longitudinal section view of my device as taken along the cross-section indicated generally by the line 6—6 of Figure 5;

Figure 7 is a longitudinal cross-sectional view of my improved die head compression device as taken along the line indicated by the line 7—7 of Figure 5; and

Figure 8 is a view similar to the Figure 6 with the locking pin thereof pulled to a release position, whereby the compressed sleeve and connected wires may be removed from the die head compression device.

In the figures of the drawings, the reference character 10 indicates my improved die head generally. This die head 10 is adapted for use with a fluid actuating device comprising a cylinder 17 and piston 16. A pump of any convenient design, such for example as the fluid pump 32 is employed in conjunction with the piston 16 and cylinder 17, and the entire assembly is mounted upon a convenient base 35 as illustrated in the Figure 1.

The die head device 10 comprises a base portion 11 having a first arm portion 12 and a second arm portion 13 extending upwardly from the base portion 11. The arms 12 and 13 are substantially parallel to one another and are separated by a slot area 14 therebetween.

The base portion 11 has a piston chamber 15 therein, and is provided with internal threads 28 which are adapted to threadably engage corresponding threads on the external surface of the cylinder 17. The piston chamber 15 opens into the slot area 14, and the piston 16 is therefore adapted to operate in the bottom portion of the slot area 14.

A die guide 38 on the arm 13 and a die guide 39 on the arm 12 are adapted to slidably receive a die set comprising a top die 24 and a bottom die 25. The die set 24 and 25 may be inserted

from the top of the die head 10 and slidably move downwardly toward the top surface of the piston 16. A pin 27 extends into the slot area 14 from the arm 13, and is employed as a die stop pin. The bottom die 25 is provided with the vertical groove 26 thereon of sufficient dimension to pass by the end of the pin 27. Therefore, when the die set 24 and 25 moves toward the piston 16, the bottom die 25 will pass the pin 27, but the top die 24 will be stopped by the pin 27. Therefore, when the piston 16 is moved to its lowermost position as illustrated in Figure 6 of the drawings, the pin 27 will hold or support the top die 24 but allow the bottom die 25 to contact the top of the piston 16, and therefore separate the dies 24 and 25. When thus separated, a connecting sleeve 33 as illustrated in the Figure 2 may be inserted between the top and bottom dies 24 and 25, and wire ends 34 inserted into the sleeve 33.

Figure 6 of the drawings illustrates the piston 16 in its lowermost position, and Figure 7 illustrates the piston 16 raised to compress the dies 24 and 25 to compress the sleeve 33 upon the wire ends 34. Of course, the dies 24 and 25 are free to move in the die guides 38 and 39, and therefore I have provided a suitable cross-pin 18 to hold the dies in place and resist the force of the piston during periods of operation to compress the sleeves. An opening 30 in the arm 12 and an opening 31 in the arm 13 are provided to receive the cross-pin 18. The openings 30 and 31 in the illustrated embodiment of my invention are substantially cylindrical in form, and are axially aligned with one another with their common axes substantially perpendicular to the die path as defined by the die guides 38 and 39. The cross-pin 18 is of tempered steel and is provided with an aluminum handle 19 on one end thereof. It will be seen that the handle 19 is of a size larger than the opening 30, and therefore the cross-pin 18 will be stopped from passing through the opening 30.

In the embodiment of the cross-pin 18 as illustrated, I have provided a flat surface 21 on one side of the cylindrical pin 18 to form a flat abutment surface against which the top die 24 may contact. The flat surface 21 ends in an abutment surface 40 at the end opposite the handle 19 as is best illustrated in Figure 8 of the drawings. In order to prevent the cross-pin 18 from being withdrawn from the opening 30 during operation, but nevertheless assuring fast and easy sliding movement of the cross-pin 18 relative to the openings 30 and 31, a flat spring 20 is suitably attached to the arm 12 by means of the screws 23 as illustrated, and is curved to extend into the opening 30 and thereby tightly contact the flat surface 21 of the cross-pin 18. The cross-pin 18 is thereby held in a fixed position and the flat surface 21 thereof held square with respect to the top die 24.

When the cross-pin 18 is pulled to the position illustrated in the Figure 8 of the drawings, the end of the flat spring 20 contacts the end abutment surface 40 on the cross-pin 18 and prevents withdrawal of the cross-pin 18 further than the position illustrated in the Figure 8. However, this position is quite sufficient to allow the insertion and withdrawal of the dies 24 and 25 from the die guides 38 and 39. On the other hand, after the dies have been inserted within the die head 10 between arms 12 and 13, the cross-pin 18 may be slidably moved to engage the opening 31 as illustrated in the Figure 6 of the drawings, and lock the dies in the guides.

I have provided the die head 10 of worked or extruded aluminum alloy known to the trade as 75 S–T alloy having a tensile strength of substantially 70,000 p. s. i. This material I have found is sufficiently strong to withstand the several tons of pressure exerted by the piston 16 upon the dies 24 and 25, and is light enough to be readily portable. On the other hand, I have provided the cross-pin 18 of solid steel in order to provide minimum deflection of the pin under the high pressure load exerted by the piston 16. To make the pin of anything that would have a deflection characteristic under the load would set up components of force tending to spread the arms 12 and 13 out of parallel and open the slot area 14. The combination of the characteristics of the worked or extended lightweight aluminum alloy die head 10, with the rigidity of the steel cross-pin 18 has produced a successful device to withstand the substantially thirty five ton pressure required to compress the sleeves.

In operation, I select a suitable set of dies 24 and 25, and insert them within the slot area 14 by first withdrawing the cross-pin 18 from the opening 31, and then dropping the die members 24 and 25 into the die path defined by the die guides 38 and 39. Thereafter, the dies 24 and 25 are locked within the die head 10 by sliding the cross-pin 18 to bridge between the arms 12 and 13. Before the operating cycle is commenced, the piston 16 is in a retracted position, and the bottom die 25 clears the pin 27 and rests upon the top of the piston 16 at a distance from the die 24 which has been stopped by the pin 27. My improved device is then ready for operation. A sleeve 33 may be inserted between the dies 24 and 25, and the wire ends 34 inserted into the end of the sleeve, or the sleeve 33 may be inserted upon one of the ends 34 and then placed between the dies, after which the second end 34 is inserted within the sleeve. Thereafter, the pump 32 is actuated to move the piston 16 in the direction of the die path and therefore actuate the lower die 25 toward the upper die 24. However, the upper die is securely held against movement by the cross-pin 18. Therefore, the sleeve 33 is tightly compressed between the dies 24 and 25 and thus is coiled tightly about the ends 34 of the wires substantially as illustrated in the Figure 3.

After having applied sufficient pressure for a sufficient length of time to coin the sleeve 33 about the wire ends 34, the pressure is withdrawn from the piston 16, and the bottom die 25 is allowed to move away from the top die 24. The sleeve and wires may then be moved to coin another portion of the sleeve if the sleeve is longer than the die, and the coining operation repeated. After the sleeve has been coined, the cross-pin 18 is then withdrawn from the opening 31, and is stopped from being completely withdrawn by contact of the flat spring 20 against the abutment surface 40. Thereafter, the top die 24 may be withdrawn from the die guides 38 and 39, and the joined cable removed from the top of the slot area 14. If only a short length of wire is formed by the joined lengths, it is of course not necessary to withdraw the cross-pin 18 and the top die 24, because the short length may be pulled through the dies after the pressure is removed. It is a distinct advantage, however, to be able to remove the die head device 10 from the wire, rather than to remove the wire from the device 10, in the case of long length of wire.

The spring 20 in addition to its function as a stop and as a means to hold the flat surface 21 square with the top of the dies, also functions as friction means to prevent the pin from bouncing back into the slot area 14 upon the abutment 40 striking the end of the spring 20 during withdrawal. The spring, in addition to the addition to the above features, takes up slack or looseness and holds the pin to the top of the openings 30 and 31. Therefore, there will be a minimum slack to be taken up by the piston 16.

Although I have described my invention 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 die head device comprising, a base portion, a first and second arm member extending from and integral with said base portion with a slot area therebetween, a piston chamber in said base portion opening into said slot area, a first die guide on said first arm member, a second die guide on said second arm member, said first and second die guides being substantially parallel and defining a die path, said first and second die guides being on the inner faces of said arm members, a power piston operable in said piston chamber in said base portion, said piston being adapted to move in the direction of said die path, said first arm member having an opening therethrough, said second arm member having an opening therethrough, said openings having a common axis substantially perpendicular to said die path, a pin mounted to reciprocably slide through said openings from an open position engaged with only said first arm member, to a second position engaged with both said first and second arm members, said pin having a flat longitudinal surface against which flat die surfaces may abut under driving force from said power piston, said pin and the openings in the first and second arm members having cooperating arcuate bearing surfaces on the side of the pin opposite said flat surface, and means on said first arm and said pin cooperating to prevent unintentional removal of said pin beyond the said retracted open position.

2. In a die head device as defined in claim 1, the provision of means on one of said arms engaging and securing the upper die of a two-piece die set substantially against said pin, the lower die being free to be advanced and retracted with respect to the upper die by said piston.

3. A die head device comprising, a base portion, a first and second arm member extending from and integral with said base portion with a slot area therebetween, a piston chamber in said base portion opening into said slot area, a

first die guide on said first arm members, a second die guide on said second arm member, said first and second die guides being substantially parallel and defining a die path, said first and second die guides being on the inner faces of said arm members, a power piston operable in said piston chamber in said base portion, said piston being adapted to move in the direction of said die path, said first arm member having an opening therethrough, said second arm member having an opening therethrough, said openings having a common axis substantially perpendicular to said die path, a pin mounted to reciprocably slide through said openings from an open position engaged with only said first arm member, to a second position engaged with both said first and second arm members, said pin having a flat longitudinal surface against which flat die surfaces may abut under driving force from said power piston, said pin and the openings in the first and second arm members having cooperating arcuate bearing surfaces on the side of the pin opposite said flat surface, an abutment surface interrupting said flat surface of the pin near the end thereof, and a flat spring carried by said first arm member and extending into the outline of the opening in said first arm member, said pin mounted in said opening in the first arm member with the flat surface thereof and the flat spring in pressing engagement, and with said abutment surface engaged with said flat spring only with the pin retracted to said open position.

4. In a die head device as defined in claim 3, the provision of means on one of said arms engaging and securing the upper die of a two-piece die set substantially against said pin, the lower die being free to be advanced and retracted with respect to the upper die by said piston.

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