April 7, 1964 J. P. ROGERS 3,127,797

HAND TOOL FOR ROTATING A THREADED MEMBER HAVING AXIALLY MOVABLE CLUTCHING HANDLE SECTIONS

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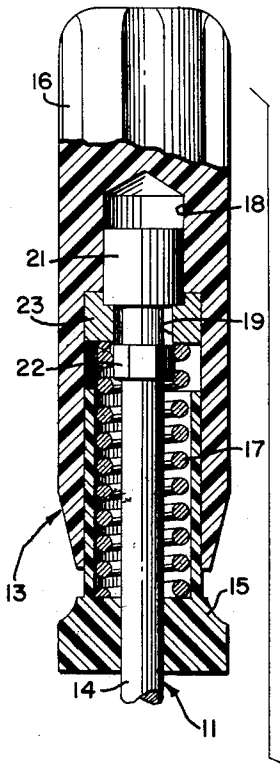
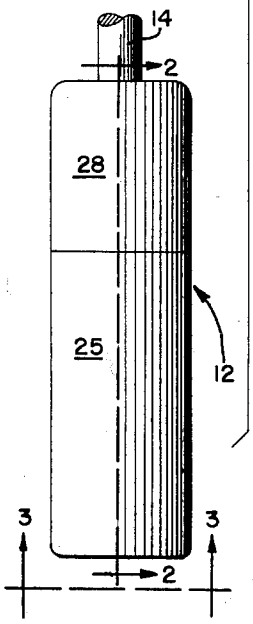


FIG. 1.



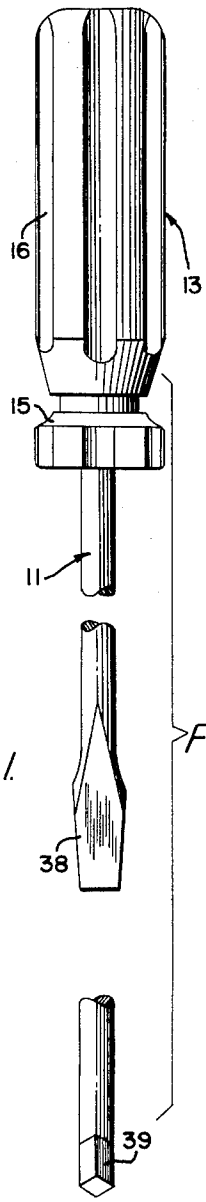


FIG. 4.

FIG. 3.

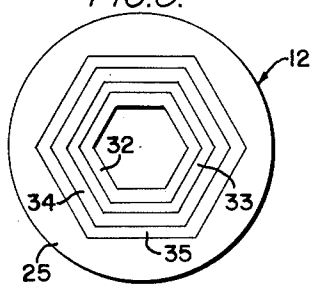
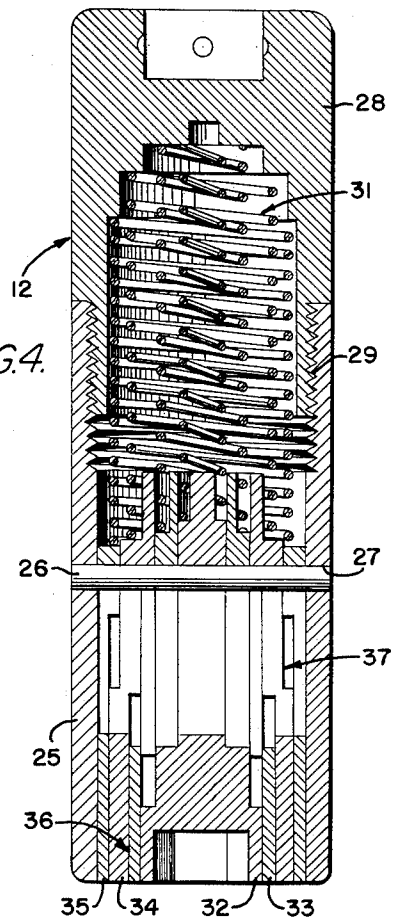


FIG. 2.



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HAND TOOL FOR ROTATING A THREADED MEMBER HAVING AXIALLY MOVABLE CLUTCHING HANDLE SECTIONS

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This invention relates to a new and improved hand tool and more particularly to a universal nut runner with a floating handle that may be adjusted to obtain additional torque without removing the self-selecting nut runner from the contact position or the hand from the handle.

In the prior art it has been the custom to use several sockets or nut runners with a single turning device. For example, a nut runner of a particular size is used on a particular size nut. The torque applied to the nut may be accomplished by using a socket and speedwrench or by a torque bar. In either case, if the size of the nut or bolt was not known, several sockets would be tried before the proper one was found.

The purpose of this invention is to provide a new improved self-selecting nut runner that is capable of being immediately adapted for use on various sizes of nuts without any prior knowledge as to the actual size of the nut. The torque applied to the nut runner may also be applied easily by changing the position of the handle to suit the operator, so that he may achieve the maximum mechanical advantage.

While the word nut is used in the specification, it is to be understood that the invention may also be used on bolts, certain screws having heads adapted to fit a socket, and certain other devices which will be more fully described herein.

The general purpose of this invention is to provide a handtool which embraces all the advantages of similarly employed prior art devices, but possesses none of the aforedescribed disadvantages.

It is an object of the present invention to provide a universal nut runner that may be easily and quickly adapted to any nut on which it is placed.

Another object is to provide a self-selecting nut runner with a floating handle that may be rotated in either direction to achieve maximum torque without removing the tool from the work or the hand from the handle.

A further object is to provide a nut runner wherein the tool may be rotated in either direction with one hand while a portion of the handle is held rigid in the palm of the hand.

Still another object is to provide a handle for a tool wherein the shank with one portion of the handle may be turned in either direction, independently of the butt portion of the handle, by the thumb and forefinger, but will allow both portions of the handle to be locked together so that it may be turned as a single unit when additional torque or leverage is required.

Other objects and many of the attendant advantages of this invention will be readily appreciated as they become better understood by reference to the following detail description when considered in connection with the accompanying drawings and wherein;

FIG. 1 is a diagrammatical view partly in section of a universal tool having the principles of the invention embodied therein;

FIG. 2 is a cross-sectional view of the universal nut runner of FIG. 1 taken along lines 2—2 thereof;

FIG. 3 is an end view of the universal nut runner of FIG. 1 taken along lines 3—3; and

FIG. 4 discloses the floating handle of this invention utilized on a handtool capable of rotating a bolt or screw with a slot in the head thereof, or for snapping into another self-selecting socket set.

Refer now to the drawings, wherein like reference numerals designate like parts throughout the several views, there is shown in FIG. 1 a universal nut runner **11**. The nut runner has three main members, which are: the self-selecting socket **12**, the floating handle **13**, and the connecting shank **14**. The self-selecting socket mechanism will be more fully described hereinafter. The shank may be rigidly mounted on the socket mechanism or may be snapped on and off as is well known in the art. The shank **14** extends into the handle substantially as shown in FIG. 1. The lower section **15** of the handle is rigidly mounted on shank **14** and both pieces are slidably mounted in the upper portion **16** of the handle. The terms upper and lower or top and bottom as used in this specification are made with reference to the attached drawing submitted hereinwith. The lower section **15** of the handle is shaped substantially like a hollow cylinder closed at the bottom and open at the top with the shank **11** extending through the center thereof. A spring **17** is located inside the lower section and encircles shank **14**. The upper portion **16** of the handle has a bore **18** and a counter bore **19** extending into the handle from one end. The shank **14** has a cylindrical member **21** integrally mounted on one end thereof. The cylindrical member **21** is machined to a close tolerance with respect to bore **18** so that it slides smoothly within the bore. The cylindrical member **21** will help stabilize the shank when it is in either the top or bottom position in the bore. A hexagon shaped member **22** is rigidly mounted on the shank a short distance from member **21**. The reason for locating the hexagon shaped members a short distance from member **21** will readily become apparent hereinafter. A steel insert member **23** is rigidly press fitted into the counter bore **19** immediately adjacent the bore **18**. The top portion of the insert member **23** has a ring shaped interface in which cylindrical member **21** will normally be located. The remaining portion of the interface of the insert is hexagon shaped with a radius slightly smaller than the radius of the ring shaped portion, thereby effectively holding cylindrical member **21** in bore **18**. However, member **23** will encase member **22** locking the two portions of the handle together. Spring **71** normally biases the shank, and the lower portion **15** of the handle away from the bore **18**, so that member **21** is seated in the ring portion of insert **23** causing the upper handle to float with respect to the lower portion of the handle. In this position, either the upper or lower portion of the handle may be turned without turning the other portion. When member **16** is pressed down compressing spring **17**, the hexagon shaped member **22** is moved into that portion of the insert having a hexagon shaped interface and the cylindrical member **21** is moved to the top of bore **18**. In this position, the two portions of the handle become locked together and moves as a unit. Thus it can be seen that the top portion of the handle may be rotated and then depressed to obtain a new position with additional torque while maintaining the original grip on the handle and without removing the nut runner from the nut. Refer to FIGS. 2 and 3 which discloses the details of the self-selecting socket mechanism **12**. While this invention is not limited to any size, it has been found that this socket mechanism may be made with five sockets mounted inside one another ranging from 3/16" to 7/16" in size. This range is the most popular and the most widely used. In FIG. 2 the largest socket **25** is also the outside housing for the socket mechanism. A pin **26** is passed through slots **27** located in each of the sockets. Each socket has two slots located 180 degrees apart, except for socket **25**. The slots are aligned and provide guides for each socket as it slips with respect to the adjacent socket. A spring housing **28** is mounted on socket **25** by threads **29**. The spring housing **82** is formed like a hollow cylin-

der with one closed end to encase the five springs **31**. The end that is closed has several steps **32** of decreasing radii. Each step is a compressing surface for a spring making contact with one of the sockets in socket mechanism **12**. The slots **27** and the compression force of springs **31** insure that the five sockets are normally held in alignment. Each socket will be moved smoothly forward, as viewed in the drawing, by the appropriate spring when the nut or bolt compressing it is removed. For example, if a bolt the size of socket **35** needed to be rotated, the following operation would be performed. The self-selecting socket mechanism would be placed on top of the bolt. The self-selecting sockets would be rotated by turning the lower portion **15** of the handle with the thumb and forefinger. Sockets **32**, **33**, and **34** would be moved so as to compress their appropriate spring and socket **35** would slip over to encase the bolt. The upper handle **16** would then be pressed forward so that hexagon member **22** is pressed into the hexagon shaped interface **23** and the entire tool is rotated. The torque from the handle is transferred from the handle to the socket **25**, then to socket **35** located adjacent thereto, and then to the bolt causing it to rotate. Each socket is machined to a very close tolerance and, therefore, cannot turn inside the adjacent socket. The lower part **36** of each socket is made in the form of a hexagon and the top part **37** is made in the form of a circle. The change from the hexagon material to the round material limits the travel of the next smaller socket without moving the particular socket in question. Of course, the pin **26** limits the travel of all the sockets. FIG. 4 discloses a nut runner **38** for the type of bolt, nut or screw that has a slot therein for the advancing or retardation thereof. It may be desirable to provide several socket sets, to provide a finite selection of sockets. In that case, a snap on shank **39** may be employed to avoid the cost of several handles.

By way of further explanation of this invention, the handle is normally held firm in the palm of the hand while the thumb and forefinger comfortably grip and rotate the forward section of the handle.

The self-selecting socket mechanism is placed onto the nut or bolt to be rotated. The smaller sockets are pushed out of the way by the nut allowing the proper size socket to encapsulate the nut. The nut may be advanced by rotating the lower portion of the handle with the thumb and forefinger until additional torque is required. The other hand is completely free to guide the nut or hold the bolt as the need arises. By compressing the upper handle, turning the tool, releasing the returning upper handle to the original position, the nut may be completely tightened with a ratchet-like action without removing the socket or without changing the grip on the handle. Spring **17** in the handle has a sufficient tensile property that it will allow the upper portion of the handle to be released and rotated without allowing the sockets to become disengaged during this operation.

It is considered obvious that this invention has filled a longstanding need in the art where space and time are of prime consideration. For example, this invention will replace the entire socket set now utilized, to allow the craftsman additional room in his tool box for other tools. Another us of this tool will be in the training and equipping of blind craftsmen for assembly line work. By using the self-selecting socket set, the tedious job of finding the proper size socket and fitting it onto the nut has completely been eliminated. The craftsman need only place the self-selecting socket mechanism on the nut and turn slowly to get the proper socket on the nut. In making emergency repairs very often time is of the essence and by utilizing this invention, one hand is free to align the parts while the nut or bolt is rotated by the other, thus expediting the needed repairs.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A self-selecting nut runner for quick advancement of a nut during continuous contact therewith comprising a housing connected in alignment with a removable outer socket casing, a plurality of normally aligned sockets encased by said outer socket, each of said plurality of sockets independently movable with respect to the adjacent sockets to accommodate various sized nuts, a first biasing means for maintaining said plurality of sockets in the normally aligned position, a shank normally connected at one end thereof to said housing, a floating handle means located at the other end on said shank, said handle means including a first section rigidly mounted on said shank, a second section slidably mounted on and extending beyond said first section, a second biasing means interengaging said first and second sections normally biasing said second section in a disengaged position, means for engaging said second section to said shank comprising an axial polygonal shaped opening in said second section and a mating polygonal shaped member located on said shank, said second section being capable of being constrained to an inward engaged position engaging said shank.

2. A handtool comprising a shank, means on one end of said shank for engaging a threaded member, a floating handle means located at the other end of said shank, said handle means including a first section rigidly mounted on said shank, a second section slidably mounted on and extending beyond said first section, a biasing means interengaging said first and second sections normally biasing said second section in a disengaged position; means for engaging said second section to said shank comprising an axial, polygonal-shaped opening in said second section and a mating polygonal-shaped member located on said shank, said second section being capable of being constrained to an inward engaged position engaging said shank.

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