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DRIVER AND EXTRACTOR FOR STUD BOLTS AND THE LIKE

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2 Sheets-Sheet 2

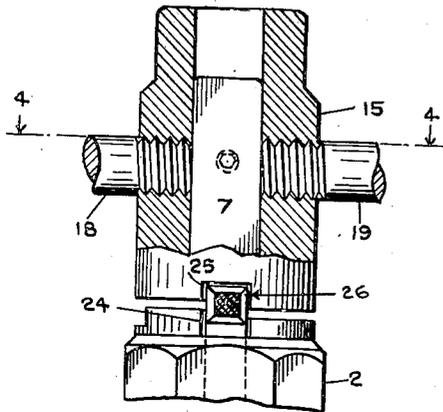


Fig. 3

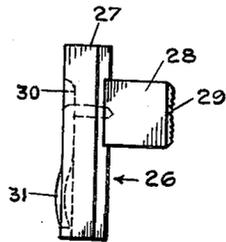


Fig. 9

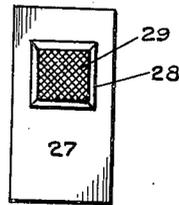


Fig. 10

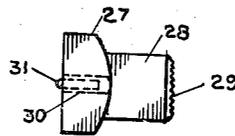


Fig. 11

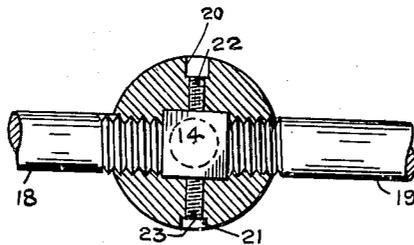


Fig. 4

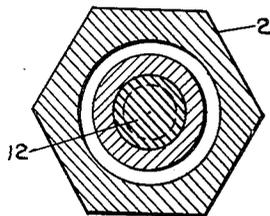


Fig. 5

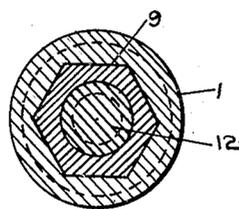


Fig. 6

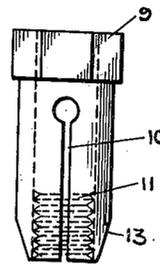


Fig. 7

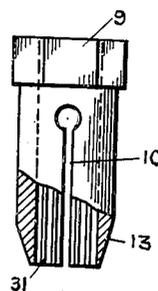


Fig. 8

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DRIVER AND EXTRACTOR FOR STUD BOLTS AND THE LIKE

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9 Claims. (Cl. 81-113)

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This invention relates to means for driving and removing threaded or unthreaded studs or taps, and more particularly to means used in connection with such taps and studs for driving and seating them securely and extracting them, and it is an object of the invention to provide an improved means of the type described which at all times can be manipulated to either drive and seat or extract threaded or unthreaded studs or taps.

A further object of this invention is to provide a single tool which may be used to either drive studs or to remove such studs or jammed taps.

Another object is to provide a tool which will not injure delicate stud threads in the operation of either driving the stud into stock or removing the stud therefrom.

Another object of this invention is to provide a tool which will drive a stud or operate a tap to a predetermined depth such depth being preset by adjustment of the tool without the use of accessory parts.

Another object of this invention is to provide a tool which is readily adaptable for either manual or machine use interchangeably.

Another object of this invention is to provide a tool whereby different sizes of threaded collets may be inserted in the tool quickly and easily and by unskilled workmen without throwing the tool out of adjustment.

Further objects and advantages of this invention will be apparent from the accompanying drawings and the following specification.

In the said drawings, in which preferred embodiments of the invention are illustrated:

Fig. 1 is an elevational view of the tool showing a stud being driven into stock;

Fig. 2 is a view partly in vertical section and partly in elevation of a tool constructed in accordance with this invention;

Fig. 3 is a sectional view of the head of the tool showing the method of locking the head to the main body by means of the handles or by means of the set screws;

Fig. 4 is a horizontal partly sectional view of Fig. 3 taken on the lines 4-4 of Figs. 2 and 3, showing the method of locking the head of the tool to the main body by means of either handles or the set screws;

Figs. 5 and 6 are horizontal cross section views of the tool taken on the lines 5-5 and 6-6 respectively of Fig. 2;

Figs. 7 and 8 are elevations of two different types of collets which may be used in the invention;

Figs. 9, 10 and 11 are side, front and top eleva-

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tions respectively of the shift lock of this invention.

Referring to Figs. 1 and 2 of the drawing, 1 is the driver body or barrel which is formed into a nut-like exterior portion 2 at its upper end. The barrel 1 has a bore throughout its length to form a tubular portion whose bore decreases in size by steps as shown at 3, 4, and 5 in Fig. 2. The decreased bore 3 is threaded internally to accommodate an externally right-hand screw threaded cylinder 6 whose interior is left-hand threaded to accommodate the threaded lower portion of the screw bolt 7 which ends in a narrowed drive face 8 which abuts the head of collet pin 9^a which is held within the collet 9. The collet 9 has vertical slits 10 cut through its sides and is internally threaded as shown at 11 to accommodate a threaded stud 12. The outer surface of the collet 9, at its lower end is graduated to fit the decreasing internal diameter of the barrel 1 as shown at 13. The screw bolt 7 has an elongated angular shank 14 which extends through the tubular interior of the barrel 1 and is long enough to pass through the interior of the removable tool head 15. The interior of the tool head 15 is made to snugly accommodate the shank of the screw bolt 7 as shown in Figs. 2, 3 and 4, and threaded holes are cut in the sides at 16 and 17 to accommodate complementary threaded handle bars 18 and 19. Smaller threaded holes 20 and 21 are drilled in the head 15 as shown in Fig. 4 and set-screws 22 and 23 inserted therein, so that the head 15 may be firmly secured to the screw bolt 7 independently of the holding action of the handle bars 18 and 19.

The upper section of the barrel 1 is slotted at 24 and the lower section of the head 15 is correspondingly slotted at 25 to accommodate the shift control 26. The upper portion of the screw threaded cylinder 6 is preferably slotted at 6^a in such a manner that when shift control 26 is inserted in slot 6^a and slot 24 the bottom shoulder 6^b of 6 is just out of contact with the top surface of the collet 9. As shown in Figs. 9, 10 and 11 the shift control 26 is a bar 27 and knob 28 preferably made in one piece, the knob 28 being serrated at 29 for non-slip finger-tip operation. The bar 27 is slotted at 30 to accommodate a bowed spring 31 for frictional engagement with the threaded cylinder 6.

A segment of the top of the barrel 1 is cut away at 32 while a segment of the bottom of the head 15 is cut away at 33 leaving a projection 34 so that the two sections interlock allowing head 15

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to rotate only within the limit of the slot 32, and thus making a stop pin of 34.

In the drawings, Figure 8 represents a different type of collet which may be used with this invention. Instead of a threaded interior section the collet of Figure 8 has vertical serrations indicated at 31 in its interior. The purpose of these vertical serrations is to grip a non-threaded stud or tap enabling the operator to insert or remove it; for example, studs in which the threaded portion has broken off or become so rusted or corroded that no definite working threads exist.

In operation, the head 15 of the tool is removed and the screw bolt 7 rotated either clockwise or counter-clockwise until with the collet pin 9^a is in a restricted position in the collet 9 and until there is the required stud length observed in the threaded collet opening. The head 15 is now replaced on the screw bolt 7 and the handle bars 18 and 19 rotated until they grasp firmly the said screw bolt 2. If the handles 18 and 19 are not to be used the small screws 22 and 23 are tightened. In this connection it will be noted that the upper section of the screw bolt 7 does not entirely fill the cavity in the head 15, so that an extension rod may be inserted therein for operation of the tool.

With the head locked in place and the shift control 26 in the up position, the left hand screw bolt 7 and the right hand screw threaded cylinder 6 are locked together through the driving head 15. A stud is now screwed into the collet 9 until its head meets the base of the collet pin 9^a. The drive head 15 is now turned to the right, or clockwise, by use of the handle bars 18 and 19. As the drive head 15 is turned the projection 34 will strike the end of slot 32 at the top of barrel 1; checking further relative rotary movement. Meanwhile rotation of the drive head 15 has rotated the cylinder 6 within the barrel 1 so that the drive face 8 on the end of the screw bolt 7 comes into contact with the head of the collet pin 9^a. Any further rotation of the drive head will force collet 9 down into taper 13 of barrel 1 and tighten the threads of collet 9 around the stud threads until the pitch diameters of the collet threads and the stud threads coincide, and the stud may then be easily driven into a casting to the desired depth.

In order to release the tool from the stud, rotation in a counter-clockwise direction is all that is required as such counter-clockwise rotation will turn as a unit the drive head 15, right hand screw cylinder 6 and left hand screw bolt 7 allowing these units to rise slightly in barrel 1 and thus relieving pressure on the collet pin 9^a and releasing collet 9 from taper 13 which releases the hold of the collet threads on the stud threads and allows easy removal of the tool.

In order to remove a stud with the tool the shift control 26 is shifted to its down position in the slot 25 thus unlocking 6 and 7. The tool is then screwed down on the threaded stud until the top of the stud abuts the base of the collet pin 9^a. The shift control 26 being in a down position the right-hand-screw cylinder 6 and barrel 1 are locked together and left-hand-screw bolt 7 is free to rotate. Further turning of the driver head will drive the collet 9 into the taper of the barrel 1 and tighten the collet around the threads of the stud 12. The pressure on the handles 18 and 19 is now reversed to a counter-clockwise direction which applies additional pressure on the collet pin 9^a through the screw bolt face 8 thereby forcing collet 9 further into the

taper of barrel 1 and tightening the collet on the screw thread of stud 12. The pressure thus applied to the handles 18 and 19 is thus built up through the screw bolt 7, collet pin 9^a and collet 9 until a point is reached where the pressure and rotation of the collet seizure is equal to the seizure of the lower thread of the stud 12, in its tapped hole in the casting.

To remove the stud from the tool it is only necessary to place the nut-like portion 2 of the barrel 1 in a vise or similar device and turn handles 18 and 19 clockwise until lug 34 strikes the shoulder of segment 32. This moves slots 24, 25 into alignment so that said shift control 26 may be moved into its up position. Rotation of the drive head 15 in counter-clockwise direction will then release the pressure on the collet 9 and the stud may be removed with a twisting motion of the fingers.

By use of the collet shown in Fig. 8, it is possible to remove damaged or broken taps. It is also possible to remove studs which for one reason or another have no threads at all, or no serviceable threads on their exposed portion. After the tool has been adjusted for a stud having a given projection successive studs having the same projection may be driven or removed without removing the tool head.

It will be seen by the foregoing that the improvements provide a device which can be employed for both driving and removing studs and the like without requiring the use of accessory wrenches or other tools, the gripping pressure of the collet building up automatically in direct proportion to the torque required to break the stud away from its casing; that they provide within the device an adjustment for receiving the stud to the desired depth, the removal of the driving head allowing the left-hand screw to be turned in or out to retract or advance the collet pin so that, inter alia, all studs may be driven to uniform depth and studs may be removed where only a few threads may be held; that the device may be used in places where cross handles cannot be used by simply inserting a standard extension, universal, ratchet or other connecting member in the square broach of the head for either power of hand driving; that collets may be changed without danger of throwing the device out of adjustment, each tool accepting three collets of different size; and that the semi-sealed construction confines the lubrication and excludes grit or dust. Other uses and advantages will be apparent to those skilled in the art.

Various changes in the details of construction of the exemplary embodiment herein described and shown may be made without departing from the scope of the invention as defined by the appended claims.

What I claim is:

1. In a device of the character described, a contractible collet adapted when contracted to engage a stud, bolt or the like and to grip the same, a hollow member in which said collet is removably mounted for longitudinal movement, said collet and member having inclined surfaces adapted to engage each other to contract and permit expansion of the former, a member mounted to move longitudinally in the interior of said collet and to bear against said stud, bolt or the like to cause it to move lengthwise while said surfaces are in engagement, a bar having a screw thread on a portion of it and a sleeve-like member having an internal complementary engaging screw thread within which said

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bar is located, the last two parts being located within the hollow member and the said hollow member and sleeve-like member having respective internal and external complementary screw threads pitched reversely to the threads of the bar and the internal threads of the sleeve-like member, a hollow driving head mounted at one end of the said hollow member, and receiving an outer portion of the bar, means for securing said head to the bar and for rotating both clockwise and counter-clockwise and releasable means for connecting the head and the sleeve-like member, whereby rotation of the head in one direction causes the bar to press against the member in the collet and cause the same to grip a stud and to rotate it in unscrewing direction and rotation of the head in the opposite direction when the sleeve-like member is connected therewith causes the same gripping action and a driving or screwing up rotation of a stud.

2. In a device of the character described, a contractible collet provided with an internal screw thread at its outer portion and adapted when contracted to engage a stud, bolt or the like having a complementary screw thread on its exterior and to grip the same, a hollow member in which said collet is removably mounted for longitudinal movement, said collet and member having respective internal and external inclined surfaces adapted to slidably engage each other to contract and permit expansion of the former, a member mounted to move longitudinally in the interior of said collet and to bear against said stud, bolt or the like to cause it to move lengthwise and outwardly while said surfaces are in engagement, a bar having a screw thread on a portion of it and a sleeve-like member having an internal complementary engaging screw thread within which said bar is located, the last two parts being located within the hollow member and the said hollow member and sleeve-like member having respective internal and external complementary screw threads pitched reversely to the threads of the bar, and the internal threads of the sleeve-like member, a hollow driving head removably mounted at one end of the said hollow member, and receiving an outer portion of the bar, means for securing said head to the bar and for rotating both clockwise and counter-clockwise and releasable means for connecting the head and the sleeve-like member, whereby rotation of the head in one direction causes the bar to press against the member in the collet and causes the same to grip a stud and to rotate it in unscrewing direction and rotation of the head in the opposite direction when the sleeve-like member is connected therewith causes the same gripping action and a driving or screwing up rotation of a stud.

3. In a device of the character described, a contractible collet adapted when contracted to engage a stud, bolt or the like and to grip the same, a hollow member in which said collet is removably mounted for free longitudinal movement, said collet and member having inclined surfaces adapted to engage each other to contract and permit expansion of the former, a member mounted to move longitudinally and freely in the interior of said collet and to bear against said stud, bolt or the like to cause it to move lengthwise while said surfaces are in engagement, a bar having a screw thread on a portion of it and a sleeve-like member having an internal complementary engaging screw thread

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within which said bar is located, the last two parts being located within the hollow member and the said hollow member and sleeve-like member having respective internal and external complementary screw threads pitched reversely to the threads of the bar and the internal threads of the sleeve-like member, a hollow driving head mounted at one end of the said hollow member, and receiving an outer portion of the bar, means for securing said head to the bar and for rotating both clockwise and counter-clockwise and releasable means for connecting the head and the sleeve-like member, whereby rotation of the head in one direction causes the bar to press against the member in the collet and cause the same to grip a stud and to rotate it in unscrewing direction and rotation of the head in the opposite direction when the sleeve-like member is connected therewith causes the same gripping action and a driving or screwing up rotation of a stud.

4. In a device of the character described, a contractible collet adapted when contracted to engage a stud, bolt or the like and to grip the same, a hollow member in which said collet is removably mounted for free longitudinal movement, said collet and member having inclined surfaces adapted to engage each other to contract and permit expansion of the former, a member mounted to move longitudinally and freely in the interior of said collet and to bear against said stud, bolt or the like to cause it to move lengthwise while said surfaces are in engagement, a bar having a screw thread on a portion of it and a sleeve-like member having an internal complementary engaging screw thread within which said bar is located, the last two parts being located within the hollow member and the said hollow member and sleeve-like member having respective internal and external complementary screw threads pitched reversely to the threads of the bar and the internal threads of the sleeve-like member, a hollow driving head mounted at one end of the said hollow member, and receiving an outer portion of the bar, means for securing said head to the bar and for rotating both clockwise and counter-clockwise and releasable means for connecting the head and the sleeve-like member, whereby rotation of the head in one direction causes the bar to press against the member in the collet and cause the same to grip a stud and to rotate it in unscrewing direction and rotation of the head in the opposite direction when the sleeve-like member is connected therewith causes the same gripping action and a driving or screwing up rotation of a stud said means for connecting the head and sleeve-like member comprising alignable recesses in both parts and a slidable knob mounted on one part movable into and out of the recess of the other.

5. In a device of the character described, a contractible collet adapted when contracted to engage a stud, bolt or the like and to grip the same, a hollow member in which said collet is mounted for relative movement, said collet and member having portions adapted on such movement to engage each other to contract and permit expansion of the former, a member mounted to move in said collet and to bear against said stud, bolt or the like and to cause it to move while said portions are in engagement, a bar, a screw threaded portion on said bar and a sleeve-like member within which said bar is located, said bar and screw threaded portion being located within the hollow member, an internal screw thread in

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 said sleeve-like member complementary to the thread of the bar, respective internal and external complementary screw threads on the hollow member and sleeve-like member pitched reversely to the threads of the bar and the internal threads of the sleeve-like member, a driving head mounted on the said hollow member and receiving an outer portion of the said bar, means for rotating both clockwise and counter-clockwise, and releasable means for connecting and disconnecting the head and the sleeve-like member, whereby rotation of the head in one direction causes the bar to press against the member in the collet and cause the same to grip a stud and to rotate it in unscrewing direction and rotation of the head in the opposite direction when the sleeve-like member is connected therewith causes the same gripping action and a driving rotation of a stud.

6. A device as set forth in claim 5, in which said means for connecting the head and sleeve-like member comprise alignable recesses with which they are provided and a slidable member mounted on one and movable into and out of the recess of the other.

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 7. A device as set forth in claim 5 in which said sleeve-like member is in all positions out of actual contact with the collet.

8. A device as set forth in claim 5 in which the member mounted to move in the collet is unsecured thereto.

9. A device as set forth in claim 5 in which the said bar is mounted to bear directly against the said member in the collet.

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