May 30, 1961 R. E. ECKMAN ET AL 2,986,052

PREDETERMINED TORQUE RESPONSIVE HAND TOOL

Filed Oct. 27, 1958 3 Sheets-Sheet 1

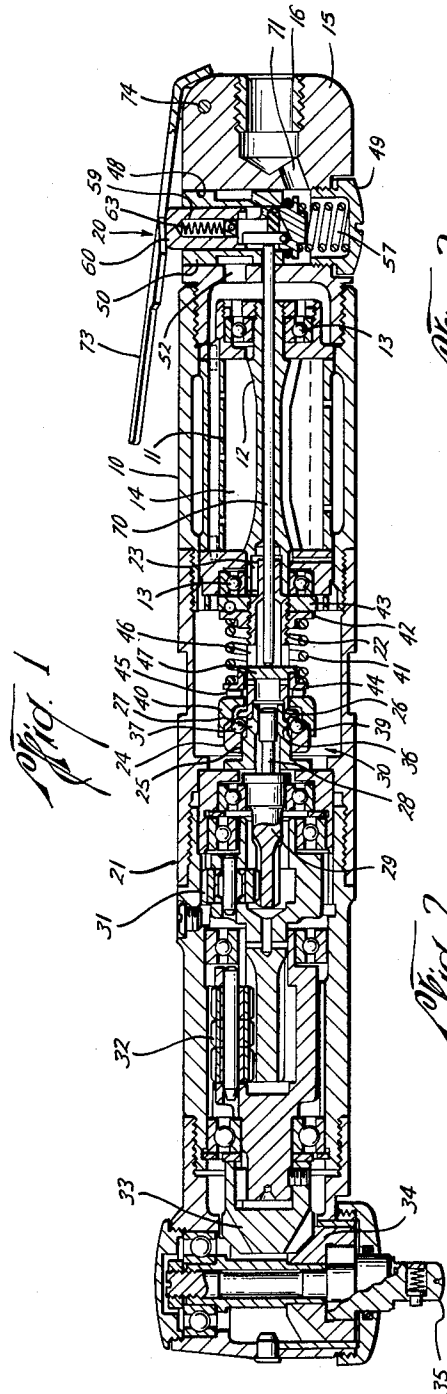

Fig. 1

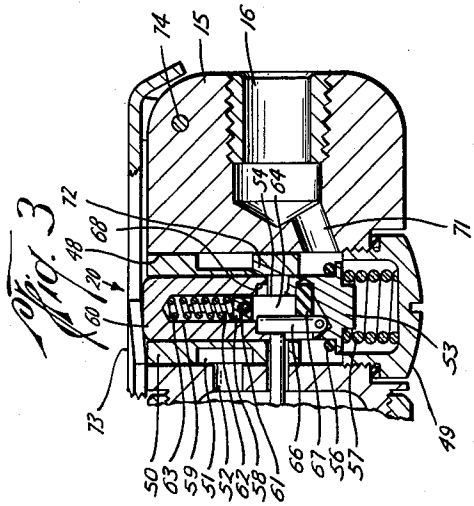

Fig. 3

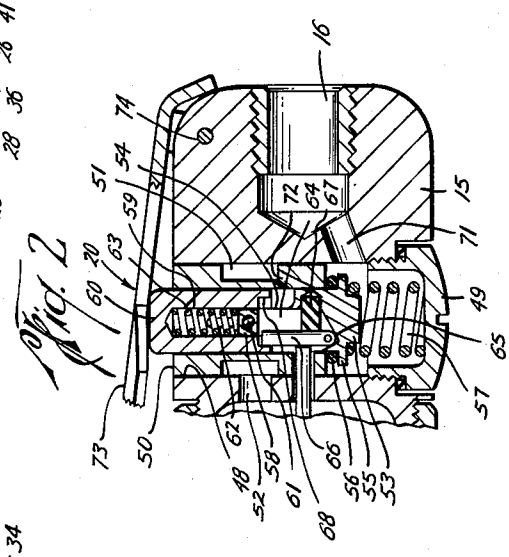

Fig. 2

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PREDETERMINED TORQUE RESPONSIVE HAND TOOL

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Fig. 4

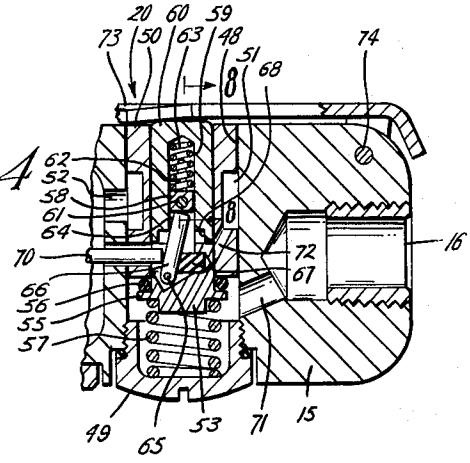


Fig. 5

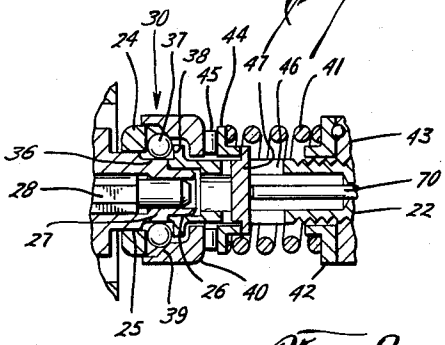


Fig. 6

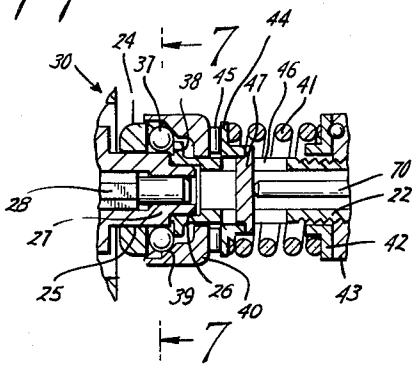


Fig. 8

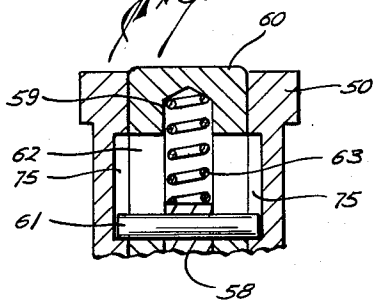
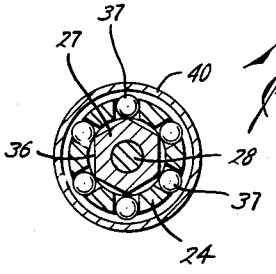


Fig. 7



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PREDETERMINED TORQUE RESPONSIVE HAND TOOL

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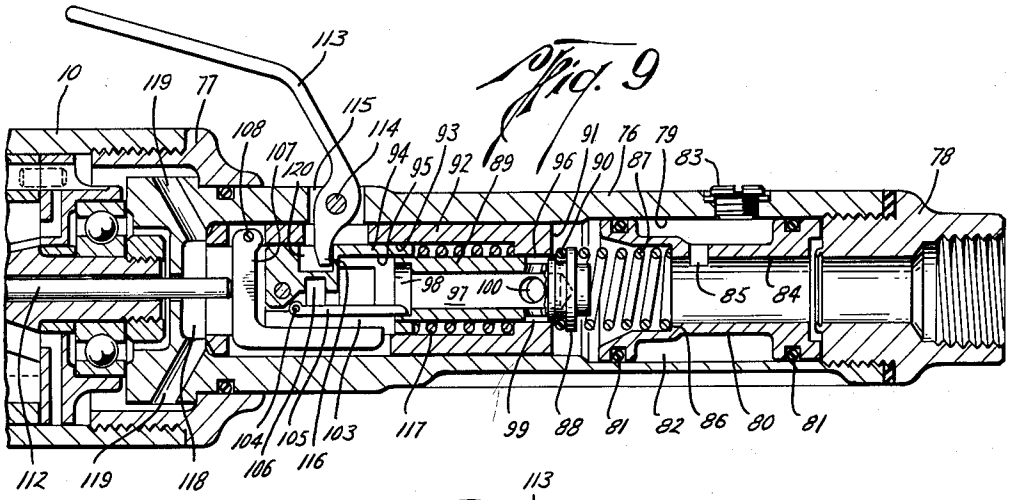

Fig. 9

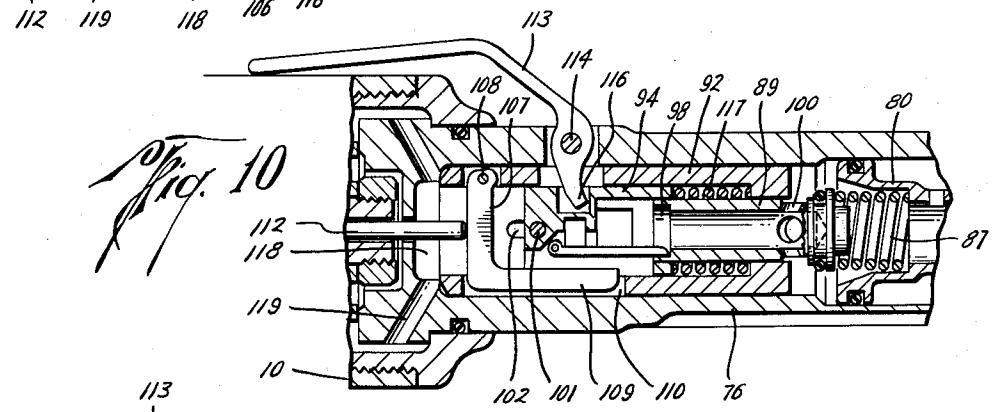

Fig. 10

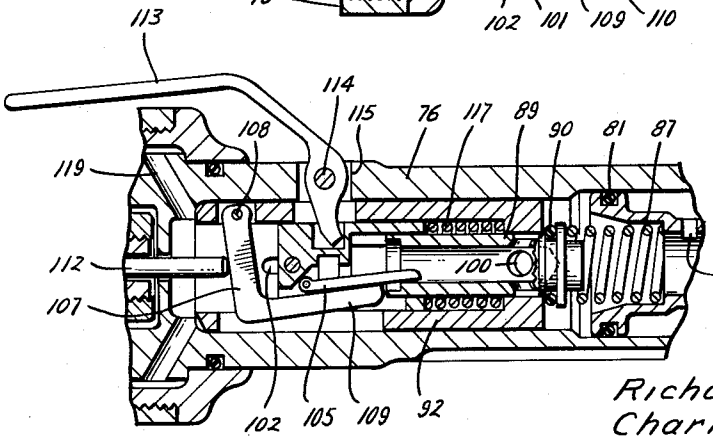

Fig. 11

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United States Patent Office 2,986,052 Patented May 30, 1961

2,986,052

PREDETERMINED TORQUE RESPONSIVE HAND TOOL

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Filed Oct. 27, 1958, Ser. No. 769,848

19 Claims. (Cl. 81—52.4)

This invention relates broadly to a pressure fluid actuated tool for running and setting threaded elements such as screws, nuts, bolts and the like, but more particularly to a torque controlling device for such a tool.

One object of this invention is to provide a pressure fluid actuated tool for running and setting threaded elements with simple and efficient means adapted to shut off the pressure fluid supply to the tool upon a predetermined torque output of the tool.

Another object of this invention is to provide such a tool with an improved throttle valve mechanism adapted to shut of automatically and prevent further operation of the tool when its torque output has reached a predetermined maximum.

Another object of this inevntion is to provide such a tool with simple and dependable means for adjusting, within a relatively large range, the maximum torque output of the tool. Other objects and advantages more or less ancillary to the foregoing reside in the specific construction and aggroupment of the elements peculiar to this structure, as will become apparent from a more complete examination of this specification.

In the drawings:

Fig. 1 is a side elevational view, in section, of a portable tool embodying the invention.

Fig. 2 is an enlarged view of the handle portion with the parts positioned as shown in Fig. 1.

Figs. 3 and 4 are views similar to Fig. 2, but with some of the parts shown in different positions.

Fig. 5 is an enlarged view of the clutch mechanism shown in Fig. 1.

Fig. 6 is a view similar to Fig. 5 with some of the parts shown in different positions, and

Fig. 7 is a cross sectional view taken on line 7—7 in Fig. 6 and looking in the direction of the arrows.

Fig. 8 is an enlarged sectional view taken on line 8—8 in Fig. 4.

Fig. 9 is a fragmental longitudinal view of a tool embodying a modification of the invention.

Figs. 10 and 11 are views corresponding to Fig. 9 but illustrating parts in different positions.

Referring to the drawings in which like symbols designate corresponding parts throughout the several views, **10** designates a pressure fluid actuated vane type motor well known in this art, which motor generally includes a stator **11** having a rotor **12** journalled within adequate bearings **13** and carrying the usual radially movable vanes **14**. Screw threaded within the right end of the motor **10** is a coaxial head **15** having a pressure fluid connection **16** and a throttle valve assembly **20**, which will be described in detail hereinafter.

To the left end of the motor **10** is screw threaded a coaxial clutch housing **21** adequately machined to accommodate a torque responsive clutch generally designated by **30**, which clutch is adapted to transmit rotation from the motor to the work piece such as a screw, nut or bolt intended to be set by the tool. This clutch includes a driving clutch member in the form of a sleeve **22** extending coaxially from the rotor **12** and rotationally locked thereto by a key **23**. This sleeve has its left end in Fig. 1 enlarged to form a head **24** which is internally machined to have a running fit over cylindrical bearing portions **25** and **26** of a cam member **27** which is closely fitted on the polygonal shank **28** of a driven spindle **29**. Thus the cam member is rotationally locked to the spindle **29** and since it rotates therewith, it can actually be construed as a part thereof. From the spindle **29**, rotation is transmitted through a system of planetary gears **31** and **32** and bevel gears **33** and **34** to a suitable work driving tip **35**, which is here shown at right angles to the center axis of the tool. Since the transmission mechanism from the driven spindle **29** to the driving tip **35** forms no part of this invention, no further description is thought necessary other than pointing out that the driving tip can be of any desired shape and made to fit the work intended to be driven.

Referring to the clutch **30**, the cam member **27** between its cylindrical portions **25** and **26** is provided with a polygonal cam section **36** having its sides engaged by detents or balls **37** mounted within equally spaced bores **38** extending radially through the head **24** of the sleeve **22**. The balls **37** are proportioned to protrude beyond the internal and external walls of the sleeve head **24**, and are urged inwardly against the cam section **36** by the inclined wall **39** of a ball retainer **40**, which retainer is urged axially against the balls **37** by a compression spring **41**. This spring has one end engaging a spring follower **42** which is axially adjustable on the sleeve **22** by a nut **43** screwed on the sleeve. The other end of the spring engages another follower **44** which transmits axial thrust to the retainer **40** through a needle bearing **45**, thereby enabling free rotation of the ball retainer irrespective of the axial thrust to which it is subjected. In the vicinity of the spring follower **44**, the sleeve **22** is provided with slot **46** extending diametrically therethrough and having mounted therein a cross piece **47** which is closely fitted on the spring follower **44** for axial movement therewith.

Referring to the throttle valve **20**, the head **15** is provided with a relatively large cross bore **48** closed at one end by a screw threaded plug **49**. In the other end portion of the bore **48** is press fitted a stationary bushing **50** which is provided, intermediate its ends, with an external annular groove **51** connected with the interior of the motor **10** through a passageway **52**. This bushing is formed with a bore of uniform diameter extending axially therethrough and has slidably mounted within the inner end portion thereof the cylindrical head **53** of a valve member **54**. The head **53** has an external annular flange **55** on one side of which is mounted a resilient O ring **56** engageable with the inner end of the bushing **50** to form a fluid tight seal therewith, and the other side having one end of a compression spring **57** seated thereon, while the other end rests against the bottom of the plug **49**. The valve member **54** is formed with a stem **58** slidably guided within a bore **59** of a valve guide or valve actuator **60**, which guide is slidably fitted within the outer end portion of the bushing **50** and is adapted to protrude beyond the contour of the head **15**. As shown in Fig. 8, a pin **61** extends through the stem **58** and through an axially extending slot **62** provided within the valve guide **60**, with its ends located within diametrically opposed axially extending grooves **75** formed within the bushing **50**, thus the stem **58** and guide **60** are rotationally locked to the stationary bushing **50** but are axially movable relative thereto. The guide is normally urged away from the stem by a compression spring **63** located within the bore **59**, outward movement of the guide relative to the stem being limited by the pin **61** engaging one end of the slot **62**. Intermediate its ends, the valve member **54** is provided with a slot **64** which extends diametrically through the major portion of the stem **58** and part way into the head

53. In this slot is pivotally mounted by a cross pin 65 a pawl or sear 66 which is urged counterclockwise by a resilient member 67. Movement of the sear in a counterclockwise direction is limited by engagement of its free end with the inner wall of a counterbore 68 provided within the inner end of the valve guide 60. As shown, the sear 66 is offset with respect to the center axis of the valve member 54, and normally engages the bottom of the counterbore 68 of the guide 60, but it is small enough to fit within the stem 58 and under certain conditions of operation to move therewith into the bore 59. The sear 66 may be pivoted clockwise against the resilient member 67 by a trip rod 70 extending through the rotor 12 and having one end engaging the cross piece 47 and the other end the sear 66. With the clutch 30 in operative engagement and the sear cocked as shown in Fig. 1, the trip rod 70 just floats between the cross piece 47 and sear 66 without exerting end pressure thereon.

From the connection 16, motive fluid is admitted into the bore 48 through a port 71, and when the valve member is opened, motive fluid is free to flow through the slot 64 into the groove 51 via a port 72. The valve guide 60 may be moved inwardly by the operator depressing a lever 72 which is pivotally connected to the back head 15 by a pivot pin 74.

When pressure fluid from the connection 16 is admitted into the bore 48 through the port 71, the motor 10 may be actuated by the operator depressing the lever 73 to cause inward movement of the valve guide 60. In this instance the sear 66 is in the cocked position shown in Fig. 2, that is perpendicular to the end of the valve guide and is normally maintained in that position by the resilient member 67 which causes the free end of the sear to bear against the side wall of the counterbore 68. Thus the inward movement of the valve guide 60 is transmitted to the valve member 54 by the sear 66, thereby causing the O ring to move away from the end of the bushing 50 to enable free flow of pressure fluid into the groove 51 via the valve slot 64 and the port 72. In the slot 64 pressure fluid acts on the right end of the trip rod 70 which is slightly spaced from the sear 66 and tends to urge the trip rod against the cross piece 47. From the groove 51, pressure fluid is supplied to the motor through the port 52 to actuate the motor in the usual way. From the motor rotation is transmitted to the sleeve 22, and therefrom to the spindle 29 by the detents 37 engaging the sides of the polygonal cam 36.

When free running of the work, such as a screw, is completed, seating resistance gradually increases until the work is prevented from rotating, thereby causing the spindle 29 to remain stationary even though the motor 10 is still operating. In this instance rotation of the sleeve 22 will cause the detents 37 to pass over the points of the polygonal cam 36 as clearly shown in Fig. 7, thereby imparting radial outward motion to the balls and the consequential axial movement of the ball retainer 40, needle bearing 45 and spring follower 44 against the spring 41. This axial movement causes the cross piece 47, carried by the follower 44, to drive the trip rod 70 toward the sear 66, to swing the free end of the sear away from the bottom of the counterbore 68 and with the valve stem 58 to enter the bore 59 of the valve guide. As the sear is thus moved to the uncocked position by compressing the resilient member 67, the valve member 54 is automatically closed by the spring 57 acting on the flange 55 to move the O ring in fluid tight engagement with the inner end of the bushing 50, thereby preventing further supply of pressure to the motor. It will be noticed that this automatic shutting off of the motor is effected even though the operator is still depressing the lever 73 which normally maintains the valve open. In other words, shut off of the pressure fluid to the motor is responsive to a predetermined torque resistance of the spindle 29. Once the tool has reached the torque output for which it has been set, it shuts off automatically and independently of the operator.

As the tool is removed from the work, the spring 41 will once more act on the follower 40 to maintain the balls 37 against the sides of the cam 36, thereby causing the cross piece 47 to release its axial thrust on the trip rod 70. As the operator releases the lever 73, the valve guide 60 is moved outwardly by the spring 63, thereby enabling the sear 66 to again be cocked by the resilient member 67 for end engagement with the bottom of the counterbore 68.

In the modified construction shown in Figs. 9 to 11, the head 15 has been replaced by a tubular housing 76 which forms a handle adapted to be held by the operator. This housing has its left or inner end fixed to the motor 10 by a gland nut 77, while its outer end is internally threaded to receive a pressure fluid connection 78. Within the bore 79 of the housing 76 is mounted a spool like sleeve 80 having its right end abutting against the fluid connection 78 and provided with longitudinally spaced O ring packings 81. This sleeve and the inner wall of the bore 79 define a lubricant reservoir 82, adapted to be filled by a removable plug 83, and capable of supplying lubricant to the axial bore 84 of the sleeve through a lubricating element 85. The left end of the sleeve bore 84 is enlarged to form a seat 86 against which rests one end of a compression spring 87 which has its other end engaging one side of a flange 88 provided near the right end of a sleeve valve 89, while the other side of the flange 88 has mounted thereon a resilient O ring 90 capable of fluid tight engagement with the adjacent end 91 of a valve bushing 92. This valve bushing is fixed within the left end of the housing bore 79 and is provided with an axial bore 93 extending therethrough and within which is slidably mounted a valve guide or actuator 94. The left end of the valve 89 is slidably guided within a bore 95 which opens through the right end of the valve guide 94, while the right end portion of the valve is slidably guided within a reduced portion 96 of the bushing bore 93. The sleeve valve 89 is provided with a central passage 97 having its left end enlarged to form a counterbore 98 while its right end communicates with an external annular groove 99, provided on the valve adjacent the O ring 89, through radial ports 100.

The valve guide 94 is rotationally locked but axially movable relative to the valve bushing 92 by a cross pin 101 having its ends extending into diametrically opposed longitudinally extending slots 102 formed within the bushing 92. Also provided within the valve guide 94 is a slot 103 extending the full length thereof and opening into the bore 95. In this slot is pivotally mounted by a cross pin 104 a pawl or sear 105 which is urged clockwise by a resilient member 106. Movement of this sear in a clockwise direction is limited by engagement of its free end with the inner wall of the counterbore 98 provided within the left end of the sleeve valve 89. As shown, the sear 105 is offset with respect to the center axis of the valve 89 and normally its free end is slightly spaced from the bottom of the counterbore 98, but it can be located within the bore 97 of the valve, as shown in Fig. 11. An L shaped lever has one arm 107 extending transversally through the bushing 92 where its free end is pivotally connected by a pivot pin 108. The other arm 109 is located within a bushing slot 110 and normally extends part way into the slot 103 accommodating the sear 105. A trip rod 112 is engageable with the lever arm 107. This trip rod corresponds and functions in the same manner as the trip rod 70 shown in Figs. 1 to 4. The guide valve 94 is axially movable to the right by a lever 113 pivotally connected by a pin 114 within a slot 115 provided through the housing 76, with one end 116 of the lever fitted within a recess 120 formed within the guide valve 94. A compression spring 117 located between the right end of the guide valve and the bottom of the bore 93 urges the guide valve toward the left, its movement in that direction being limited by the cross pin 101 engaging one end of the slot 102.

When pressure fluid from the connection 78 is admitted

into the bore 84 of the spool 80, it cooperates with the spring 87 to normally maintain the valve 89 closed, by effecting the fluid tight engagement of the valve O ring 90 with the end 91 of the bushing 92. In this instance the sear 105 is in the cocked position shown in Fig. 9, with its free end spaced slightly from the bottom end of the counterbore 98. As the operator depresses the lever 113, the valve guide 94 shifts to the right, thus causing the free end of the sear 105 to engage the bottom of the counterbore 98 to shift the valve 89 to the open position shown in Fig. 10, thereby enabling pressure fluid to flow via the valve annular groove 99 and ports 100 into the valve bore 97. From this bore pressure fluid is free to flow through the valve guide bore 95, slot 103, past the lever arm 107 into the end 118 of the housing bore 79, and therefrom to the motor 10 through ports 119, which ports correspond to the port 52 shown in Figs. 1 to 4.

When the trip rod 112 is moved to the right by virtue of a predetermined resistance to rotation of the work as herein above explained in connection with the trip rod 70, it exerts an axial force on the arm 107 of the L-shaped lever and causes the lever to pivot counterclockwise. During this pivotal movement the lever arm 109 moves against the sear 105 to shift it to the uncocked position shown in Fig. 11 by compressing the resilient member 106. As the sear is thus moved to the uncocked position, the sleeve valve 89 is automatically closed by the spring 87, thereby preventing further supply of pressure fluid to the motor. It will be noticed that in this modified construction, the automatic shutting off of the motor is also effected even though the operator is still depressing the lever 113 which normally maintains the valve open.

As the tool is removed from the work, the axial thrust which actuated the trip rod 112 is released in the manner herein above explained in connection with the trip rod 70. As the operator releases the lever 113, the valve guide 94 is moved to the left by the spring 117, thereby enabling the sear 105 to again be cocked by the resilient member 106 for engagement with the wall of the counterbore 98.

From the foregoing description it will be understood that the tool is equipped with a simple and efficient device adapted to automatically shut off the pressure fluid supply to the motor when the tool has reached a predetermined torque output, which output is adjustable by varying the compression of the spring 41 through the nut 43.

Although the foregoing description is necessarily of a detailed character in order to completely set forth the invention, it is to be understood that the specific terminology is not intended to be restrictive or confining, and it is to be further understood that various rearrangement of parts and modifications of structural detail may be resorted to without departing from the scope or spirit of the invention as claimed.

We claim:

1. In a device of the character described, a pressure fluid conveying passageway, a valve controlling said passageway, a spring urging and normally maintaining said valve closed relative to said passageway, a guide for said valve movable relative thereto in valve open or close positions, a connecting means between said guide and valve to open said valve upon movement of said guide to said valve open position, said connecting means being capable of release to enable said valve to close by virtue of said spring even though said guide is in said valve open position.

2. In a device of the character described, a pressure fluid conveying passageway, a valve controlling said passageway, a spring urging and normally maintaining said valve closed relative to said passageway, a guide for said valve movable relative thereto in valve open or close positions, a connecting means between said guide and valve to open said valve upon movement of said guide to said valve open position, said connecting means being capable of release to enable said valve to close by virtue of said spring even though said guide is in said valve open position, and means automatically effecting said connecting means after said release upon movement of said guide to said valve close position.

3. In a device of the character described, a housing, a pressure fluid conveying passageway through said housing, a throttle valve assembly within said housing including a valve member controlling said passageway, a spring urging and normally maintaining said valve member closed relative to said passageway, a guide for said valve member movable relative thereto in valve open or close positions, a sear linkage between said guide and valve member to open the latter upon movement of said guide to said valve open position, said linkage being capable of release to enable said valve member to close by virtue of said spring even though said guide is in said valve open position.

4. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid actuated rotary motor, means providing a passageway conveying motive fluid to the motor to actuate the same, a valve controlling said passageway, a spring urging and normally maintaining said valve closed relative to said passageway, a guide for said valve movable relative thereto in valve open or close positions, a connecting means between said guide and valve to open the valve upon movement of said guide to said valve open position, said connecting means being capable of release to enable said valve to close by virtue of said spring even though said guide is in said valve open position, a spindle adapted to be rotated by said motor, clutch means between said motor and spindle automatically releasable upon a predetermined resistance to rotation of said spindle, and means responsive to the release of said clutch means automatically effecting the release of said connecting means.

5. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid actuated rotary motor, means providing a passageway conveying motive fluid to the motor to actuate the same, a valve controlling said passageway, a spring urging and normally maintaining said valve closed relative to said passageway, a guide for said valve movable relative thereto in valve open or close positions, a connecting means between said guide and valve to open the valve upon movement of said guide to said valve open position, said connecting means being capable of release to enable said valve to close by virtue of said spring even though said guide is in said valve open position, a spindle adapted to be rotated by said motor, clutch means between said motor and spindle including a duality of clutch members one axially movable relative to the other upon a predetermined resistance to rotation of said spindle, and means responsive to the axial movement of said one clutch member automatically effecting the release of said connecting means.

6. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid actuated rotary motor, means providing a passageway conveying motive fluid to the motor to actuate the same, a throttle valve assembly within said motor including a valve member controlling said passageway, a spring urging and normally maintaining said valve member closed relative to said passageway, a guide for said valve member movable relative thereto to a first and a second position, a sear linkage between said guide and valve member to open the latter relative to said passageway upon movement of said guide to said first position, said linkage being capable of release to enable said valve member to close by virtue of said spring even though said guide is in said first position, a spindle adapted to be rotated by said motor, clutch means between said motor and spindle including a duality of clutch members one movable axially relative to the other upon a predetermined resistance to rotation of said spindle, and a trip rod responsive to the axial movement of said one clutch member to effect the release of said linkage.

7. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid

actuated rotary motor, means providing a passageway conveying motive fluid to the motor to actuate same, a throttle valve assembly within said motor including a valve member controlling said passageway, a spring urging and normally maintaining said valve member closed relative to said passageway, a guide for said valve member movable relative thereto to a first and a second position, a sear linkage between said guide and valve member to open the latter relative to said passageway upon movement of said guide to said first position, said linkage being capable of release to enable said valve member to close by virtue of said spring even though said guide is in said first position, a spindle adapted to be rotated by said motor, clutch means between said motor and spindle including a pair of coaxially disposed members one surrounding the other, rotation transmitting means between said members including a polygonal cam on one of said members and a plurality of detents on the other member, a single spring biased element exerting a radial force on said detents in one direction to maintain them in engagement with the sides of said cam and normally prevent relative rotation between said members, said cam upon a predetermined resistance to rotation of one of said members adapted to drive said detents in a direction opposite to that of said force to effect deflection of said element and enable relative rotation between said members, and a trip rod responsive to the deflection of said element to effect the release of said linkage.

8. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid motor, a spindle, rotation transmitting clutch means between said motor and spindle automatically releasable upon a predetermined resistance to rotation of said spindle, valve means controlling the supply of motive fluid to said motor, and axially movable trip means automatically closing said valve means to interrupt said supply upon release of said clutch means.

9. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid motor, a spindle, rotation transmitting clutch means between said motor and spindle automatically releasable upon a predetermined resistance to rotation of said spindle, a valve controlling the supply of motive fluid to said motor, a valve opening member, a releasable connection between said member and valve normally transmitting the opening movement of the member to the valve, means responsive to the release of said clutch means to release said connection, and spring means closing said valve upon the release of said connection.

10. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid motor, a spindle, rotation transmitting clutch means between said motor and spindle automatically releasable upon a predetermined resistance to rotation of said spindle, a valve controlling the supply of motive fluid to said motor, a valve opening member, a releasable sear linkage between said member and valve normally transmitting the opening movement of the member to the valve, a trip rod actuated axially by virtue of the release of said clutch means to release said sear sear linkage, and a spring closing said valve upon the release of said linkage.

11. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid motor, a spindle, rotation transmitting clutch means between said motor and spindle automatically releasable upon a predetermined resistance to rotation of said spindle, a valve controlling the supply of motive fluid to said motor, a valve actuator movable to a valve open position, a connection between said actuator and valve to open said valve upon movement of said actuator to said valve open position, means responsive to the release of said clutch means to release said connection even though said actuator is in said valve open position, and means closing said valve upon the release of said connection.

12. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid motor, a spindle, rotation transmitting clutch means between said motor and spindle automatically releasable upon a predetermined resistance to rotation of said spindle, means forming a passageway conveying motive fluid to said motor, a valve movable to open or close positions relative to said passageway, a valve actuator movable to valve open position, a sear between said valve and actuator adapted to be cocked to open said valve upon movement of said actuator to said valve open position, means normally effecting the cocking of said sear, means responsive to the release of said clutch means to release said sear, even though said actuator is in said valve open position, and means closing said valve relative to said passageway upon the release of said sear.

13. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid motor, a spindle, rotation transmitting clutch means between said motor and spindle automatically releasable upon a predetermined resistance to rotation of said spindle, means forming a passageway conveying motive fluid to said motor, a valve movable to open or close said passageway, an actuator movable to valve open position, a sear pivotally connected to said actuator adapted to be cocked to open said valve upon movement of said actuator to said valve open position, means normally effecting the cocking of said sear, means actuated by virtue of the release of said clutch means to release said sear, and means closing said valve upon the release of said sear.

14. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid motor, a spindle, rotation transmitting clutch means between said motor and spindle automatically releasable upon a predetermined resistance to rotation of said spindle, means forming a passageway conveying motive fluid to said motor, a valve movable to open or close said passageway, an actuator movable to valve open position, a pawl pivotally connected to said actuator movable to a first position to open said valve upon movement of said actuator to said valve open position, means urging and maintaining said pawl to said first position, means actuated by virtue of the release of said clutch means to move said pawl to a second position even though said actuator is in said valve open position, and means automatically closing said valve when said pawl is in said second position.

15. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid motor, a spindle, rotation transmitting clutch means between said motor and spindle automatically releasable upon a predetermined resistance to rotation of said spindle, means forming a passageway conveying motive fluid to said motor, a valve movable to open or close said passageway, an actuator movable to valve open position, a pawl pivotally connected to said actuator movable in a direction to a first position to open said valve upon movement of said actuator to said valve open position, means effecting movement of said pawl in said one direction, means on said valve preventing movement of said pawl in said one direction beyond said one position, means actuated by virtue of the release of said clutch means to move said pawl in another direction to a second position even though said actuator is in said valve open position, and means automatically closing said valve when said pawl has reached said second position.

16. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid motor, a spindle, rotation transmitting clutch means between said motor and spindle automatically releasable upon a predetermined resistance to rotation of said spindle, means forming a passageway conveying motive fluid to said motor, a valve axially movable to open or close said passageway, an actuator coaxial with said valve axially movable to a valve open position, a member

axially fixed but pivotally movable relative to said actuator adapted to pivotally move to a first position to open said valve upon movement of said actuator to said valve open position, resilient means effecting pivotal movement of said member to said first position, means preventing said pivotal movement beyond said first position, means responsive to the release of said clutch means to pivotally move said member to a second position, and means automatically closing said valve as said member reaches said second position.

17. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid motor, a spindle, rotation transmitting clutch means between said motor and spindle automatically releasable upon a predetermined resistance to rotation of said spindle, means forming a passageway conveying motive fluid to said motor, a valve axially movable to open or close said passageway, an actuator axially movable to a valve open position, a member offset relative to the center axis of said actuator axially fixed and pivotally movable relative to said actuator adapted to pivotally move to a first position to open said valve upon movement of said actuator to said valve open position, resilient means effecting pivotal movement of said member to said first position, means preventing said pivotal movement beyond said first position, means responsive to the release of said clutch means to pivotally move said member to a second position, means within said valve affording space for said member in said second position, and means automatically closing said valve as said member reaches said second position.

18. In a pressure fluid actuated tool for running and setting a threaded element, the combination of a fluid motor, a spindle, rotation transmitting clutch means between said motor and spindle automatically releasable upon a predetermined resistance to rotation of said spindle, means forming a passageway conveying motive fluid to said motor, a cylindrical valve movable to open or close said passageway, a manually operated actuator axially movable to a valve open position, a pawl pivotally carried by said actuator movable to a first position for perpendicular engagement with one end portion of said valve to open same upon movement of said actuator to said valve open position, resilient means normally maintaining said pawl in said first position, means responsive to the release of said clutch means to pivotally move said pawl to a second position inclined relative to said one end portion of said valve, means within said valve affording space for said pawl in said second position, and spring means on the other end portion of said valve closing the valve as said pawl reaches said second position.

19. In a rotary tool for running and setting a threaded element, the combination of a motor, a spindle, rotation transmitting clutch means between the said motor and spindle automatically releasable upon a predetermined resistance to rotation of the said spindle, means controlling a supply of motive power to said motor, trip means adjacent to said clutch means, and movable upon release of said clutch means, and means effective in response to said trip means movement to automatically discontinue said supply of motive power.

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